A historical look at scientific uncertainty in the Gulf of Mexico fishery stock assessment process: Are we underestimating scientific uncertainty?

Introduction:

- There have been large discrepancies between projected quotas and landings for several stocks in the Gulf of Mexico including cobia, greater amberjack, and both red and gag grouper.
- The magnitude of those discrepancies suggests the quota setting process is underestimating scientific or management uncertainties; formalized as the buffer between OFL and ABC, or ACL and ACT respectively.
- The buffer for scientific uncertainty is determined according to a formal ABC control rule. For data rich stocks the ABC is determined by applying an acceptable probably of overfishing (determined from a set of agreed upon criteria) to the PDF of the OFL (generated from the assessment).
- Three factors can lead to underestimation of scientific uncertainty in the ABC control rule:
    - 1) underestimation of uncertainty in the stock assessment;
    - 2) the range of acceptable probabilities of overfishing explored in Tier 1 of the ABC control rule; and
    - 3) the weighting of factors used to estimate the target probability (P*) of overfishing.
- The SSC has recommended that Tier 1 of the ABC control rule be revisited as it creates PDFs that are too narrow
- Punt et al 2018[1] suggest using a "historical retrospective" approach to estimating uncertainty which captures more uncertainty than alternative approaches (conventional retrospective and sensitivity analysis).
- This paper explores whether there is a mismatch between the magnitude of the buffers estimated from the existing ABC control rule and basic historical comparisons of projected OFLs and ABCs over time.

Methods:

- Historical stock assessment and quota information was collated for all of the assessed stock in the Gulf of Mexico and plotted over time (see appendix).
- A qualitative comparison of estimated OFL/ABCs and realized landings was performed to identify any trends across species

[1] Punt, A.E., Day, J., Fay, G., Haddon, M., Klaer, N., Little, L.R., Privitera-Johnson, K., Smith, A.D., Smith, D.C., Sporcic, M. and Thomson, R., 2018. Retrospective investigation of assessment uncertainty for fish stocks off southeast Australia. *Fisheries Research*, *198*, pp.117-128.

- A quantitative comparison of the differences between projected OFLs in overlapping years for stocks with multiple assessments was also performed as a measure of between assessment uncertainty
    - Limited to a 5 year projection window
    - Percent difference between OFLs among assessments is estimated as:
        - % difference = ABS(A1y1-A2y1)/ A2y1; where A1y1 is the estimated OFL from first assessment in year 1 and A2y1 is the second (updated) assessment for the same year.

Results:

- There are instances of accepted OFL/ABC annual yields that appear to be strongly inflated as compared to realized landings before and during those years, including:
    - Cobia (2014-2017) – ABC/OFL nearly 2x landings. ABC and OFL are for the entire Cobia stock, which includes the portion occurring the South Atlantic Council jurisdiction (This could account for the discrepancy).
    - Gulf Group Spanish Mackerel (fishing years 13/14-16/17) – ABC/OFL 2-3x landings
    - Red Grouper (2015-2017) – ABC/OFL nearly 3x landings
    - Gag Grouper (2015-2017) – ABC/OFL 3-5x landings
    - Gray Triggerfish (2017-2019) – partially due to rebuilding
    - See appendix for details
- The strongest differences between realized landings and Council approved ABC/OFL values have occurred recently (2015-current).
- A historical comparison of OFL projections over time reveals differences as large as 200% for gray triggerfish for overlapping years. A range of 20-50% differences between projected OFLs in overlapping years was common (Figure 1).

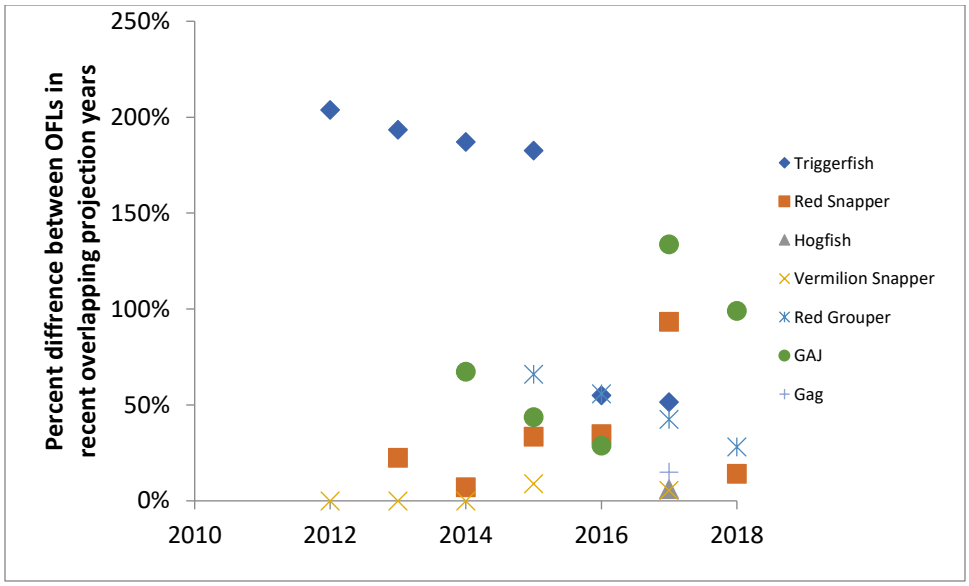


Figure 1. Percent difference between overlapping projection years for those stocks with multiple assessments. Percent difference uses the most recent assessment as the denominator to estimate percentages.

Conclusions:

- The strong differences between realized landings and Council approved ABC/OFL values have occurred recently (2015-current). What are the possible reasons for this discrepancy?
    - The recent popularity of Stock Synthesis as a stock assessment modeling platform driving projection yields?
    - A shift in Gulf SSC/Council advice or management in regards to uncertainty?
    - ABC control rule / P* adjustments?
    - Recreational landings / APAIS adjustments?
- A historical comparison of OFL projections reveals differences as large as 200% for gray triggerfish and a range of 30-50% difference was not uncommon.
- Currently the P* approach in Tier 1 of the ABC control rule generally produces buffers that are much narrower (3-5%)
- Any revisions to the ABC control rule should incorporate and reflect the magnitude of the buffers.
- Given the discrepancies in the current range of buffers generated from the ABC control rule and the uncertainties identified here, a “historical retrospective” approach to estimating uncertainty is recommended to generate more representative buffers.

Appendix 1: Key definitions

ABC - **Acceptable Biological Catch** is a catch level recommended by the SSC and set at or below OFL to account for scientific uncertainty in the estimate of OFL, any other scientific uncertainty, and Council's risk policy. The ABC is dependent not only on the P* value (**Risk Level Probability**), but also on the shape of the PDF (**Probability Distribution Function**) curve. The shape of the PDF curve can change depending on which variables are selected to vary in MCMC simulations. An estimate of standard deviation is required to construct a PDF. An external value of **0.37** can be used for all stocks. Using an external value allows a PDF to be constructed even if there is no stock assessment with an estimate of MSY or its proxy. This value came from the Pacific Council, which calculated an average standard deviation for all of its stock assessments. This is a time-consuming effort that may be difficult to replicate for Gulf stocks. The SSC suggested that, given the large number of stocks from which the Pacific std dev = 0.37 value was determined; it is likely that this is a universal value that can be applied to all stocks. However, this theory has not been evaluated.

MSY - **Maximum Sustainable Yield** is the largest amount of fish that can be harvested on a continuing basis. The true value for MSY is often not known, so a proxy is usually used, such as the yield when fishing at $F_{30\%\ SPR}$.

MFMT - **Maximum Fishing Mortality Threshold** is the highest fishing mortality rate allowed. It is usually set to the rate corresponding to harvesting the maximum sustainable yield (FMSY) of proxy. Fishing at a rate higher than MFMT constitutes overfishing and can lead to stock declining.

OFL - **Overfishing Threshold** is the yield from fishing at MFMT. Exceeding OFL in any year is an alternate way to determine if overfishing is occurring.

Over-estimation[2] can arise if assessments change in structure due to advances in our understanding of stock assessment, changes in best practices for conducting stock assessments, and changes in data availability for stocks that initially had few data and later have more data. **Under-estimation** can arise most importantly from the very reason that assessments are not "independent" from one another. For example, the bulk of the data used in a previous assessment will be used in the most recent assessment. Similarly, because the same analysts run the same assessments, they tend to only make changes to key assumptions (e.g. fleet structure, value for natural mortality) when "needed". Changes to assessment software may not be expected to result in very different estimates because in most cases the underlying

[2]Punt, A.E., J. Day, G. Fay, M. Haddon, N. Klaer, L.R. Little, K. Privitera-Johnson, A.D.M. Smith, D.C. Smith, M. Sporcic, R. Thomson, G.N. Tuck, J. Upston, and S. Wayte. 2018. Retrospective investigation of assessment uncertainty for fish stocks off southeast Australia. Fisheries Research 198, 117-128.

population dynamics equations are very similar between assessment software. Peer review processes also tend to "stabilize" assessments by encouraging continuity of assessments.

P* - A **probability of overfishing**, which is applied to a probability distribution function (PDF) of the OFL. Although P* is intended to be representative of the probability that ABC will be higher than the true OFL, it cannot realistically incorporate all sources of uncertainty, and therefore does not represent a true probability.

Q* - A **qualitative measure of the relative risk**. It's applied to either the OFL or the formula used to determine OFL. For example, in the formula,

ABC = yield at 0.75 * FMSY Q* = 0.75

Q* does not represent a quantitative measure of the probability of overfishing.

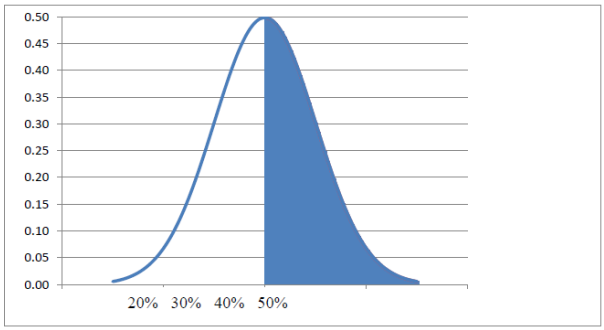
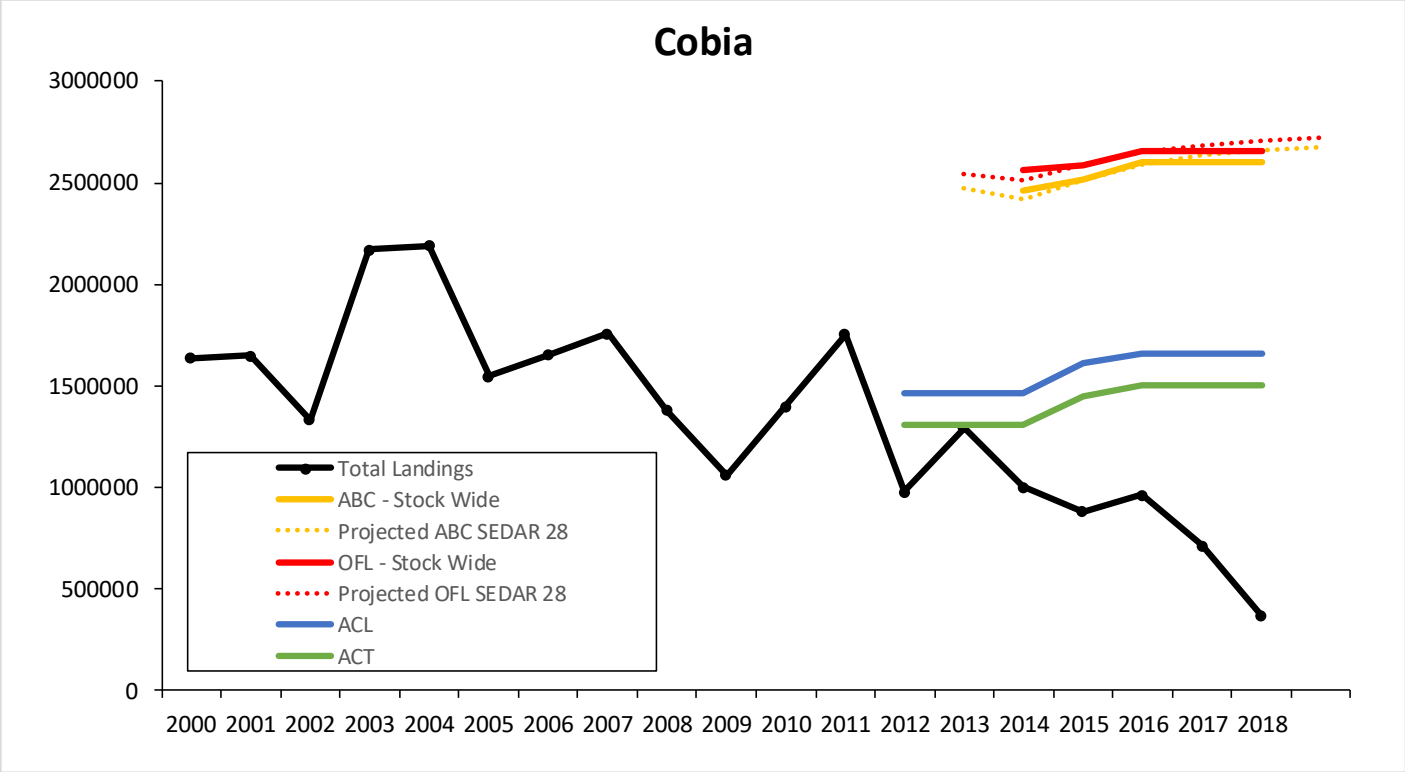


Figure 2. Hypothetical PDF. X-axis is the P*. Y-axis would be the ABC. OFL is 50%.

Appendix 2: Figures - Gulf of Mexico Historical Stock Landings, Annual Catch Limits (ACLs), Acceptable Biological Catch (ABC), and Overfishing Limits (OFL)

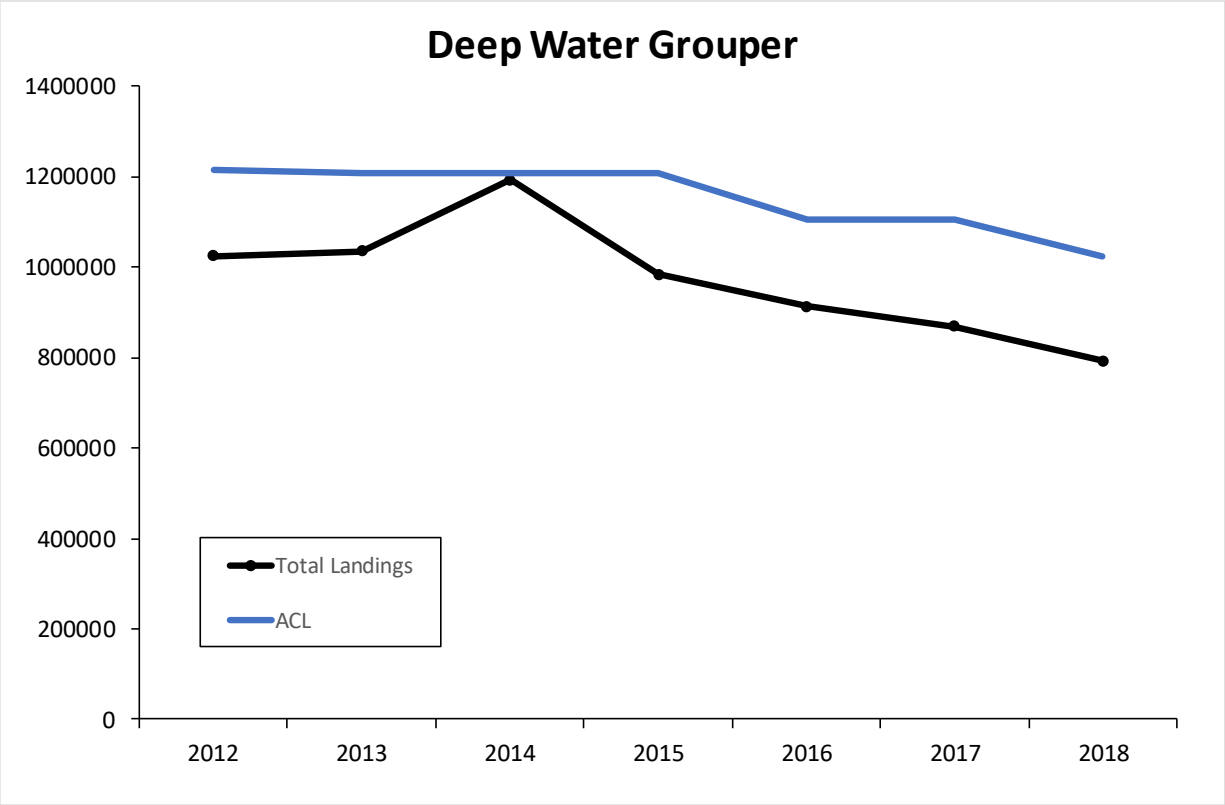
Recreational and commercial landings reflected in these figures are from MRFSS, MRIP, and headboat surveys (Recreational) and commercial dealer trip tickets reported to the Southeast Fisheries Science Center Accumulated Landings System (ALS) database. Commercial landings are from ACL_FILES_100517. **Landings for 2018 are preliminary**. ABC, OFL, projection yields, and historic landings were commonly found in Gulf Council reports, Gulf SSC Meeting Reports, Draft Framework Amendments, Framework Action reports, Final Amendment reports, and SEDAR Assessment workshop reports. Tables summarizing the data can be found in Appendix 3.



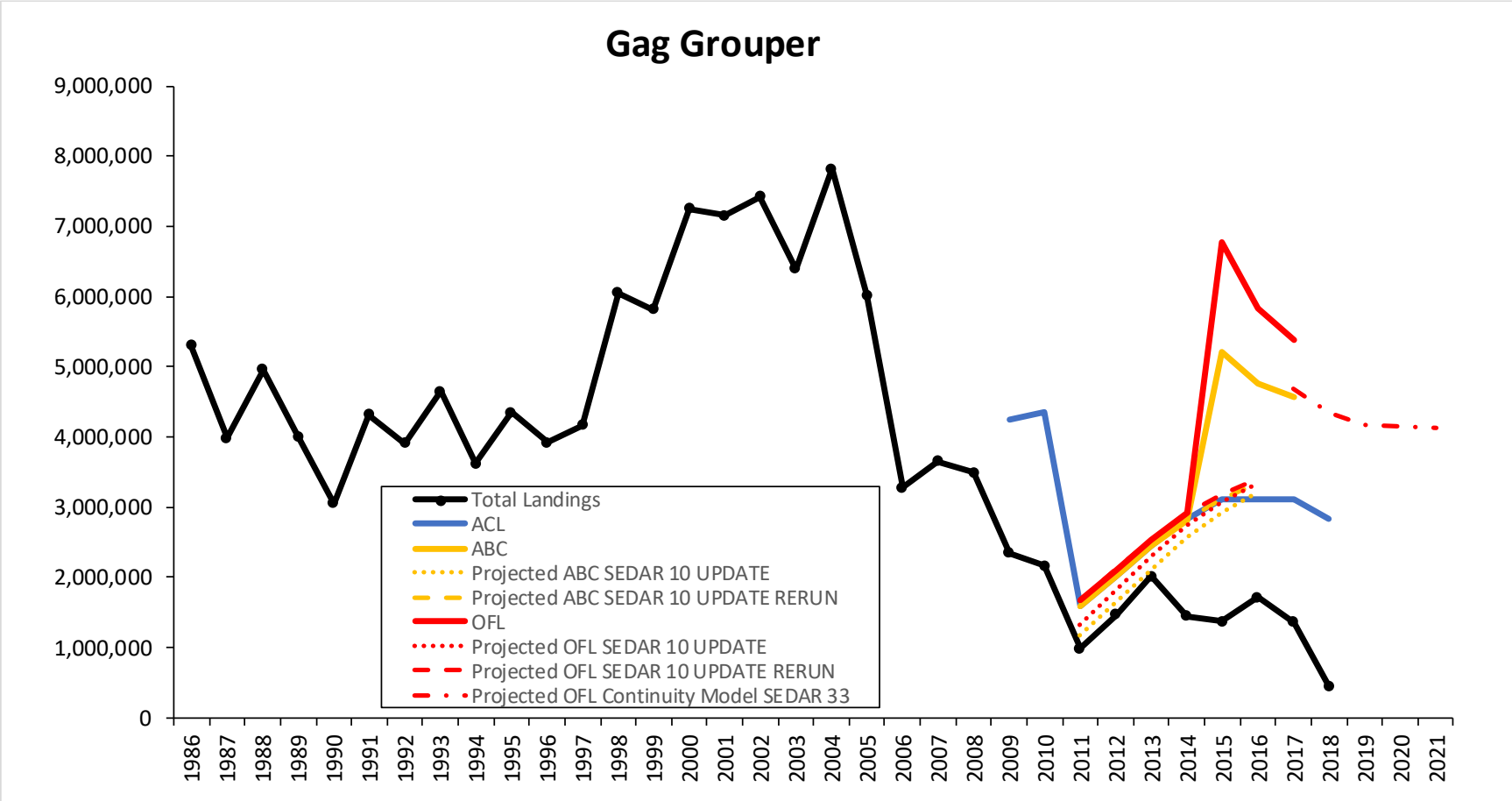
* ACL and ACT values are only for the portion of the Gulf cobia stock which occurs in the Gulf Council's jurisdiction

** OFL and ABC values are for the **entire** Gulf cobia stock, including the portion which occurs in the South Atlantic Council's jurisdiction. Steepness fixed at 0.8

Deep Water Grouper



Gag Grouper



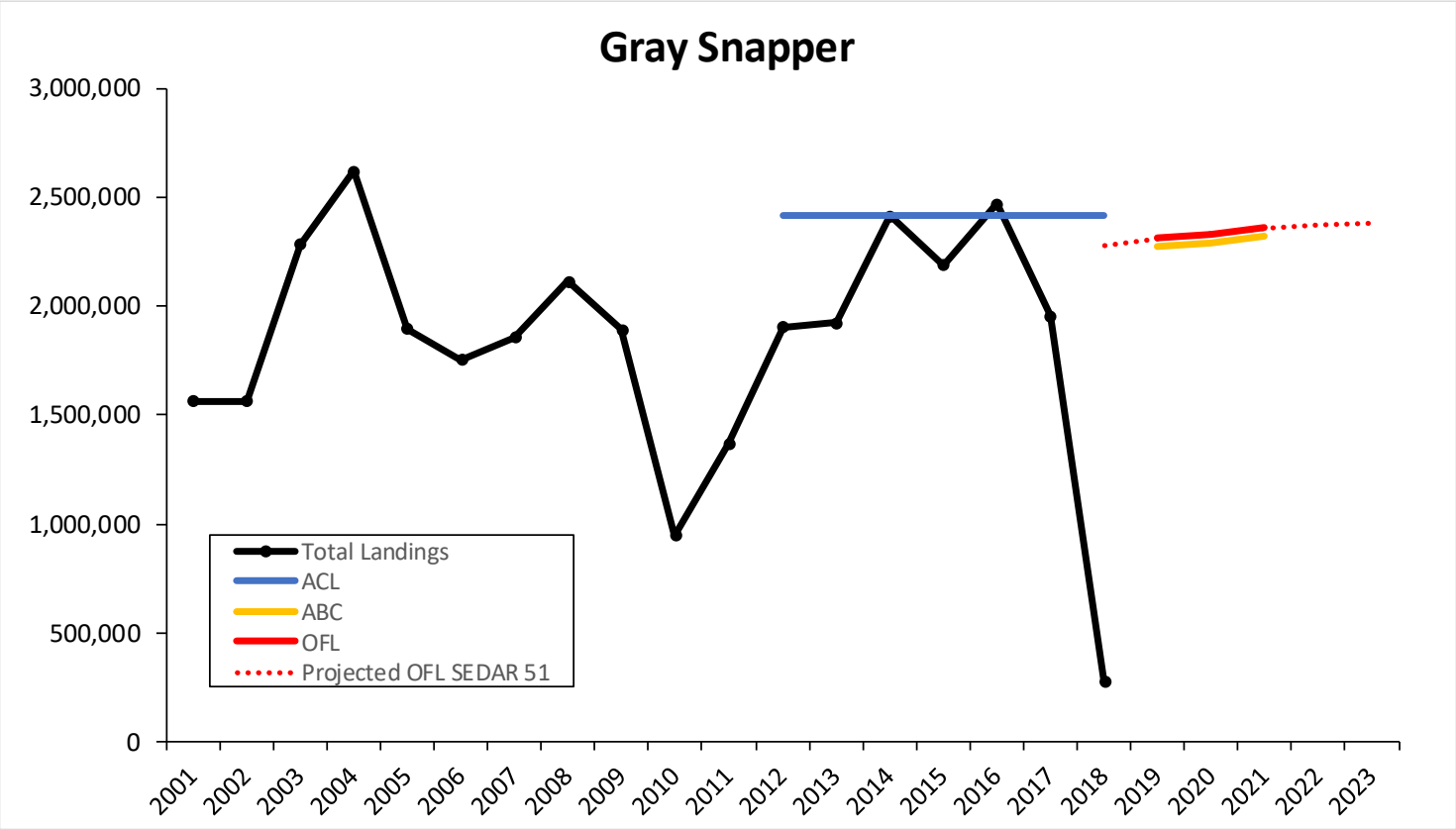
*Prior to 2009 Gag grouper was part of the Shallow Water Grouper complex

*Gag landings exclude Monroe County, Florida.

SEDAR 10 projections assumed constant recruitment, steepness = 0.75

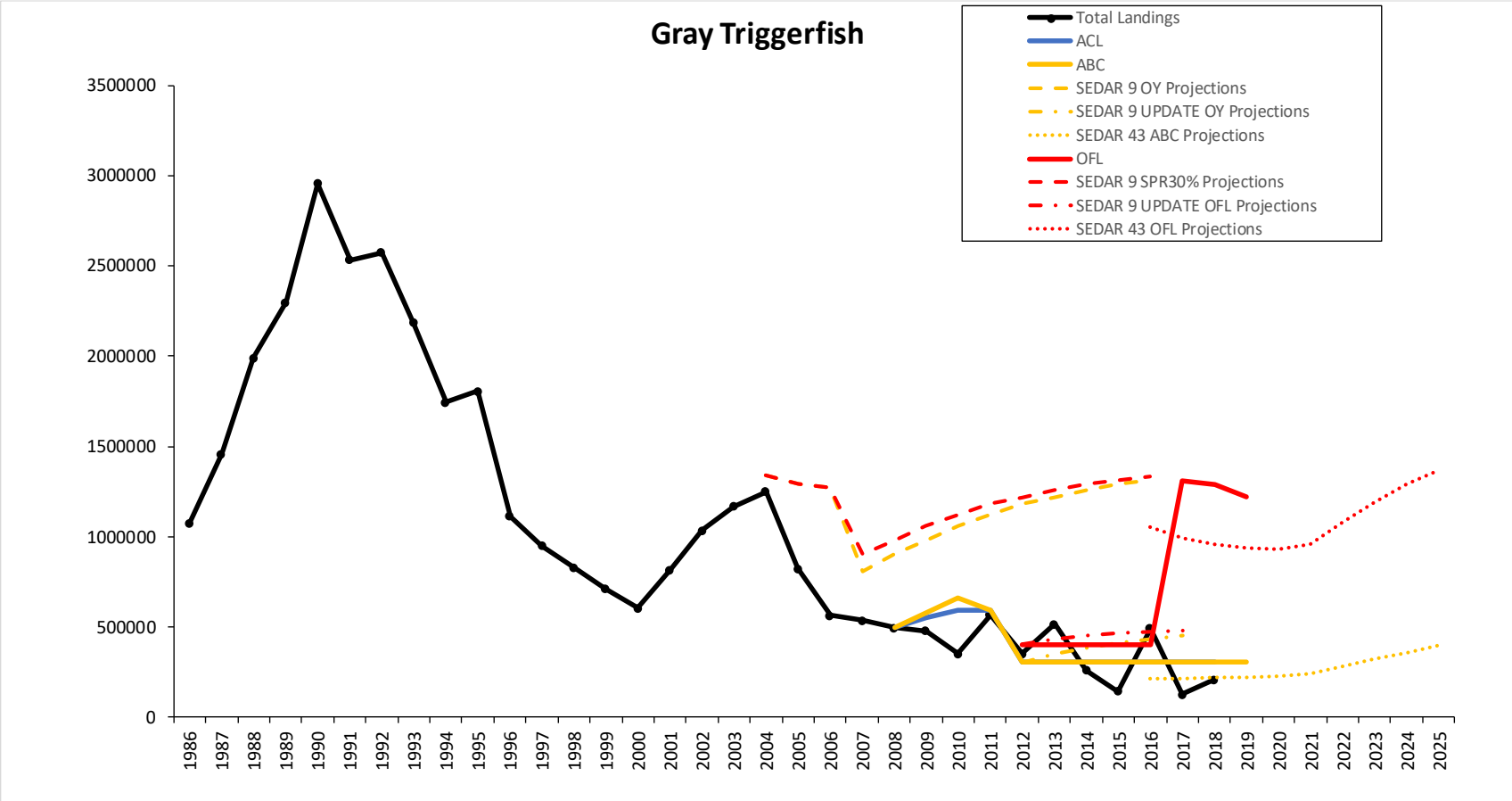
SEDAR 33 projections steepness fixed at 0.85

Gray Snapper



*ABC and OFL are Gulf SSC recommendations. The Gulf Council has not approved catch levels yet. Steepness for projections was fixed at 1.0

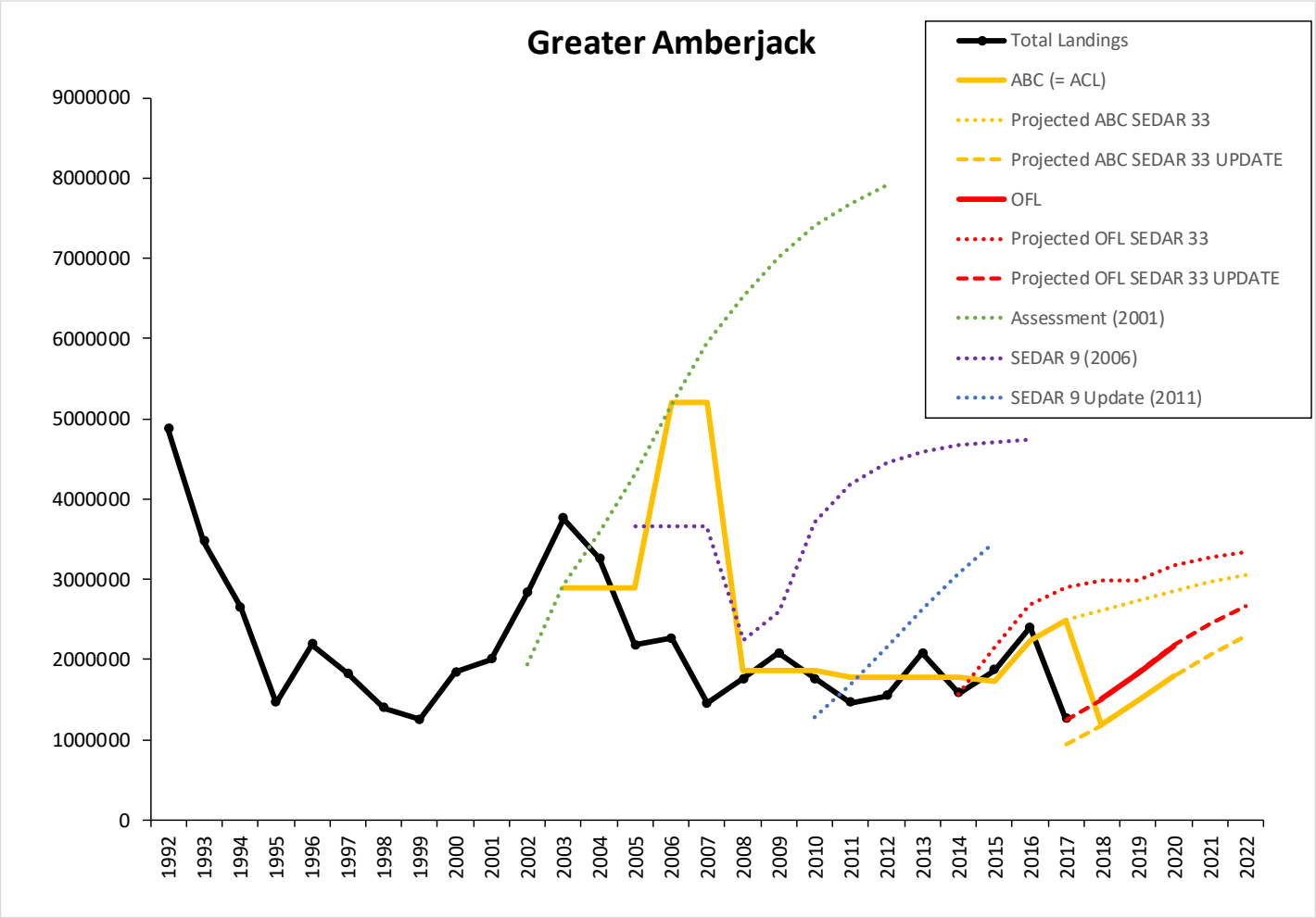
Gray Triggerfish



SEDAR 9 and SEDAR 9 Update Steepness fixed at 0.89, recruitment determined solely by S-R relationship

SEDAR 43, steepness estimated at 0.459 for base model, projections used recruitment determined solely by S-R relationship

Greater Amberjack

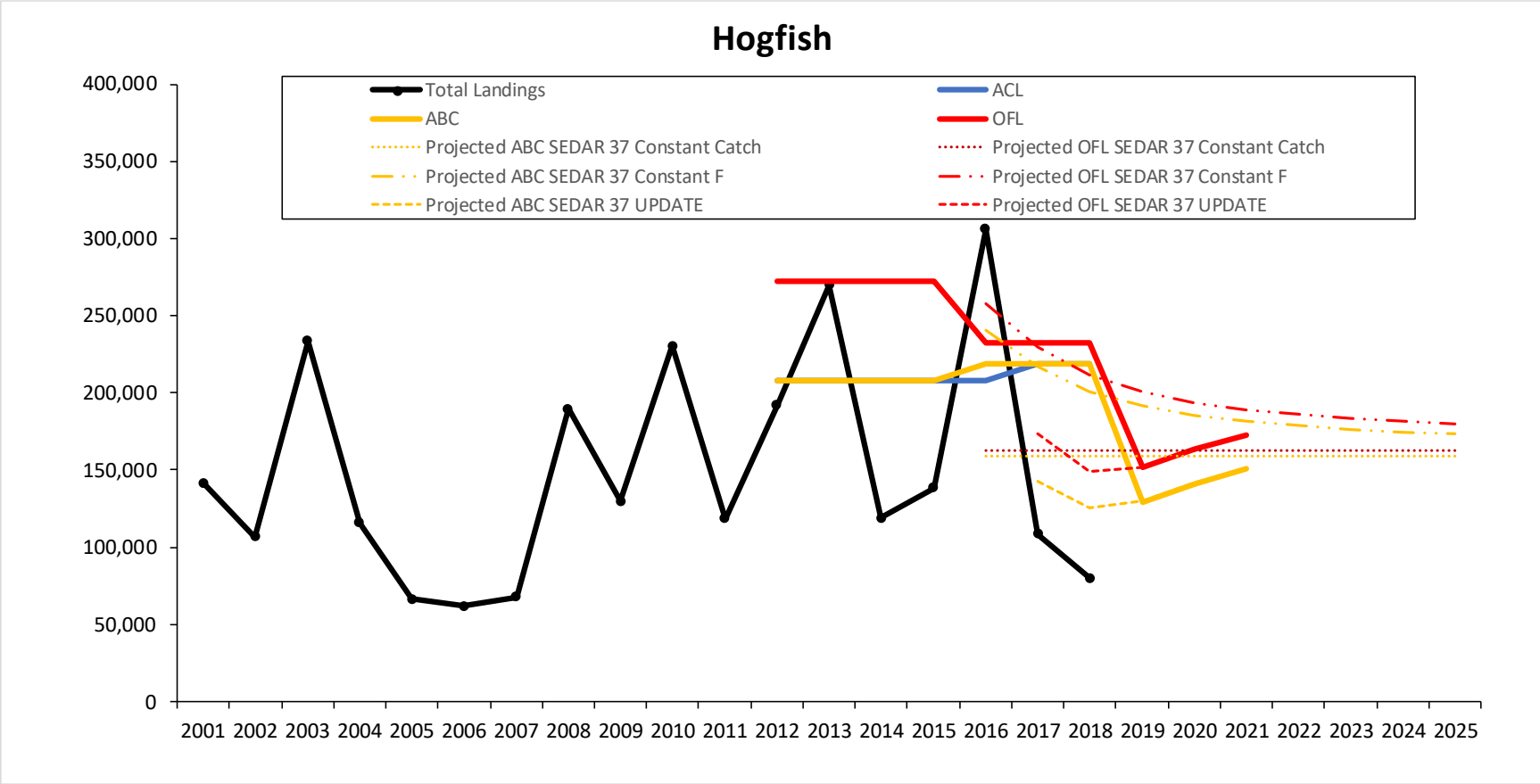


SEDAR 9 steepness was at mean=0.7 CV=0.35

SEDAR 33 projected recruitment average previous 3 years. Base model estimated steepness at 0.898; SSC selected a fixed value of 0.85 for management advice

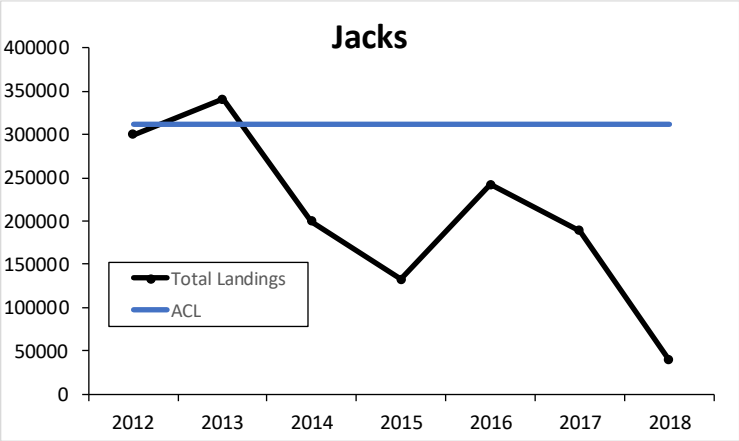
SEDAR 33 update fixed steepness at 0.85

Hogfish

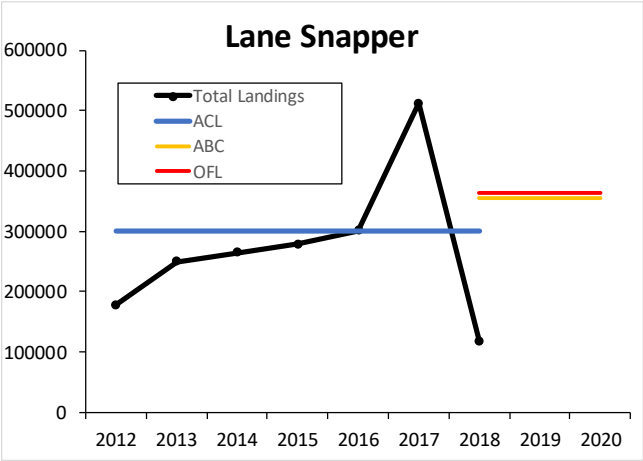


SEDAR 37 steepness estimated at 0.847, projections use average recruitment of last three years
SEDAR 37 steepness estimated at 0.867, projections use average recruitment of last three years

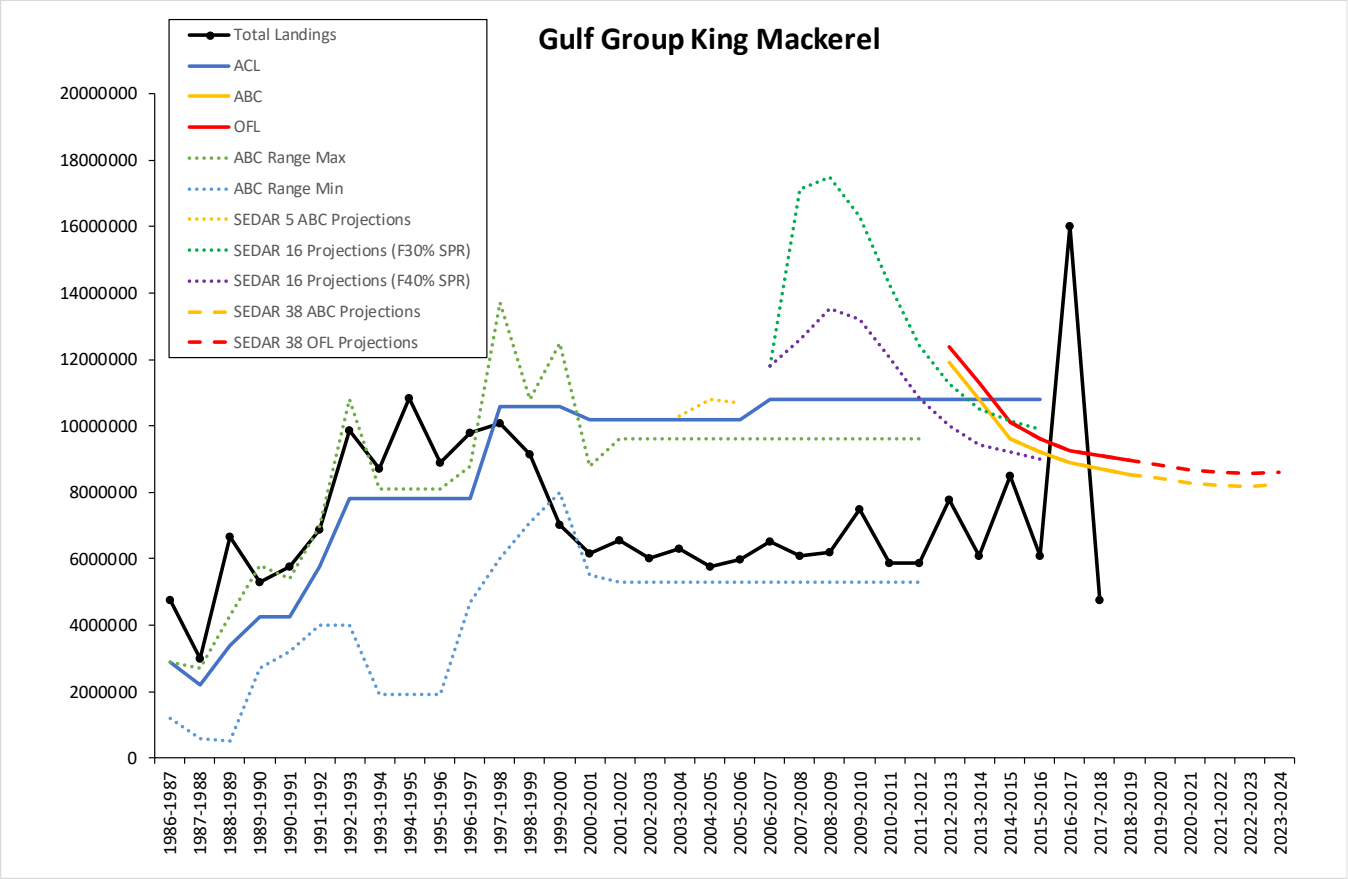
Jacks



Lane Snapper



Gulf Group King Mackerel



*As of May 11, 2017, the King Mackerel fishery zones were redefined, and the Florida east coast subzone was removed. As such, the quota previously associated with the Florida east coast subzone was distributed to the other remaining zones.

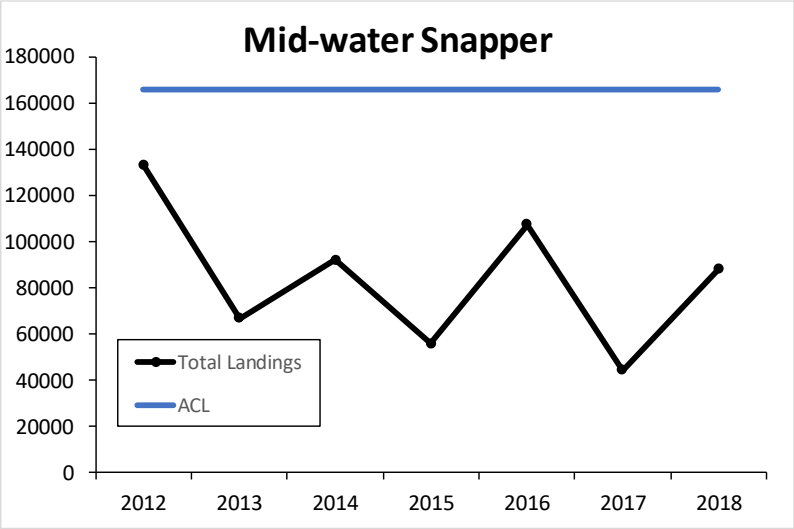
** The range has been defined in terms of acceptable risk of achieving the FMP's fishing mortality rate target: the Panel's best estimate of ABC has been intermediate to the end-point of this range.

SEDAR 5 projections use recruitment from a stock recruitment model specific within each bootstrap

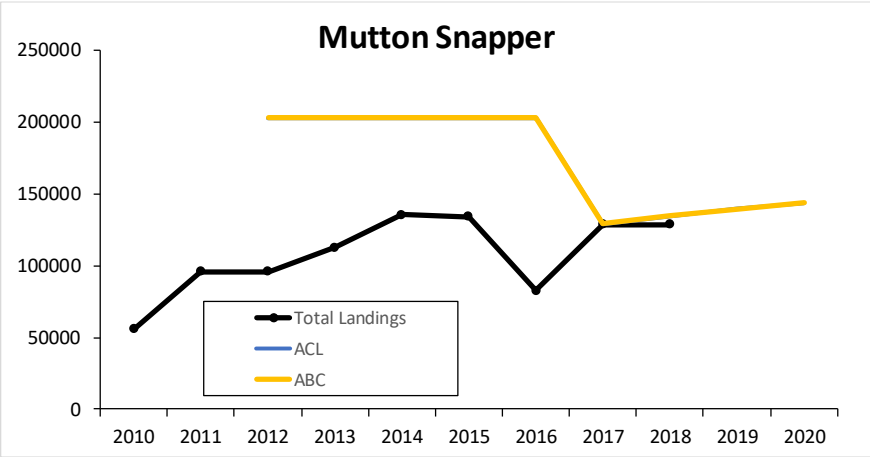
SEDAR 16 projections used fixed steepness at 0.95.

SEDAR 38 projections used fixed steepness of 0.99

Mid-water Snapper

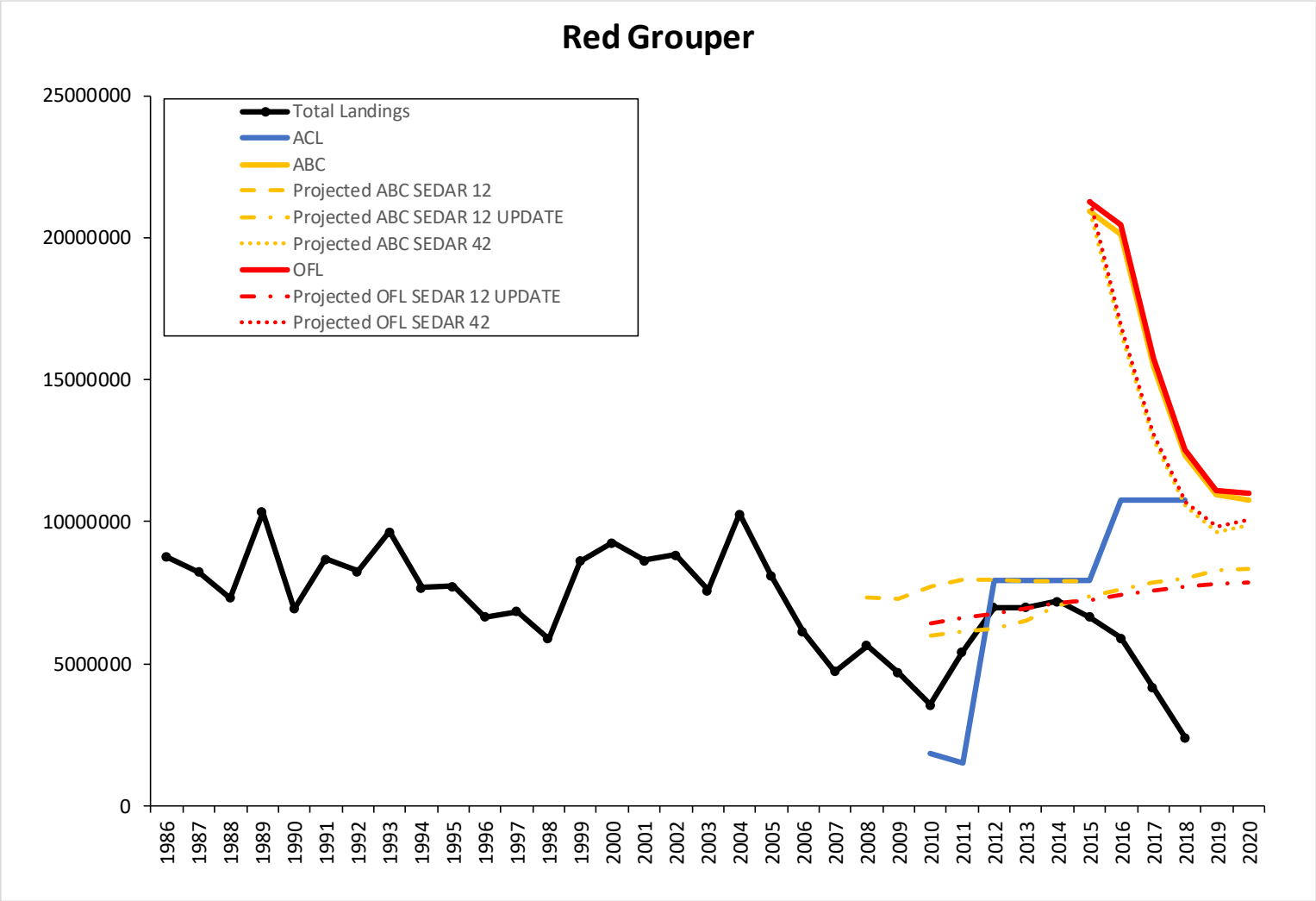


Mutton Snapper



*All mutton snapper landings reported in Monroe County were assigned to the South Atlantic
**Gulf stock apportionment of the ACL equal to 18% of the stock ABC. ACL=ABC
SEDAR 15 – Steepness fixed at 0.75

Red Grouper

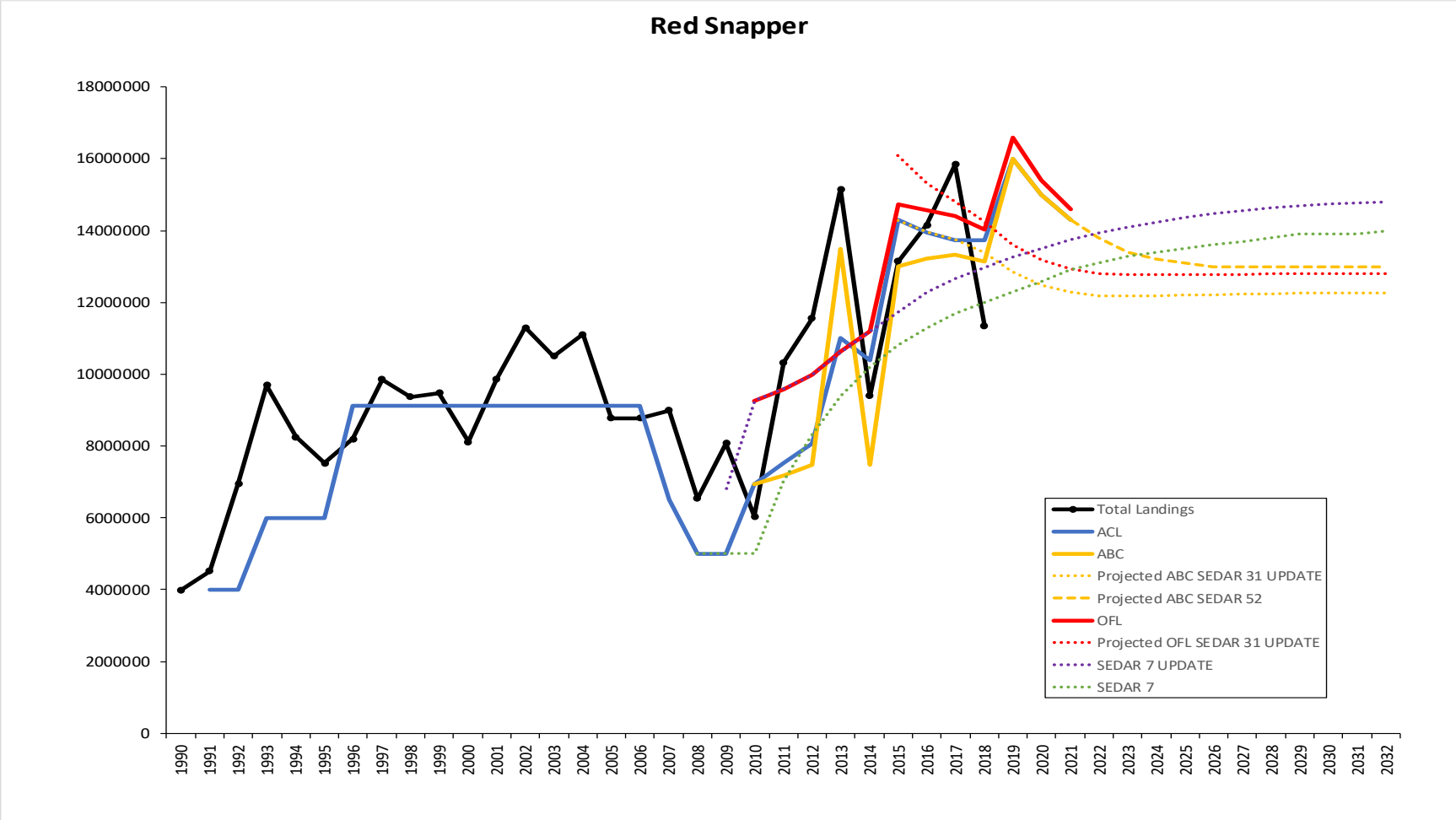


SEDAR 12 – Estimated steepness was 0.86. Projected recruitment is estimated from the average estimated over the assessment period

SEDAR 12 UPDATE – Estimated steepness was 0.84. Future recruitment was projected using the ASAP-estimated Beverton-Holt stock-recruitment relationship

SEDAR 42 – Steepness fixed at 0.99, and used median recruitment in projections

Red Snapper

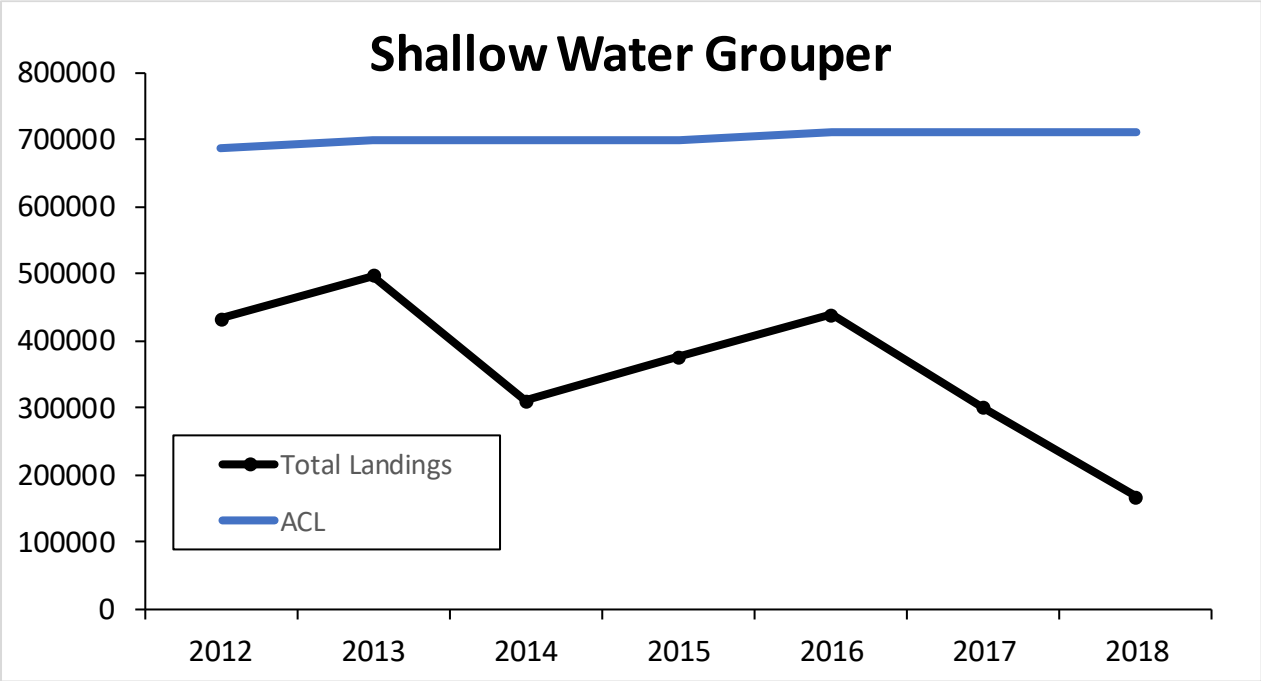


* Landings include Eastern and Western GOM

SEDAR 7 – Projections based on recruitment equal to recent average. Steepness estimated at 0.974

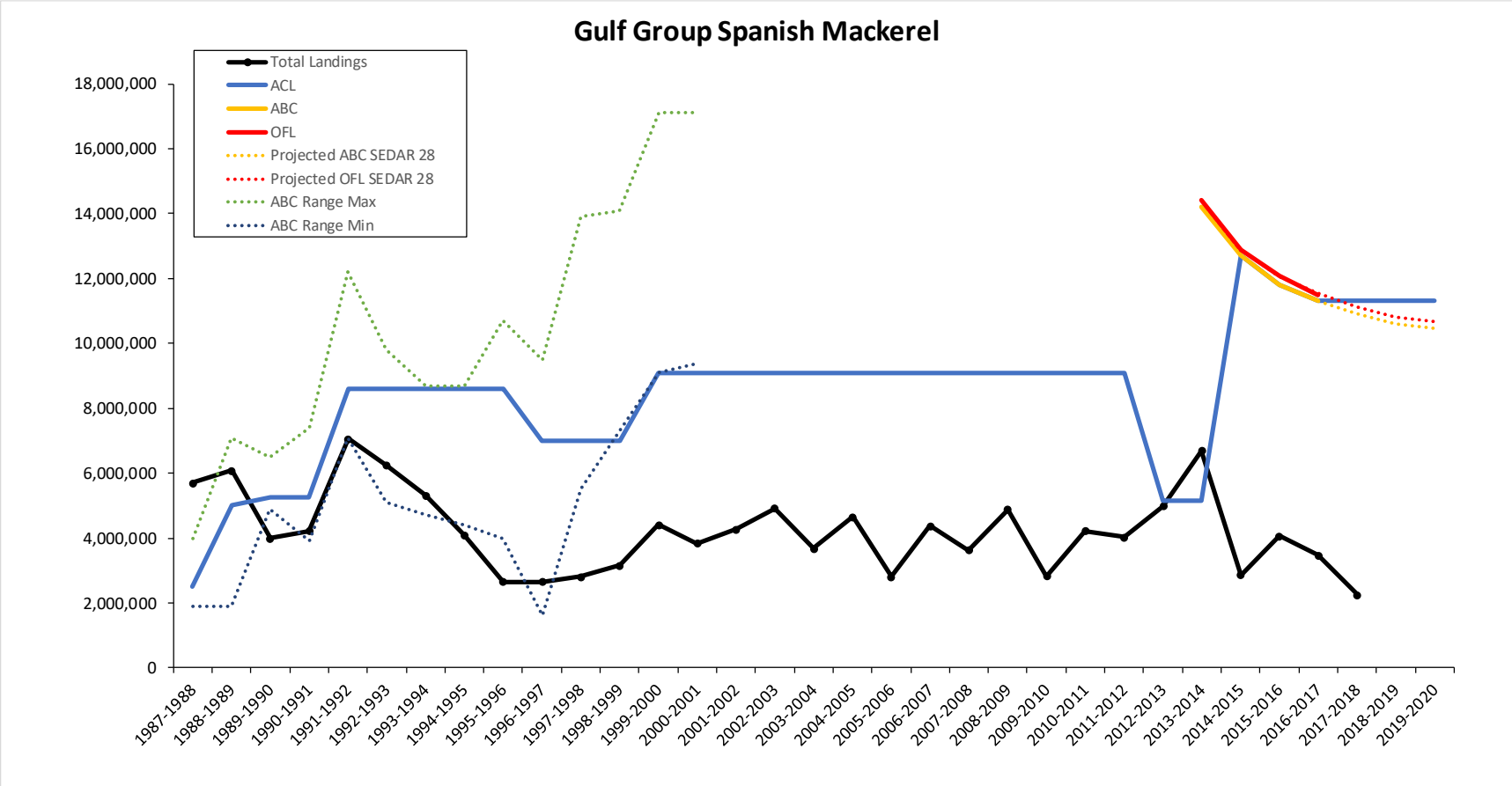
SEDAR 31 – Steepness fixed at 0.99, it was assumed the forecast recruitments would to continue at recent levels (i.e., 1984-2013)

Shallow Water Grouper



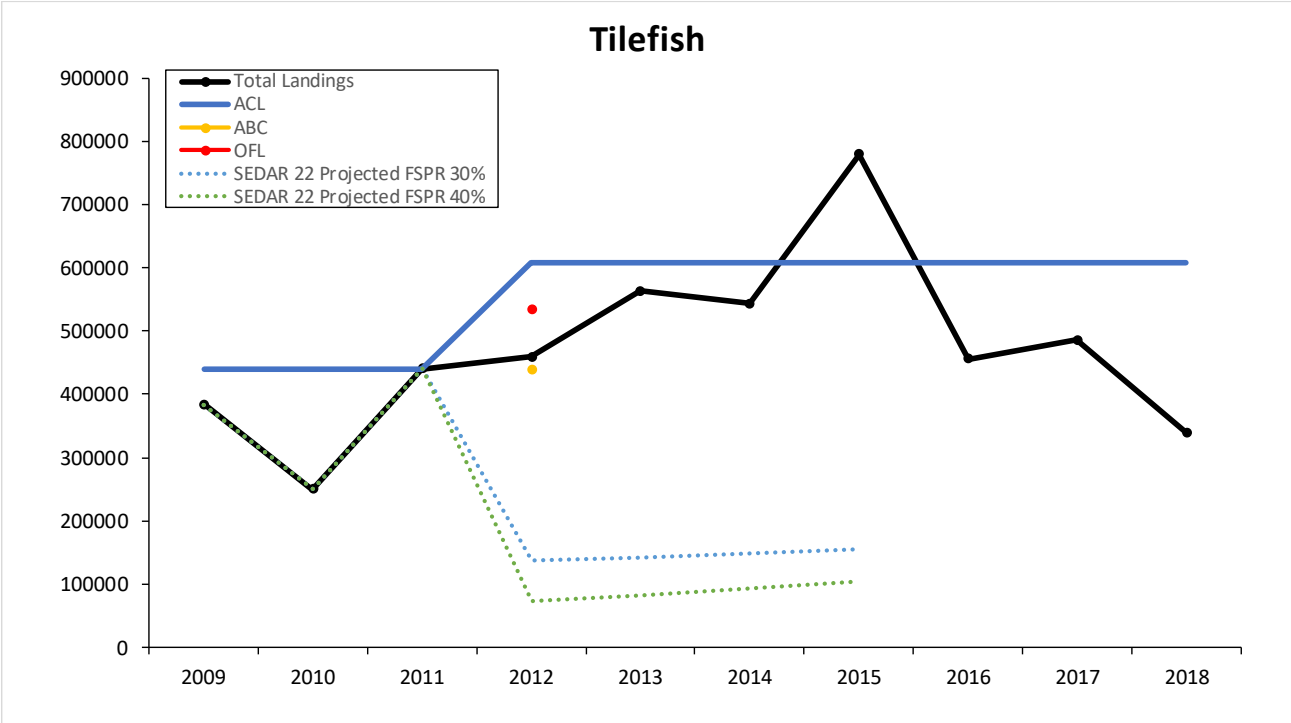
*During 2004-2009, the SWG quota was comprised of gag, red grouper, yellowmouth grouper, yellowfin grouper, red hind, rock hind, black grouper, and scamp. Beginning in 2010, gag and red grouper were removed. Beginning in 2012, red hind and rock hind were removed.

Spanish Mackerel



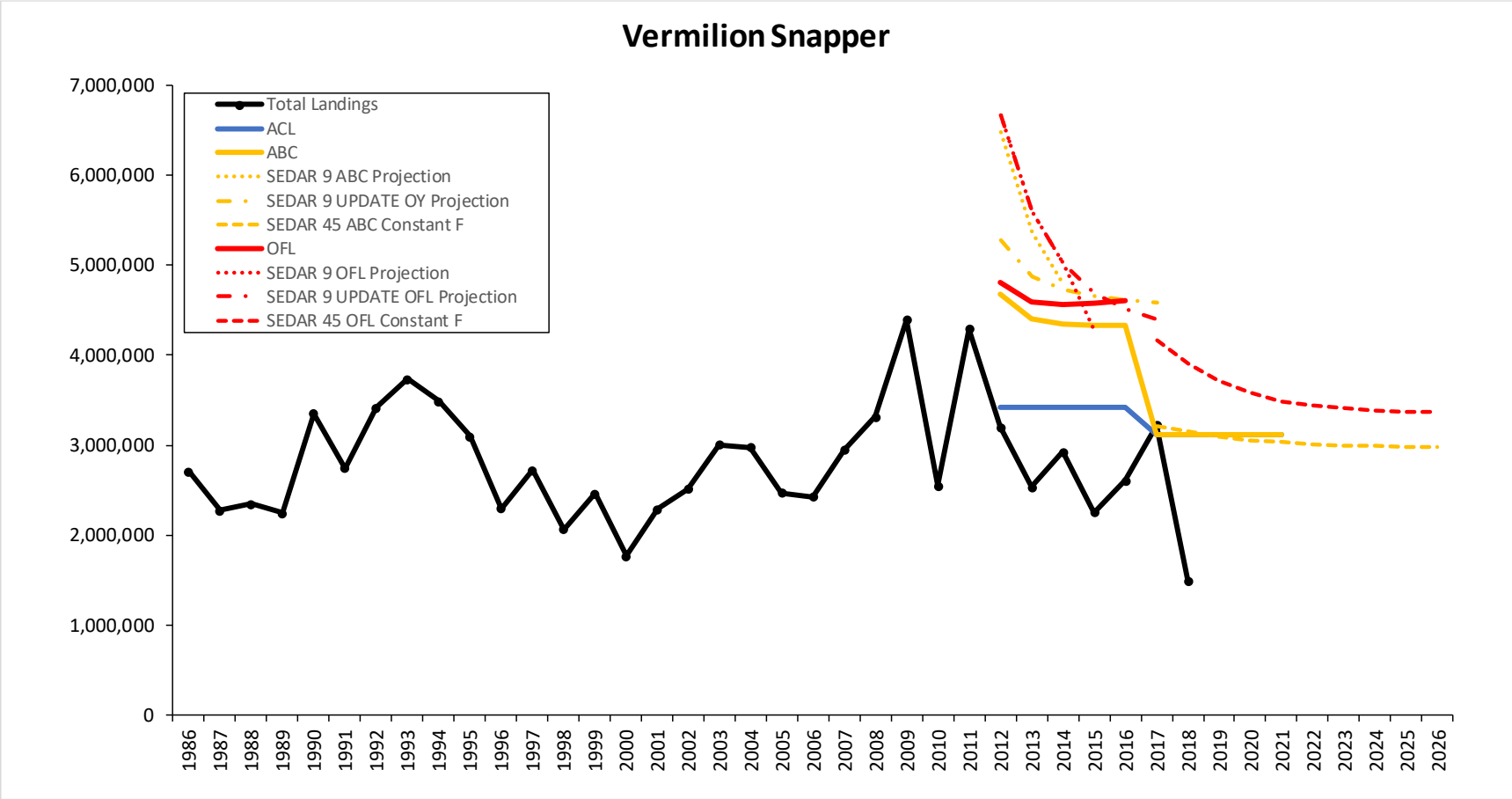
SEDAR 28 – Steepness value used for generating recruitment values for projections fixed at 0.8

Tilefish



*Anchor and blackline tilefish were removed in 2012.
SEDAR 22 – Steepness fixed at 0.75

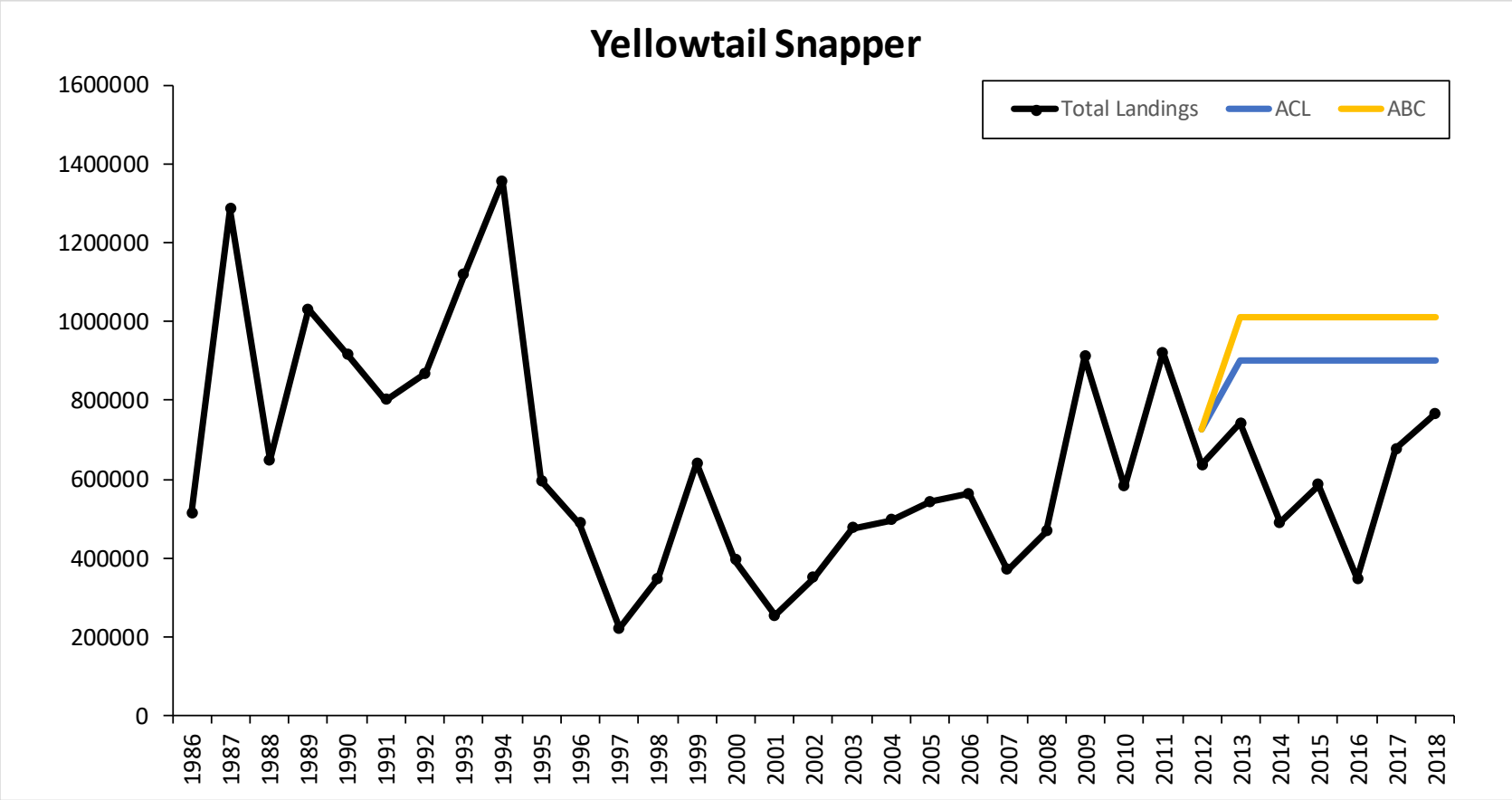
Vermilion Snapper



SEDAR 9 – Steepness at 0.80

SEDAR 45 – Estimated steepness at 0.57. Maintain estimated stock-recruit relation for the purpose of estimating recruitment, but to use recent recruitment estimates for projection purposes instead of relying on the stock-recruit curve.

Yellowtail Snapper



*All yellowtail snapper landings reported in Monroe County were assigned to the South Atlantic

**OFL is combined across both coasts, equal to the annual yield at equilibrium MSY, 4.61 mp

SEDAR 3 – There was no requirement to provide projections

SEDAR 27 – Estimated steepness = 0.697. Projected recruitment calculated from spawning biomass and a log recruitment deviation.

Appendix 3: Tables - Gulf of Mexico Historical Stock Landings, Annual Catch Limits (ACLs), Acceptable Biological Catch (ABC), and Overfishing Limits (OFL)

Recreational and commercial landings reflected in these tables are from MRFSS, MRIP, and headboat surveys (Recreational) and commercial dealer trip tickets reported to the Southeast Fisheries Science Center Accumulated Landings System (ALS) database. Commercial landings are from ACL_FILES_100517. **Landings for 2018 are preliminary**. ABC, OFL, projection yields, and historic landings were commonly found in Gulf Council reports, Gulf SSC Meeting Reports, Draft Framework Amendments, Framework Action reports, Final Amendment reports, and SEDAR Assessment workshop reports.

Cobia

Cobia															
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACT*	ACT%	*ACL	ACL %	ABC**	OFL**	Base ABC Projections	Base OFL Projections	Closure Date	Data Source
2000	Jan 1 - Dec 31	1,508,489	129,890	1,638,379	as reported										SERO ACL Mon
2001		1,555,656	92,365	1,648,021											SERO ACL Mon
2002		1,227,708	105,320	1,333,028											SERO ACL Mon
2003		2,060,423	111,636	2,172,059											SERO ACL Mon
2004		2,090,425	101,181	2,191,606											SERO ACL Mon
2005		1,461,039	87,582	1,548,621											SERO ACL Mon
2006		1,572,637	81,948	1,654,585											SERO ACL Mon
2007		1,685,402	73,208	1,758,610											SERO ACL Mon
2008		1,312,126	68,723	1,380,849											SERO ACL Mon
2009		996,105	62,239	1,058,344											SERO ACL Mon
2010		1,317,728	82,361	1,400,089											SERO ACL Mon
2011		1,683,588	69,768	1,752,756											SERO ACL Mon
2012		924,697	51,911	976,608		1,310,000	74.6	1,460,000	66.9						Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2013		1,211,101	82,531	1,293,632		1,310,000	98.8	1,460,000	88.6			2,473,157	2,547,481		Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2014		923,426	78,481	1,001,907		1,310,000	76.5	1,460,000	68.6	2,460,000	2,560,000	2,422,071	2,512,054	Comm 12/11/14	Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2015		811,564	70,314	881,878		1,450,000	60.8	1,610,000	54.8	2,520,000	2,590,000	2,514,822	2,587,804		Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2016		888,898	74,608	963,506		1,500,000	64.2	1,660,000	58	2,600,000	2,660,000	2,593,367	2,649,422		Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2017		643,048	68,514	711,562		1,500,000	47.4	1,660,000	42.87	2,600,000	2,660,000	2,637,153	2,686,085		Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2018		334,209	30,178	364,387		1,500,000	24.3	1,660,000	22.0	2,600,000	2,660,000	2,662,178	2,708,682		Draft Framework Amedment 7 to the FMP for Coastal Migratory Pelagic Resources in the GOM and Atlantic Region
2019												2,677,841	2,723,629		

* ACL and ACT values are only for the portion of the Gulf cobia stock which occurs in the Gulf Council's jurisdiction

** OFL and ABC values are for the **entire** Gulf cobia stock, including the portion which occurs in the South Atlantic Council's jurisdiction. Steepness fixed at 0.8

Cubera Snapper

Cubera Snapper											
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	Closure Date	Data Source
2012		378	1172	1550		5065	30.6				SERO ACL Mon
2013		2094	1004	3098		5070	61.1				SERO ACL Mon
2014		421	1590	2011		5070	39.7				SERO ACL Mon
2015	Jan 1 - Dec 31	347	1041	1388	ww	5070	27.4				SERO ACL Mon
2016		245	1508	1753		5065	34.6				SERO ACL Mon
2017		1023	2003	3026		5065	59.7				SERO ACL Mon
2018		40	1265	1305		5065	25.8				SERO ACL Mon

Deep Water Grouper

Deep Water Grouper											
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	Closure Date	Data Source
2004			1,249,631							7/15/2004	**SERO ACL Mon**
2005			1,140,637							6/23/2005	**SERO ACL Mon**
2006			1,072,590							6/23/2006	**SERO ACL Mon**
2007			1,157,110							6/2/2007	**SERO ACL Mon**
2008			1,108,508							5/10/2008	**SERO ACL Mon**
2009			1,126,175							6/27/2009	**SERO ACL Mon**
2010			606,223								**SERO ACL Mon**
2011	Jan 1 - Dec 31		778,728		gw						**SERO ACL Mon**
2012		58801	966100	1024901		1216000	84.3				**SERO ACL Mon**
2013		115772	920034	1035806		1207000	85.8				**SERO ACL Mon**
2014		111916	1081145	1193061		1207000	98.8			NA	**SERO ACL Mon**
2015		29168	955250	984418		1207000	81.6				**SERO ACL Mon**
2016		23848	889965	913813		1105000	82.7				**SERO ACL Mon**
2017		8674	860936	869610		1105000	78.7				**SERO ACL Mon**
2018		419	792238	792657		1024000	77.4				**SERO ACL Mon**

Gag Grouper

Gag Grouper																				
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	Rec ACL	Rec ACL %	Comm ACL	Comm ACL %	Total ACL	ABC	OFL	SEDAR 10 UPDATE ABC Projection	SEDAR 10 UPDATE OFL Projection	SEDAR 10 UPDATE RERUN ABC Projection	SEDAR 10 UPDATE RERUN OFL Projection	Projected OFL Continuity Model SEDAR 33	Rec Seasonal Closure	Closure Date	Data Source
1986	Jan 1 - Dec 31	3597491	1701441	5298932	gw															Final Reef Fish Amendment 30B, Oct 2008
1987		2447832	1538166	3985998																Final Reef Fish Amendment 30B, Oct 2008
1988		3747483	1216494	4963977																Final Reef Fish Amendment 30B, Oct 2008
1989		2314324	1692830	4007154																Final Reef Fish Amendment 30B, Oct 2008
1990		1259887	1793090	3052977																Final Reef Fish Amendment 30B, Oct 2008
1991		2748231	1565320	4313551																Final Reef Fish Amendment 30B, Oct 2008
1992		2245860	1663880	3909740																Final Reef Fish Amendment 30B, Oct 2008
1993		2787852	1865116	4652968																Final Reef Fish Amendment 30B, Oct 2008
1994		1999707	1618740	3618447																Final Reef Fish Amendment 30B, Oct 2008
1995		2700221	1651664	4351885																Final Reef Fish Amendment 30B, Oct 2008
1996		2353437	1566658	3920095																Final Reef Fish Amendment 30B, Oct 2008
1997		2573108	1597645	4170753																Final Reef Fish Amendment 30B, Oct 2008
1998		3519315	2530686	6050001																Final Reef Fish Amendment 30B, Oct 2008
1999		3721784	2097739	5819523																Final Reef Fish Amendment 30B, Oct 2008
2000		4972529	2283311	7255840																Final Reef Fish Amendment 30B, Oct 2008
2001		4031469	3128510	7159979																Final Reef Fish Amendment 30B, Oct 2008
2002		4435518	2983506	7419024																Final Reef Fish Amendment 30B, Oct 2008
2003		3773139	2626122	6399261																Final Reef Fish Amendment 30B, Oct 2008
2004		4913422	2901692	7815114																Final Reef Fish Amendment 30B, Oct 2008
2005		3534222	2487228	6021450																
2006		1946631	1326011	3272642																Landings: Final Amendment 38, Table 7.1
2007		2286440	1369985	3656425																Landings: Final Amendment 38, Table 7.1
2008		2231762	1262181	3493943																Landings: Final Amendment 38, Table 7.1
2009		1613316	733292	2346608		2590000		1660000		4250000										ACLs: Final Reef Fish Amendment 30B, Oct 2008
2010		1664257	496826	2161083		2640000		1710000		4350000								Jan 1 - June 30 & Nov 1 - Dec 31		ACLs: Final Reef Fish Amendment 30B, Oct 2008
2011		660287	318663	978950		964000		616000		1580000	1580000	1670000	1170000	1320000	1580000	1670000				ACLs: Final Reef Fish Amendment 32, Oct 2011
2012		938547	523138	1461685		1232000	76.2	788000	66.4	2020000	2020000	2110000	1640000	1810000	2020000	2110000				ACLs: Final Reef Fish Amendment 32, Oct 2011
2013		1435421	575335	2010756		1495000	96	956000	60.2	2451000	2450000	2540000	2120000	2300000	2450000	2540000		Jan 1 - June 30		ACLs: Final Reef Fish Amendment 32, Oct 2011
2014		862101	586377	1448478		1720000	50.1	1110000	53.3	2830000	2820000	2910000	2570000	2740000	2820000	2910000				ACLs: Final Reef Fish Amendment 32, Oct 2011
2015		823940	542774	1366714		1903000	43.3	1217000	44.6	3120000	5210000	6770000	2930000	3080000	3120000	3190000		Jan 1 - May 31	12/3/2015	ACLs: Final Reef Fish Amendment 32, Oct 2011; AE
2016		796430	910996	1707426		1903000	41.9	1217000	74.9	3120000	4750000	5840000	3200000	3340000	3340000	3400000			12/4/2014	ACLs: Final Reef Fish Amendment 32, Oct 2011; AE
2017		865230	492095	1357325		1903000	45.5	1217000	40.4	3120000	4570000	5380000					4680254			ABC (OY, recommended by SSC), OFL
2018		10834	438855	449689		1903000	0.6	939000	46.7	2842000							4340765			
2019																	4176917			
2020																	4140365			
2021																	4123654			

*Prior to 2009 Gag grouper was part of the Shallow Water Grouper complex

*Gag landings exclude Monroe County, Florida.

SEDAR 10 projections assumed constant recruitment, steepness = 0.75

SEDAR 33 projections steepness fixed at 0.85

Gray Snapper

Gray Snapper													
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACT	ACL	ACL %	ABC	OFL	Projected OFL SEDAR	Closure Date	Data Source
2001		1,364,957	198,411	1,563,368									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2002		1,333,870	231,700	1,565,570									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2003		2,085,558	197,496	2,283,054									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2004		2,390,000	230,778	2,620,778									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2005		1,659,791	234,513	1,894,304									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2006		1,548,997	203,097	1,752,094									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2007		1,705,143	150,456	1,855,599									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2008		1,961,553	150,979	2,112,532									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2009		1,714,554	179,479	1,894,033									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2010		833,085	112,307	945,392									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2011		1,171,117	192,906	1,364,023									Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2012	Jan 1 - Dec 31	1,724,641	179,006	1,903,647	ww	2080000	2420000	78.7%					Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2013		1,781,811	143,644	1,925,455		2080000	2420000	79.6%					Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2014		2,215,245	199,025	2,414,270		2080000	2420000	99.8%					Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2015		2,027,096	163,321	2,190,417		2080000	2420000	90.5%					Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2016		2,314,929	156,337	2,471,266		2080000	2420000	102.1%					Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2017		1,818,044	136,170	1,954,214		2080000	2420000	80.8%					Landings: Draft Amendment 51 to the FMP (Oct 2018) Table 1.1.1.
2018		182613	95469	278082		2080000	2420000	11.5%			2277000		
2019									2270000	2310000	2307000		
2020									2290000	2330000	2334000		
2021									2320000	2360000	2355000		
2022											2372000		
2023											2383000		

*ABC and OFL are Gulf SSC recommendations. The Gulf Council has not approved catch levels yet. Steepness for projections was fixed at 1.0

Gray Triggerfish

Gray Triggerfish																	
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	SEDAR 9 SPR 30% Projections	SEDAR 9 OY Projections	SEDAR 9 UPDATE OFL Projections	SEDAR 9 UPDATE OY Projections	SEDAR 43 ABC Projections	SEDAR 43 OFL Projections	Closure Date	Data Source
1986		977173	95629	1072802													Landings: REEF FISH AMENDMENT 30A
1987		1335064	123603	1458667													Landings: REEF FISH AMENDMENT 30A
1988		1796401	195062	1991464													Landings: REEF FISH AMENDMENT 30A
1989		1977967	317632	2295599													Landings: REEF FISH AMENDMENT 30A
1990		2498202	459037	2957239													Landings: REEF FISH AMENDMENT 30A
1991		2088347	444530	2532877													Landings: REEF FISH AMENDMENT 30A
1992		2123310	450195	2573505													Landings: REEF FISH AMENDMENT 30A
1993		1626469	558727	2185197													Landings: REEF FISH AMENDMENT 30A
1994		1338528	404719	1743248													Landings: REEF FISH AMENDMENT 30A
1995		1469408	337876	1807284													Landings: REEF FISH AMENDMENT 30A
1996		844131	267517	1111647													Landings: REEF FISH AMENDMENT 30A
1997		765005	184689	949694													Landings: REEF FISH AMENDMENT 30A
1998		653818	176724	830542													Landings: REEF FISH AMENDMENT 30A
1999		489427	219020	708447													Landings: REEF FISH AMENDMENT 30A
2000		446450	158137	604586													Landings: REEF FISH AMENDMENT 30A
2001		640194	176182	816375													Landings: REEF FISH AMENDMENT 30A
2002		798888	235563	1034451													Landings: REEF FISH AMENDMENT 30A
2003		915248	251810	1167059													Landings: REEF FISH AMENDMENT 30A
2004		1029651	218533	1248184						1340000	1340000						Landings: REEF FISH AMENDMENT 30A; SEDAR 9 projections: SEDAR9-AW2-11
2005		672984	150178	823162						1290000	1290000						Landings: REEF FISH AMENDMENT 30A; SEDAR 9 projections: SEDAR9-AW2-11
2006		469,817	91919	561,736						1270000	1270000						SEDAR 9 projections: SEDAR9-AW2-11
2007	Jan 1 - Dec 31	448,055	88336	536,391	ww					900000	810000						SEDAR 9 projections: SEDAR9-AW2-11
2008		419276	76569	495845		499000	99.4	499000		980000	900000						SEDAR 9 projections: SEDAR9-AW2-11
2009		401026	78117	479143		548000	87.4	580000		1060000	980000						SEDAR 9 projections: SEDAR9-AW2-11
2010		296358	55661	352019		595000	59.2	659000		1120000	1060000						SEDAR 9 projections: SEDAR9-AW2-11
2011		461548	105251	566799		595000	95.3	595000		1180000	1120000						SEDAR 9 projections: SEDAR9-AW2-11
2012		279874	71948	351822		305300	115.2	305300	401600	1220000	1180000	401600	305300				SEDAR 9 projections: SEDAR9-AW2-11
2013		453642	63086	516728		305300	169.3	305300	401600	1260000	1220000	429300	348000				SEDAR 9 projections: SEDAR9-AW2-11
2014		217885	42532	260417		305300	85.3	305300	401600	1290000	1260000	449300	383900				SEDAR 9 projections: SEDAR9-AW2-11
2015		94184	47480	141664		305300	46.4	305300	401600	1310000	1290000	463600	412400				SEDAR 9 projections: SEDAR9-AW2-11
2016		433896	58334	492230		305300	161.2	305300	401600	1330000	1310000	473400	433900	210000	1050000		ABC/OFL projections: SEDAR 43 Table 3.2.6, SEDAR 9-AW2-11
2017		62731	62,888	125619		305300	41.1	305300	1310000			480100	449700	210000	990000	rec 1/1/2017; comm 11/17/2017	ABC/OFL projections: SEDAR 43 Table 3.2.6
2018		145117	61755	206872		305300	67.8	305300	1290000					220000	960000	rec 8/17/2018; comm 10/7/18	ABC/OFL projections: SEDAR 43 Table 3.2.6
2019								305300	1220000					220000	940000		ABC/OFL projections: SEDAR 43 Table 3.2.6
2020														230000	930000		ABC/OFL projections: SEDAR 43 Table 3.2.6
2021														240000	960000		ABC/OFL projections: SEDAR 43 Table 3.2.6
2022														280000	1080000		ABC/OFL projections: SEDAR 43 Table 3.2.6
2023														320000	1190000		ABC/OFL projections: SEDAR 43 Table 3.2.6
2024														360000	1290000		ABC/OFL projections: SEDAR 43 Table 3.2.6
2025														400000	1370000		ABC/OFL projections: SEDAR 43 Table 3.2.6

SEDAR 9 and SEDAR 9 Update Steepness fixed at 0.89, recruitment determined solely by S-R relationship

SEDAR 43, steepness estimated at 0.459 for base model, projections used recruitment determined solely by S-R relationship

Greater Amberjack

Greater Amberjack																				
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	Rec ACL (adjusted)	Rec ACL%	Com ACL (adjusted)	Com ACL%	ABC	OFL	SEDAR ? (2001)	SEDAR 9 (2006)	SEDAR 9 (2011)	Projected ABC SEDAR 33 (2014)	Projected ABC SEDAR 33 UPDATE	Projected OFL SEDAR 33 (2014)	Projected OFL SEDAR 33 UPDATE	Closure Date	Data Source
1992	Jan 1 - Dec 31	3982538	890553	4873091	ww															Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1993		2424565	1042369	3466934																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1994		1801556	851160	2652716																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1995		752649	709513	1462162																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1996		1360722	830136	2190858																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1997		1083114	742136	1825250																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1998		898427	496962	1395389																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
1999		841623	406714	1248337																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2000		1057116	785679	1842795																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2001		1393307	605285	1998592																Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2002		2133359	703303	2836662								1936000								Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2003		2901820	857125	3758945						2900000		2917000								Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2004		2392230	870953	3263183						2900000		3600000								Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2005		1517155	662285	2179440						2900000		4320000	3669000							Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2006		1700186	566384	2266570						5200000		5162000	3666000							Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2007		867486	589235	1456721						5200000		5945000	3664000							Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2008		1318662	440936	1759598		1368000	96.4%			1871000		6527000	2242000							Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2009		1480315	601446	2081761		1368000	108.2%			1871000		7014000	2595000						11/7/2009	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2010		1225225	534095	1759320		1368000 (1243184)	89.6% (98.6%)			1871000		7401000	3719000	1280000					10/28/2010	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2011		949999	508871	1458870		1368000 (1315224)	69.4% (72.2%)			1780000		7683000	4176000	1690000					6/18/2011	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2012		1238718	308334	1547052		1299000	95.4%	481000 (237438)	64.1% (129.9%)	1780000		7919000	4448000	2160000					3/1/2012	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2013		1620761	457879	2078640		1299000	124.8%	481000 (410157)	95.2% (111.6%)	1780000			4597000	2630000					7/1/2013	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2014		1090048	486679	1576727		1299000 (1063538)	83.9% (102.5%)	481000	101.2%	1780000			4674000	3070000			1572000		8/25/2014	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2015		1407551	458693	1866244		1299000	108.4%	481000	95.4%	1720000			4714000	3460000			2138500		7/19/2015	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2016		1962560	432573	2395133		1255600 (1101959)	156.3% (178.1%)	464400	93.1%	2230000			4734000				2687400		7/17/2016	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2017		802889	454439	1257328		548641	146.0%	464400	97.9%	2490000					2489000	936000	2905700	1243000	comm 6/20/2017; rec 3/24/17	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2018	August 1 - July 31	147621	331403	479024		862860	17.0%	319140	103.8%	1182000	1500000				2616000	1182000	2985100	1500000	4/3/2018	Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2019						1086970		402030		1489000	1836000				2730000	1489000	2985100	1836000		Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2020						1309620		484380		1794000	2167000				2852000	1794000	3170000	2167000		Final Framework Action to the FMP for the Reef Fish Resources of the GOM
2021															2964000	2057000	3267300	2438000		
2022															3058000	2287000	3344400	2666000		

SEDAR 9 steepness was at mean=0.7 CV=0.35

SEDAR 33 projected recruitment average previous 3 years. Base model estimated steepness at 0.898, SSC selected a fixed value of 0.85 for management advice

SEDAR 33 update fixed steepness at 0.85

Hogfish

Hogfish																	
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	Projected ABC SEDAR 37 CC	Projected OFL SEDAR 37 CC	Projected ABC SEDAR 37 Constant F	Projected OFL SEDAR 37 Constant F	Projected ABC SEDAR 37 UPDATE	Projected OFL SEDAR 37 UPDATE	Closure Date	Data Source
2001		114256	27059	141,315													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2002		76349	30387	106,736													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2003		205685	28036	233,721													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2004		90499	25254	115,753													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2005		46194	20110	66,304													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2006		45933	15630	61,563		NA	NA										Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2007		49569	18112	67,681													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2008		165327	24150	189,477													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2009		97655	32316	129,971													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2010		195354	34926	230,280													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2011		72500	45995	118,495													Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2012		148833	42989	191,822		208000	92.20%	208000	272000								Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2013	Jan 1 - Dec 31	244905	24874	269,779	ww	208000	129.70%	208000	272000							12/2/2013	Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2014		83370	35593	118,963		208000	57.20%	208000	272000								Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2015		109933	28417	138,350		208000	66.50%	208000	272000								Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2016		275414	30737	306,151		208000	147.20%	219000	232000	159382	162557	240769	257428				Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2017		92710	15899	108,609		219000	52.20%	219000	232000	159382	162557	217086	229708	142932	173202		Table 1.1.2.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2018		70985	8987	79972		219000	36.5	219000	232000	159382	162557	201052	211310	125561	148749		Landings: SERO ACL Management System
2019								129500	151500	159382	162557	191400	200317	129594	151630		SSC Meeting 2018
2020								141300	163700	159382	162557	185447	193529	141412	163826		SSC Meeting 2018
2021								150400	172500	159382	162557	181522	189023	150537	172690		SSC Meeting 2018
2022										159382	162557	178731	185790				
2023										159382	162557	176576	183275				
2024										159382	162557	174831	181223				
2025										159382	162557	173368	179492				

SEDAR 37 steepness estimated at 0.847, projections use average recruitment of last three years

SEDAR 37 steepness estimated at 0.867, projections use average recruitment of last three years

Jacks

Jacks (Almaco jack, banded rudderfish, and lesser amberjack)											
Year	Fishing Year	Recreational	Commercial	Total Landings	Units	ACL	ACL %	ABC	OFL	Closure Date	Data Source
2012	Jan 1 - Dec 31	224126	75746	299872	ww	312000	96.1				SERO ACL Mon
2013		263136	77515	340651		312000	109.2				SERO ACL Mon
2014		141487	57790	199277		312000	63.9				SERO ACL Mon
2015		98860	33438	132298		312000	42.4				SERO ACL Mon
2016		206726	35160	241886		312000	77.5				SERO ACL Mon
2017		158378	30202	188580		312000	60.4				SERO ACL Mon
2018		18259	21512	39771		312000	12.7				SERO ACL Mon

Lane Snapper

Lane Snapper											
Year	Fishing Year	Recreational	Commercial	Total Landings	Units	ACL	ACL %	ABC	OFL	Closure Date	Data Source
2012	Jan 1 - Dec 31	149233	28928	178161	ww	301000	59.2				SERO ACL Mon
2013		226136	23189	249325		301000	82.8				SERO ACL Mon
2014		234729	30273	265002		301000	88				SERO ACL Mon
2015		233702	44780	278482		301000	92.5				SERO ACL Mon
2016		266733	33937	300670		301000	99.9				SERO ACL Mon
2017		471153	40880	512033		301000	170.1				SERO ACL Mon
2018		93436	23380	116816		301000	38.8	355500	364100		SERO ACL Mon
2019								355500	364100		SERO ACL Mon
2020								355500	364100		SERO ACL Mon

Gulf Group King Mackerel

King Mackerel												
Year	Total Landings	ACL	ABC	OFL	SEDAR 5 ABC Projections	SEDAR 5 OFL Projections	SEDAR 16 ABC Projections (F30% SPR)	SEDAR 16 ABC Projections (F40% SPR)	SEDAR 38 ABC Projections	SEDAR 38 OFL Projections	**ABC Range Min	**ABC Range Max
1986-1987	4,742,000	2,900,000									1,200,000	2,900,000
1987-1988	3,013,000	2,200,000									600,000	2,700,000
1988-1989	6,681,000	3,400,000									500,000	4,300,000
1989-1990	5,314,000	4,250,000									2,700,000	5,800,000
1990-1991	5,767,000	4,250,000									3,200,000	5,400,000
1991-1992	6,890,000	5,750,000									4,000,000	7,000,000
1992-1993	9,857,000	7,800,000									4,000,000	10,790,000
1993-1994	8,718,000	7,800,000									1,900,000	8,100,000
1994-1995	10,849,000	7,800,000									1,900,000	8,100,000
1995-1996	8,910,000	7,800,000									1,900,000	8,100,000
1996-1997	9,797,000	7,800,000									4,700,000	8,800,000
1997-1998	10,080,000	10,600,000									6,000,000	13,700,000
1998-1999	9,130,000	10,600,000									7,100,000	10,800,000
1999-2000	7,020,000	10,600,000									8,000,000	12,500,000
2000-2001	6,174,806	10,200,000									5,500,000	8,800,000
2001-2002	6,571,000	10,200,000									5,300,000	9,600,000
2002-2003	6,002,000	10,200,000									5,300,000	9,600,000
2003-2004	6,305,000	10,200,000			10,300,000						5,300,000	9,600,000
2004-2005	5,747,000	10,200,000			10,800,000						5,300,000	9,600,000
2005-2006	5,979,000	10,200,000			10,700,000						5,300,000	9,600,000
2006-2007	6,536,000	10,800,000					11,810,000	11,810,000			5,300,000	9,600,000
2007-2008	6,088,000	10,800,000					17,130,000	12,610,000			5,300,000	9,600,000
2008-2009	6,183,000	10,800,000					17,491,000	13,543,000			5,300,000	9,600,000
2009-2010	7,499,000	10,800,000					16,286,000	13,223,000			5,300,000	9,600,000
2010-2011	5,855,000	10,800,000					14,240,000	12,046,000			5,300,000	9,600,000
2011-2012	5,866,000	10,800,000					12,432,000	10,834,000			5,300,000	9,600,000
2012-2013	7,780,896	10,800,000	11,900,000	12,400,000			11,277,000	10,018,000				
2013-2014	6,096,284	10,800,000	10,800,000	11,300,000			10,503,000	9,438,000				
2014-2015	8,515,076	10,800,000	9,620,000	10,110,000			10,148,000	9,200,000	9,620,000	10,110,000		
2015-2016	6,089,068	10,800,000	9,210,000	9,610,000			9,886,000	9,015,000	9,210,000	9,610,000		
2016-2017	16,016,982		8,880,000	9,270,000					8,880,000	9,270,000		
2017-2018	4,752,818		8,710,000	9,110,000					8,710,000	9,110,000		
2018-2019			8,550,000	8,950,000					8,550,000	8,950,000		
2019-2020									8,430,000	8,810,000		
2020-2021									8,290,000	8,680,000		
2021-2022									8,200,000	8,600,000		
2022-2023									8,190,000	8,580,000		
2023-2024									8,230,000	8,600,000		

*As of May 11, 2017, the King Mackerel fishery zones were redefined, and the Florida east coast subzone was removed. As such, the quota previously associated with the Florida east coast subzone was distributed to the other remaining zones.

** The range has been defined in terms of acceptable risk of achieving the FMP's fishing mortality rate target: the Panel's best estimate of ABC has been intermediate to the end-point of this range.

SEDAR 5 projections use recruitment from a stock recruitment model specific within each bootstrap

SEDAR 16 projections used fixed steepness at 0.95.

SEDAR 38 projections used fixed steepness of 0.99

Mid-water Snapper

Mid-water Snapper (Silk snapper, wenchman snapper, blackfin snapper, queen snapper)											
Year	Fishing Year	Recreational	Commercial	Total Landings	Units	ACL	ACL %	ABC	OFL	Closure Date	Data Source
2012		11144	122233	133377		166000	80.3				SERO ACL Mon
2013		1291	65613	66904		166000	40.3				SERO ACL Mon
2014		4323	87820	92143		166000	55.5				SERO ACL Mon
2015	Jan 1 - Dec 31	2728	53103	55831	ww	166000	33.6				SERO ACL Mon
2016		28822	78688	107510		166000	64.8				SERO ACL Mon
2017		8468	35915	44383		166000	26.7				SERO ACL Mon
2018		676	87321	87997		166000	53.0				SERO ACL Mon

Mutton Snapper

Mutton Snapper											
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings*	Units	ACL	ACL %	ABC**	OFL	Closure Date	Data Source
2010		1541	54242	55783							
2011		1391	94238	95629							
2012		7156	88695	95851		203000	47.2	203000			SERO ACL Mon
2013		4960	107814	112774		203000	55.6	203000			SERO ACL Mon
2014		5039	130368	135407		203000	66.7	203000			SERO ACL Mon
2015		2154	131860	134014		203000	66	203000			SERO ACL Mon
2016		3712	78727	82439		203000	40.6	203000			ABC/OFL: GMFM
2017		2799	126023	128822		129096	99.8	129096			ABC/OFL: GMFM
2018		1174	127625	128799		134424	95.8	134424			ACL: Final Rule
2019						139392		139392			ACL: Final Rule
2020						143694		143694			ACL: Final Rule

*All mutton snapper landings reported in Monroe County were assigned to the South Atlantic

**Gulf stock apportionment of the ACL equal to 18% of the stock ABC. ACL=ABC

SEDAR 15 – Steepness fixed at 0.75

Red Grouper

Red Grouper																				
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	Rec ACL	Rec ACL%	Com ACL	Com ACL%	Total ACL	ABC	OFL	Projected ABC SEDAR 12	Projected ABC SEDAR 12 UPDATE	Projected OFL SEDAR 12 UPDATE	Projected ABC SEDAR 42	Projected OFL SEDAR 42	Closure Date Rec	Closure Date Com	Source
1986		2454263	6312986	8767249																
1987		1514252	6717890	8232142																
1988		2566798	4742506	7309304																
1989		2974617	7367910	10342527																
1990		1302261	5633515	6935776																
1991		2086165	6606915	8693080																
1992		2929270	5330792	8260062																
1993		2269986	7375476	9645462																
1994		1979965	5695784	7675749																
1995		2034430	5702810	7737240																
1996		1015753	5640409	6656162																
1997		676265	6160638	6836903																
1998		802237	5079168	5881405																
1999		1369252	7238383	8607635																
2000		2336831	6915507	9252338																
2001		1498638	7130676	8629314																
2002		1810176	7019953	8830129																
2003	Jan 1 - Dec 31*	1492482	6080419	7572901	gw															
2004		3362027	5635577	10276905															11/15/2004	
2005		1644074	5380603	8119188															10/10/2005	
2006		960890	5162527	6123417																Landings: Final Amendment 38, Table 7.2
2007		1016807	3708863	4725670																Landings: Final Amendment 38, Table 7.2
2008		892998	4739295	5632293									7330000							Landings: Final Amendment 38, Table 7.2
2009		978325	3698227	4676552									7280000							SERO ACL Mon
2010		635680	2910970	3546650		1850000	34.4			1850000	5960000	6430000	7730000	5964000	6425000					SERO ACL Mon
2011		643745	4783668	5427413		1510000	42.6			1510000			7970000	6119000	6627000					SERO ACL Mon
2012		1752930	5219133	6972063		1900000	92.3	6030000	86.6	7930000			7940000	6221000	6738000					SERO ACL Mon
2013		2377111	4599001	6976112		1900000	125.1	6030000	76.3	7930000			7910000	6536000	6947000					SERO ACL Mon
2014		1600475	5601905	7202380		1900000	84.2	6030000	92.9	7930000			7900000	7061000	7118000			10/4/2014		SERO ACL Mon
2015		1847573	4798007	6645580		1900000	97.2	6030000	79.6	7930000	20930000	21280000	7920000	7393000	7226000	20930000	21280000	10/8/2015		SERO ACL Mon
2016		1403236	4497582	5900818		2580000	54.4	8190000	54.9	10770000	20100000	20440000		7626000	7439000	16570000	16830000			SERO ACL Mon
2017		832315	3328271	4160586		2580000	32	8190000	40.6	10770000	15480000	15730000		7849000	7571000	12960000	13150000			SERO ACL Mon
2018		197259	2210373	2407632		2580000	8	8190000	27.0	10770000	12340000	12550000		7996000	7701000	10540000	10710000			SERO ACL Mon
2019											10930000	11120000		8293000	7786000	9650000	9820000			
2020											10770000	10980000		8330000	7864000	9860000	10050000			

SEDAR 12 – Estimated steepness was 0.86. Projected recruitment is estimated from the average estimated over the assessment period

SEDAR 12 UPDATE – Estimated steepness was 0.84. Future recruitment was projected using the ASAP-estimated Beverton-Holt stock-recruitment relationship

SEDAR 42 – Steepness fixed at 0.99, and used median recruitment in projections

Red Snapper

Red Snapper																
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	SEDAR 7	SEDAR 7 UPDATE	Projected ABC SEDAR 31	Projected OFL SEDAR 31	Projected ABC SEDAR	Closure Date	Data Source
1990		1,340,000	2,650,000	3,990,000												landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1991		2,310,000	2,210,000	4,520,000		4,000,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1992		3,930,000	3,030,000	6,960,000		4,000,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1993		6,320,000	3,370,000	9,690,000		6,000,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1994		5,030,000	3,220,000	8,250,000		6,000,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1995		4,590,000	2,930,000	7,520,000		6,000,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1996		3,890,000	4,310,000	8,200,000		9,120,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1997		5,040,000	4,810,000	9,850,000		9,120,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1998		4,690,000	4,680,000	9,370,000		9,120,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
1999		4,620,000	4,860,000	9,480,000		9,120,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
2000		3,280,000	4,840,000	8,120,000		9,120,000										landings: Table 3.1.1.1 Amendment 27 to the Reef fish fishery FMP
2001		5,244,802	4,625,000	9,869,802		9,120,000	108.2									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2002		6,521,745	4,779,000	11,300,745		9,120,000	123.9									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2003		6,094,042	4,409,000	10,503,042		9,120,000	115.2									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2004		6,460,244	4,651,000	11,111,244		9,120,000	121.8									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2005		4,675,918	4,096,000	8,771,918		9,120,000	96.2									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2006		4,131,132	4,649,000	8,780,132		9,120,000	96.3									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2007		5,808,793	3,182,730	8,991,523		6,500,000	138.3									Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2008		4,055,874	2,483,602	6,539,476		5,000,000	130.8			5,000,000						Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2009		5,596,857	2,483,565	8,080,422		5,000,000	161.6			5,000,000	6,820,000					Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018
2010		2,647,369	3,392,208	6,039,577		6,945,000	87.0	6,945,000	9,260,000	5,000,000	9,260,000					Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2009
2011		6,734,107	3,594,551	10,328,658		7,530,000	137.2	7,185,000	9,580,000	7,000,000	9,580,000					Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2009
2012	Jan 1 - Dec 31	7,524,241	4,036,398	11,560,639	ww	8,080,000	143.1	7,485,000	9,980,000	8,300,000	9,980,000					Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2009
2013		9,702,902	5,448,543	15,151,445		11,000,000	137.7	13,500,000	10,620,000	9,400,000	10,620,000					Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2009
2014		3,835,436	5,567,822	9,403,258		10,400,000	90.4	7,485,000	11,190,000	10,200,000	11,190,000					Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2009
2015		5,960,151	7,184,209	13,144,360		14,300,000	91.9	13,000,000	14,730,000	10,800,000	11,730,000	14,290,000	16,100,000			Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2015 ACL: Gulf Council Meeting 2015
2016		7,436,450	6,723,822	14,160,272		13,960,000	101.4	13,210,000	14,560,000	11,300,000	12,280,000	13,960,000	15,310,000			Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2015 ACL: Gulf Council Meeting 2015
2017		8,862,771	6,978,662	15,841,433		13,740,000	115.3	13,320,000	14,400,000	11,700,000	12,670,000	13,750,000	14,790,000			Landings: Table 1.1.1.2. Framework Action to the FMP for Reef Fish Resources of the GOM August 2018, ABC/OFL: SSR SSC Meeting 2015 ACL: Gulf Council Meeting 2015
2018		5,537,372	5,811,886	11,349,258		13,740,000	82.60	13,130,000	14,020,000	12,000,000	12,970,000	13,390,000	14,250,000			SSR SSC Meeting 2015
2019						16,000,000		16,000,000	16,600,000	12,300,000	13,260,000	12,850,000	13,600,000	16,000,000		SSR SSC Meeting 2018
2020						15,000,000		15,000,000	15,400,000	12,600,000	13,510,000	12,490,000	13,170,000	15,000,000		SSR SSC Meeting 2018
2021						14,300,000		14,300,000	14,600,000	12,900,000	13,740,000	12,290,000	12,930,000	14,300,000		SSR SSC Meeting 2018
2022										13,100,000	13,930,000	12,180,000	12,790,000	13,800,000		
2023										13,300,000	14,100,000	12,170,000	12,770,000	13,400,000		
2024										13,400,000	14,240,000	12,190,000	12,770,000	13,200,000		
2025										13,500,000	14,360,000	12,210,000	12,780,000	13,100,000		
2026										13,600,000	14,470,000	12,220,000	12,780,000	13,000,000		
2027										13,700,000	14,550,000	12,230,000	12,780,000	13,000,000		
2028										13,800,000	14,630,000	12,240,000	12,790,000	13,000,000		
2029										13,900,000	14,690,000	12,250,000	12,790,000	13,000,000		
2030										13,900,000	14,740,000	12,260,000	12,800,000	13,000,000		
2031										13,900,000	14,770,000	12,270,000	12,800,000	13,000,000		
2032										14,000,000	14,800,000	12,270,000	12,800,000	13,000,000		

* Landings include Eastern and Western GOM

SEDAR 7 – Projections based on recruitment equal to recent average. Steepness estimated at 0.974

SEDAR 31 – Steepness fixed at 0.99, it was assumed the forecast recruitments would to continue at recent levels (i.e., 1984-2013)

Shallow Water Grouper

Shallow Water Grouper (Black Grouper, Red Grouper, Scamp, Yellowmouth Grouper, and Yellowfin Grouper											
Year	Fishing Year	Recreational	Commercial	Total Landings	Units	ACL	ACL %	ABC	OFL	Closure Date	Data Source
2004			**8729978**							comm 11/15/2004	**SERO ACL Mon**
2005			**8044014**							comm 10/10/2005	**SERO ACL Mon**
2006			**6636828**								**SERO ACL Mon**
2007			**5123856**								**SERO ACL Mon**
2008			**6249500**								**SERO ACL Mon**
2009			**4623443**								**SERO ACL Mon**
2010			**176773**								**SERO ACL Mon**
2011	**Jan 1 - Dec 31**		**187026**								**SERO ACL Mon**
2012		134840	298102	432942		688000	62.9				**SERO ACL Mon**
2013		195318	300735	496053		700000	70.9				**SERO ACL Mon**
2014		79639	230248	309887		700000	44.3				**SERO ACL Mon**
2015		137890	238427	376317	**ww**	700000	53.8				**SERO ACL Mon**
2016		103123	335238	438361		710000	61.7				**SERO ACL Mon**
2017		99189	200009	299198		710000	42.1				**SERO ACL Mon**
2018		808	166690	167498		710000	23.6				**SERO ACL Mon**

*During 2004-2009, the SWG quota was comprised of gag, red grouper, yellowmouth grouper, yellowfin grouper, red hind, rock hind, black grouper, and scamp. Beginning in 2010, gag and red grouper were removed. Beginning in 2012, red hind and rock hind were removed.

Spanish Mackerel

Spanish Mackerel															
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	ABC Range Min	ABC Range Max	Projections ABC SEDAR 28	Projections OFL SEDAR 28	Closure Date	Data Source
1987-1988		3,124,000	2,581,000	5,705,000		2,500,000				1,900,000	4,000,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1988-1989		2,177,000	3,902,000	6,079,000		5,000,000				1,900,000	7,100,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1989-1990		1,856,000	2,145,000	4,001,000		5,250,000				4,900,000	6,500,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1990-1991		2,138,000	2,074,000	4,213,000		5,250,000				3,900,000	7,400,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1991-1992		2,889,000	4,163,000	7,053,000		8,600,000				7,100,000	12,200,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1992-1993		3,130,000	3,113,000	6,243,000		8,600,000				5,100,000	9,800,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1993-1994		2,696,000	2,614,000	5,309,000		8,600,000				4,700,000	8,700,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1994-1995		1,556,000	2,544,000	4,100,000		8,600,000				4,400,000	8,700,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1995-1996		1,575,000	1,075,000	2,650,000		8,600,000				4,000,000	10,700,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1996-1997		2,042,000	617,000	2,659,000		7,000,000				1,600,000	9,500,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1997-1998		2,455,000	356,000	2,810,000		7,000,000				5,500,000	13,900,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1998-1999		2,080,000	1,074,000	3,154,000		7,000,000				7,300,000	14,100,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
1999-2000		3,355,000	1,056,000	4,411,000		9,100,000				9,100,000	17,100,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
2000-2001		2,787,759	1,054,259	3,842,018		9,100,000	42.2			9,400,000	17,100,000				Landings and ABC range: Table 2. Coastal Migratory Pelagics Amendment 16
2001-2002		3,453,003	810,099	4,263,102		9,100,000	46.8								SERO ACL Mon
2002-2003		3,171,267	1,745,064	4,916,331		9,100,000	54								SERO ACL Mon
2003-2004	Apr 1 - Mar 31	2,742,259	941,702	3,683,961	as reported	9,100,000	40.5								SERO ACL Mon
2004-2005		2,665,254	1,986,512	4,651,766		9,100,000	51.1								SERO ACL Mon
2005-2006		1,595,371	1,221,294	2,816,665		9,100,000	31								SERO ACL Mon
2006-2007		2,845,319	1,534,040	4,379,359		9,100,000	48.1								SERO ACL Mon
2007-2008		2,724,709	902,827	3,627,536		9,100,000	39.9								SERO ACL Mon
2008-2009		2,525,545	2,360,043	4,885,588		9,100,000	53.7								SERO ACL Mon
2009-2010		1,890,078	942,501	2,832,579		9,100,000	31.1								SERO ACL Mon
2010-2011		2,964,208	1,248,711	4,212,919		9,100,000	46.3								SERO ACL Mon
2011-2012		2,677,119	1,347,945	4,025,064		9,100,000	44.2								SERO ACL Mon
2012-2013		3,578,421	1,413,904	4,992,325		5,150,000	96.9								SERO ACL Mon
2013-2014		5,232,534	1,464,381	6,696,915		5,150,000	130	14,200,000	14,400,000			14,175,763	14,396,226		SERO ACL Mon
2014-2015		1,946,040	915,785	2,861,825		12,700,000	22.5	12,700,000	12,900,000			12,720,708	12,897,078		SERO ACL Mon
2015-2016		2,616,377	1,447,243	4,063,620		11,800,000	34.4	11,800,000	12,100,000			11,816,810	12,059,320		SERO ACL Mon
2016-2017		2,376,879	1,092,768	3,469,647		11,300,000	30.7	11,300,000	11,500,000			11,309,746	11,530,209		SERO ACL Mon
2017-2018		1,464,485	791,355	2,255,840		11,300,000	20					10,912,913	11,133,375		SERO ACL Mon
2018-2019		211,067	978,721	1,189,788		11,300,000	10.5					10,604,265	10,824,727		SERO ACL Mon
2019-2020						11,300,000						10,471,987	10,670,403		SERO ACL Mon

SEDAR 28 – Steepness value used for generating recruitment values for projections fixed at 0.8

Tilefish

Tilefish (Golden Tilefish, Goldface Tilefish, and Blueline Tilefish)													
Year	Fishing Year	Recreational Landings	Commercial Landings**	Total Landings	Units	ACL	ACL %	ABC	OFL	SEDAR 22 Projected FSPR 30%	SEDAR 22 Projected F SPR 40%	Closure Date	Data Source
1996						**440000**							
1997						**440000**							
1998						**440000**							
1999						**440000**							
2000						**440000**							
2001						**440000**							
2002						**440000**							
2003						**440000**							
2004						**440000**							
2005						**440000**							
2006						**440000**							
2007	**Jan 1 - Dec 31**				**gw**	**440000**							
2008						**440000**							
2009				383700		**440000**				383700	383700		
2010				249700		**440000**				249700	249700		
2011				440000		**440000**				440000	440000		
2012		7896	451121	459017		608000	75.5	438563	533425	137400	72200		SERO ACL Mon
2013		122826	440091	562917		608000	92.6			141100	80900		SERO ACL Mon
2014		25821	517268	543089		608000	89.3			148400	92200		SERO ACL Mon
2015		241736	537512	779248		608000	128.2			155500	103900		SERO ACL Mon
2016		27263	429003	456266		608000	75						SERO ACL Mon
2017		412	484895	485307		608000	79.8						SERO ACL Mon
2018		3822	335207	339029		608000	55.8						SERO ACL Mon

*Anchor and blackline tilefish were removed in 2012.

SEDAR 22 – Steepness fixed at 0.75

Vermilion Snapper

Vermilion Snapper																	
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings	Units	ACL	ACL %	ABC	OFL	ABC Constant F SEDAR 45	OFL Constant F SEDAR 45	SEDAR 9 ABC Projection	SEDAR 9 OFL Projection	SEDAR 9 UPDATE OY Projection	SEDAR 9 UPDATE OFL Projection	Closure Date	Data Source
1986		959,610	1,749,447	2,709,057													Landings: Framework Action for VS, YS, and Venting Toc
1987		671,393	1,605,405	2,276,798													Landings: Framework Action for VS, YS, and Venting Toc
1988		795,533	1,552,982	2,348,515													Landings: Framework Action for VS, YS, and Venting Toc
1989		587,136	1,658,822	2,245,958													Landings: Framework Action for VS, YS, and Venting Toc
1990		899,173	2,454,872	3,354,044													Landings: Framework Action for VS, YS, and Venting Toc
1991		946,136	1,795,025	2,741,161													Landings: Framework Action for VS, YS, and Venting Toc
1992		1,052,843	2,361,319	3,414,162													Landings: Framework Action for VS, YS, and Venting Toc
1993		1,014,149	2,719,510	3,733,659													Landings: Framework Action for VS, YS, and Venting Toc
1994		850,604	2,639,238	3,489,842													Landings: Framework Action for VS, YS, and Venting Toc
1995		919,278	2,178,040	3,097,318													Landings: Framework Action for VS, YS, and Venting Toc
1996		468,624	1,827,282	2,295,906													Landings: Framework Action for VS, YS, and Venting Toc
1997		598,911	2,125,815	2,724,725													Landings: Framework Action for VS, YS, and Venting Toc
1998		333,787	1,732,678	2,066,466													Landings: Framework Action for VS, YS, and Venting Toc
1999		427,363	2,036,151	2,463,514													Landings: Framework Action for VS, YS, and Venting Toc
2000		306,882	1,458,829	1,765,711													Landings: Framework Action for VS, YS, and Venting Toc
2001		573,957	1,715,083	2,289,040													Landings: Framework Action for VS, YS, and Venting Toc
2002		506,478	2,005,115	2,511,593													Landings: Framework Action for VS, YS, and Venting Toc
2003		587,075	2,415,666	3,002,741													Landings: Framework Action for VS, YS, and Venting Toc
2004		810,762	2,162,262	2,973,024													Landings: Framework Action for VS, YS, and Venting Toc
2005	Jan 1 - Dec 31	601,282	1,868,879	2,470,160	ww												Landings: Framework Action for VS, YS, and Venting Toc
2006		663,869	1,760,249	2,424,118													Landings: Framework Action for VS, YS, and Venting Toc
2007		563,680	2,382,817	2,946,497													Landings: Framework Action for VS, YS, and Venting Toc
2008		515,322	2,800,210	3,315,533													Landings: Framework Action for VS, YS, and Venting Toc
2009		627,492	3,765,186	4,392,679													Landings: Framework Action for VS, YS, and Venting Toc
2010		457,499	2,093,844	2,551,343													Landings: Framework Action for VS, YS, and Venting Toc
2011		1,149,616	3,142,066	4,291,682													Landings: Framework Action for VS, YS, and Venting Toc
2012		756052	2441360	3197412		3,420,000	94	4,680,000	4,810,000			6,480,000	6,660,000	5,280,000	6,660,000		SERO ACL Mon
2013		1118790	1418454	2537244		3,420,000	74	4,410,000	4,590,000			5,370,000	5,600,000	4,880,000	5,600,000		SERO ACL Mon
2014		1160951	1765496	2926447		3,420,000	86	4,340,000	4,560,000			4,780,000	5,020,000	4,730,000	5,020,000		SERO ACL Mon
2015		886587	1367227	2253814		3,420,000	66	4,330,000	4,570,000				4,270,000	4,660,000	4,690,000		SERO ACL Mon
2016		1021924	1584104	2606028		3,420,000	76	4,330,000	4,610,000					4,620,000	4,510,000		SERO ACL Mon
2017		1604161	1618013	3222174		3,110,000	104	3,110,000		3,210,000	4,170,000			4,590,000	4,400,000		SERO ACL Mon
2018		232335	1262338	1494673		3,110,000	48	3,110,000		3,150,000	3,910,000						SERO ACL Mon
2019						3,110,000		3,110,000		3,100,000	3,710,000						
2020						3,110,000		3,110,000		3,050,000	3,580,000						
2021						3,110,000		3,110,000		3,030,000	3,490,000						
2022										3,010,000	3,440,000						
2023										3,000,000	3,410,000						
2024										2,990,000	3,390,000						
2025										2,980,000	3,370,000						
2026										2,980,000	3,370,000						

SEDAR 9 – Steepness at 0.80

SEDAR 45 – Estimated steepness at 0.57. Maintain estimated stock-recruit relation for the purpose of estimating recruitment, but to use recent recruitment estimates for projection purposes instead of relying on the stock-recruit curve.

Yellowtail Snapper

Yellowtail Snapper											
Year	Fishing Year	Recreational Landings	Commercial Landings	Total Landings*	Units	ACL	ACL %	ABC	OFL**	Closure Date	Data Source
1986		7,622	506,144	513,766							Landings: Framework Action for VS, YS, and Venting Tool
1987		9,743	1,275,194	1,284,937							Landings: Framework Action for VS, YS, and Venting Tool
1988		9,460	638,412	647,872							Landings: Framework Action for VS, YS, and Venting Tool
1989		10,581	1,020,640	1,031,221							Landings: Framework Action for VS, YS, and Venting Tool
1990		11,532	906,233	917,765							Landings: Framework Action for VS, YS, and Venting Tool
1991		13,180	787,663	800,843							Landings: Framework Action for VS, YS, and Venting Tool
1992		36,986	831,013	867,999							Landings: Framework Action for VS, YS, and Venting Tool
1993		51,015	1,067,452	1,118,467							Landings: Framework Action for VS, YS, and Venting Tool
1994		11,762	1,344,942	1,356,704							Landings: Framework Action for VS, YS, and Venting Tool
1995		3,434	591,074	594,508							Landings: Framework Action for VS, YS, and Venting Tool
1996		2,854	485,120	487,974							Landings: Framework Action for VS, YS, and Venting Tool
1997		2,008	218,384	220,392							Landings: Framework Action for VS, YS, and Venting Tool
1998		4,965	341,479	346,444							Landings: Framework Action for VS, YS, and Venting Tool
1999		39,260	601,027	640,287							Landings: Framework Action for VS, YS, and Venting Tool
2000		4,781	388,984	393,765							Landings: Framework Action for VS, YS, and Venting Tool
2001		7,045	246,849	253,894							Landings: Framework Action for VS, YS, and Venting Tool
2002	Jan 1 - Dec 31	7,782	341,823	349,605	gw						Landings: Framework Action for VS, YS, and Venting Tool
2003		11,472	463,743	475,215							Landings: Framework Action for VS, YS, and Venting Tool
2004		17,937	478,027	495,964							Landings: Framework Action for VS, YS, and Venting Tool
2005		31,176	510,437	541,613							Landings: Framework Action for VS, YS, and Venting Tool
2006		21,477	542,237	563,714							Landings: Framework Action for VS, YS, and Venting Tool
2007		19,726	350,079	369,805							Landings: Framework Action for VS, YS, and Venting Tool
2008		6,056	460,569	466,625							Landings: Framework Action for VS, YS, and Venting Tool
2009		19,250	891,946	911,196							Landings: Framework Action for VS, YS, and Venting Tool
2010		8,783	571,611	580,394							Landings: Framework Action for VS, YS, and Venting Tool
2011		25,560	895,652	921,212							Landings: Framework Action for VS, YS, and Venting Tool
2012		5,007	630,984	635,991		725,000	87.7	725,000			
2013		6,991	734,112	741,103		901,125	82.2	1,012,000	4,610,000		
2014		21,536	467,941	489,477		901,125	54.3	1,012,000	4,610,000		
2015		78,127	507,398	585,525		901,125	65	1,012,000	4,610,000		
2016		27,148	320,679	347,827		901,125	38.6	1,012,000	4,610,000		
2017		101,815	574,831	676,646		901,125	75.1	1,012,000	4,610,000		
2018		27,403	739,356	766,759		901,125	85.1	1,012,000	4,610,000		

*All yellowtail snapper landings reported in Monroe County were assigned to the South Atlantic

**OFL is combined across both coasts, equal to the annual yield at equilibrium MSY, 4.61 mp

SEDAR 3 – There was no requirement to provide projections

SEDAR 27 – Estimated steepness = 0.697. Projected recruitment calculated from spawning biomass and a log recruitment deviation.