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# SEDAR 70 Gulf of Mexico Greater Amberjack Projections

Updated, and with allocation scenarios

GMFMC Reef Fish AP Meeting  
1/5/2022

*Modified by Ryan Rindone for the Reef Fish AP*

# Stepwise corrections to the SEDAR 70 projections presented to the SSC in Jan. 2021

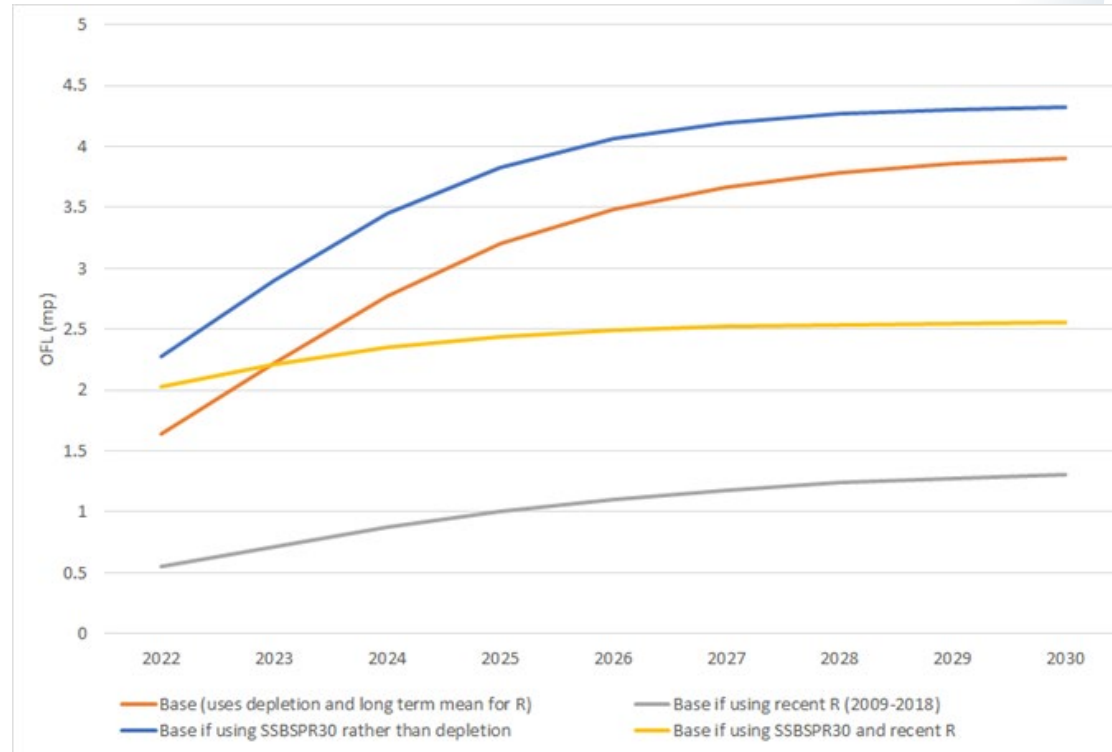
- Updated projections presented at the January 2021 SSC meeting had two key misspecifications
  - $SSB_{30\%}$  was used instead of  $SPR_{30\%}$  as a proxy
  - The long-term average of recruitment was used for both benchmarks and projections, instead of the recent estimated mean (as stated in the presentation and report).



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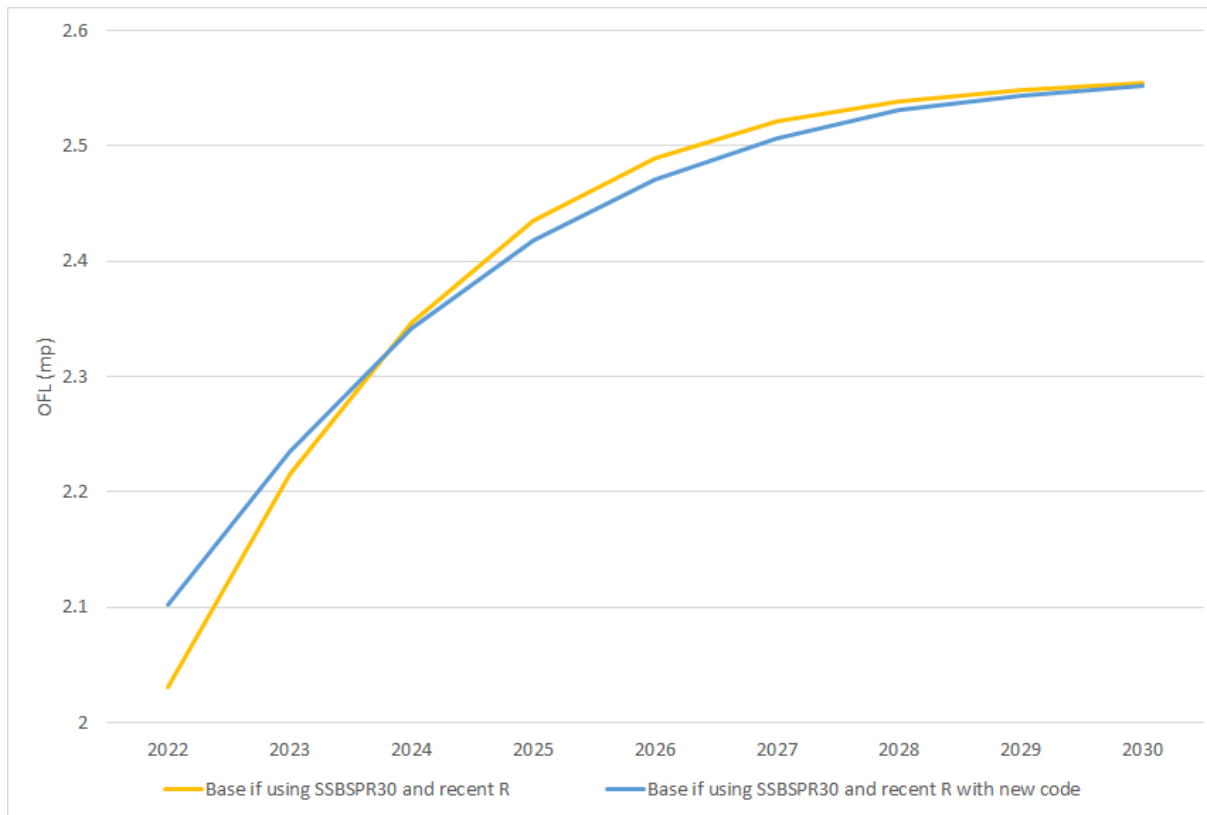
# Stepwise corrections continued

- Orange line: January 2021 base run using the  $SSB_{30\%}$  proxy and long-term average recruitment.
- Grey line: projection using recent recruitment (2009-2018) to inform benchmarks and the projection period.
- Dark blue line: projection using the  $SPR_{30\%}$  proxy.
- Yellow line: projections specified as described in Jan (grey line + dark blue line).



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# Projections with the key decisions for SEDAR 70 with the new code



Zoomed in to see the minor differences



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# Projection decisions from the Sept. 2021 SSC meeting

The SSC asked for the following specs to remain unchanged from the SEDAR 70 specifications:

- Years to determine relative F
- Years to determine  $F_{\text{Current}}$
- Years to determine selectivity
- Years to determine retention
- Interim landings
- Allocation ratio for the base run



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# Interim landings

- SAR:
- 1/21 SSC meeting:
- The updated landings reduced the take assumed in 2019-2021.

Parameter	Value
2019 and 2020 Landings	284.01 mt (Commercial Vertical Line), 11.90 mt (Commercial Longline), 65.43 thousands of fish (Charter/Private), 1.38 thousands of fish (Headboat)
2019 and 2020 Landings	158.11 mt (Commercial Vertical Line), 12.4635 mt (Commercial Longline), 44.9437 thousands of fish (Charter/Private), 1.3209 thousands of fish (Headboat)
2019 Landings	156.907 mt (Commercial Vertical Line), 14.51 mt (Commercial Longline), 22.979 thousands of fish (Charter/Private), 0.99 thousands of fish (Headboat)
2020 and 2021 Landings	184.01 mt (Commercial Vertical Line), 11.891 mt (Commercial Longline), 66.1150 thousands of fish (Charter/Private), 1.377 thousands of fish (Headboat)



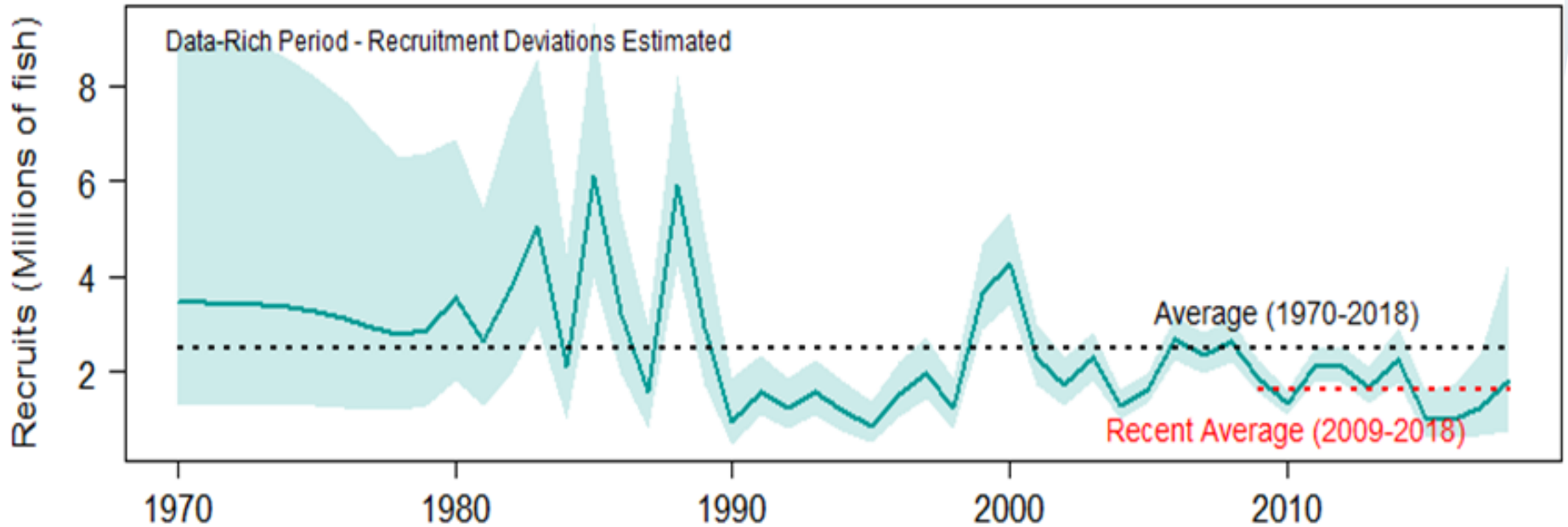
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# Base run projection settings

- Use  $SPR_{30\%}$  as the MSY proxy
- Use the spawner-recruit curve to calculate recruitment for setting benchmarks
  - Consistent with the projections used to set the rebuilding plan.
- Use the recent low recruitment for the projection period, assuming low recruitment will continue in the short term.
- Provide OFL, ABC and rebuilding projections (rebuild to  $SSB_{SPR30\%}$  by 2027)



# Recruitment



**Recent (2009-2018) average:** 1650.66 million fish  
S/R average for setting benchmarks: 3001.48 million fish for (2022-2030)





# Results

OFL

ABC

F<sub>Rebuild</sub>

Nov_GAJ_base_OFL									
Yr	R	F	F_FSPR30	SSB	SSB_SBSBSPR30	SSB_MSSTSPR30	SSB_SSB0	SPR	OFL_mp
2022	1650.66	0.24	1.00	2471	0.42	0.85	0.10	0.29	2.102
2023	1650.66	0.24	1.00	2652	0.45	0.91	0.11	0.30	2.236
2024	1650.66	0.24	1.00	2813	0.48	0.96	0.12	0.30	2.343
2025	1650.66	0.24	1.00	2930	0.50	1.00	0.12	0.30	2.419
2026	1650.66	0.24	1.00	3017	0.52	1.03	0.13	0.30	2.472
2027	1650.66	0.24	1.00	3078	0.53	1.05	0.13	0.30	2.507
2028	1650.66	0.24	1.00	3121	0.53	1.07	0.13	0.30	2.531
2029	1650.66	0.24	1.00	3145	0.54	1.08	0.13	0.30	2.544
2030	1650.66	0.24	1.00	3160	0.54	1.08	0.13	0.30	2.552

Nov_GAJ_base_ABC									
Yr	R	F	F_FSPR30	SSB	SSB_SBSBSPR30	SSB_MSSTSPR30	SSB_SSB0	SPR	Yield
2022	1650.66	0.18	0.75	2471	0.42	0.85	0.10	0.37	1.583
2023	1650.66	0.18	0.75	2836	0.49	0.97	0.12	0.38	1.779
2024	1650.66	0.18	0.75	3174	0.54	1.09	0.13	0.38	1.945
2025	1650.66	0.18	0.75	3444	0.59	1.18	0.15	0.39	2.072
2026	1650.66	0.18	0.75	3655	0.63	1.25	0.15	0.39	2.166
2027	1650.66	0.18	0.75	3810	0.65	1.31	0.16	0.39	2.233
2028	1650.66	0.18	0.75	3923	0.67	1.34	0.17	0.39	2.279
2029	1650.66	0.18	0.75	3996	0.68	1.37	0.17	0.39	2.309
2030	1650.66	0.18	0.75	4042	0.69	1.38	0.17	0.39	2.327

Nov_GAJ_base_Rebuild									
Yr	R	F	F_FSPR30	SSB	SSB_SBSBSPR30	SSB_MSSTSPR30	SSB_SSB0	SPR	Yield
2022	1650.66	0.06	0.24	2471	0.42	0.85	0.10	0.69	0.521
2023	1650.66	0.06	0.24	3216	0.55	1.10	0.14	0.70	0.649
2024	1650.66	0.06	0.24	3986	0.68	1.37	0.17	0.70	0.77
2025	1650.66	0.06	0.24	4693	0.80	1.61	0.20	0.71	0.875
2026	1650.66	0.06	0.24	5314	0.91	1.82	0.22	0.71	0.964
2027	1650.66	0.06	0.24	5837	1.00	2.00	0.25	0.71	1.035
2028	1650.66	0.24	1.00	6269	1.07	2.15	0.26	0.31	4.433
2029	1650.66	0.24	1.00	5341	0.91	1.83	0.23	0.31	3.831
2030	1650.66	0.24	1.00	4614	0.79	1.58	0.19	0.30	3.381

# MSRA table for the Nov 2021 Base Run

Variable	Definition	Value
Base M	Fully selected ages of Lorenzen Natural Mortality (M)	0.28
Steepness	Fixed Stock-Recruit (SR) parameter	0.777
Virgin Recruitment	Estimated SR parameter	3,698
Generation Time	Fecundity-weighted mean age	7.59
SSB Unfished	Estimated virgin spawning stock biomass	23,733
	<b>Mortality Rate Criteria</b>	
FMSYproxy	Equilibrium F that achieves SPR30%	0.242
MFMT	Equilibrium F that achieves SPR30%	0.242
FOY	F that rebuilds the stock to SSBSPR30% by 2027	
Fcurrent	0.75 * Directed F at FSPR30%	0.302
Fcurrent/FMSYproxy	Geometric Mean (F2016-2018)=Fcurrent	1.25
Fcurrent/MFMT	Current stock status based on FMSYproxy	1.25
	Current stock status based on MFMT	
	<b>Biomass Criteria</b>	
SSBMSYproxy	Equilibrium SSB at FSPR30%	5,838
MSST	0.5*SSBSPR30%	2,919
SSB at Optimum Yield	Equilibrium SSB when Directed F = 0.75 * Directed F at FSPR30%	
SSB_2018	SSB2018	2,433
SSB_2018/SSBFMSYproxy	Current stock status based on SSBSPR30% (Equil)	0.42
SSB_2018/MSST	Current stock status based on MSSTSPR30%	0.83
SSB_2018/SSBunfished	Depletion	0.1



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# Additional Allocation Scenarios

- From the Council request:

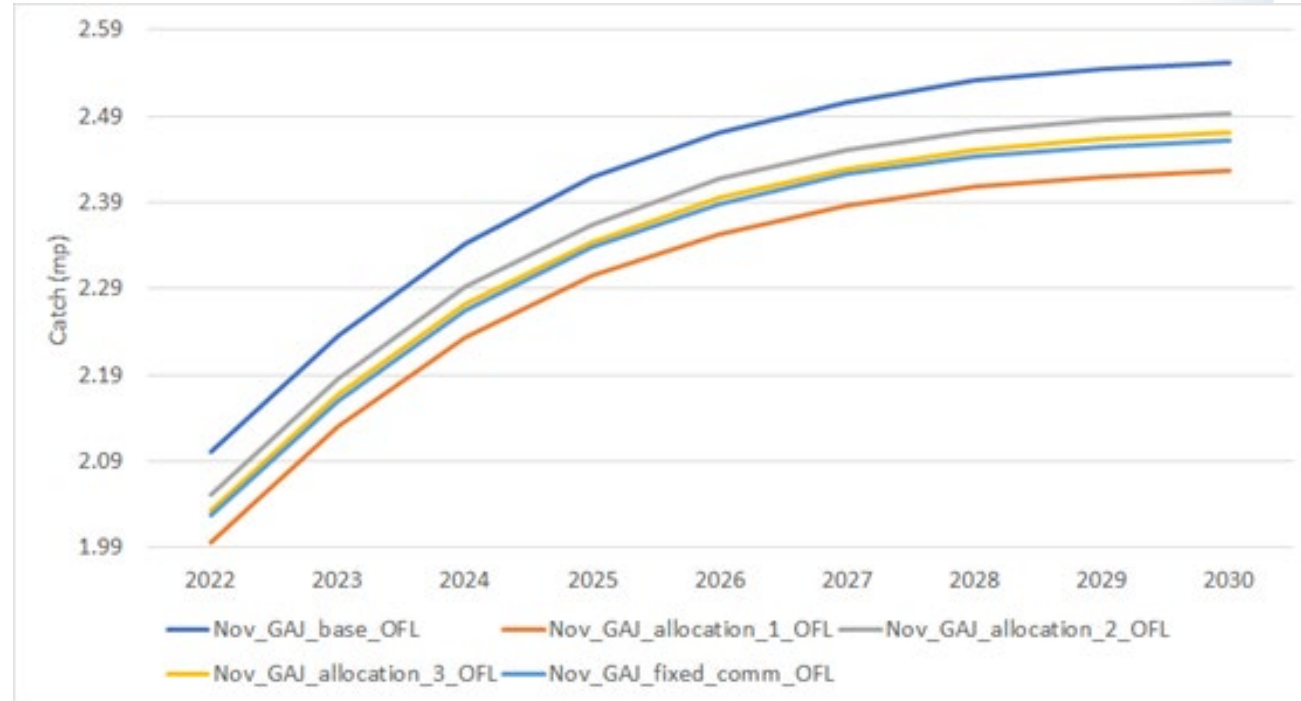
Provide OFL, ABC and rebuilding projections with the following allocations:

- Using the years 1981-2004; 84% recreational: 16% commercial;
  - Using the years 1993-2007; 78% recreational: 22% commercial;
  - Using the years 1993-2019; 80% recreational: 20% commercial; and,
  - Keeping the commercial annual catch limit fixed at 484,380 lbs whole weight, and calculate OFL, ABC, and sector allocation percentages thereafter.
- 
- Rebuilding:  $SSB = SSB_{SPR30\%}$  by 2027
  - ABC is the catch when fishing is at 75% of  $F_{SPR30\%}$ .



# All OFL results across allocation scenarios

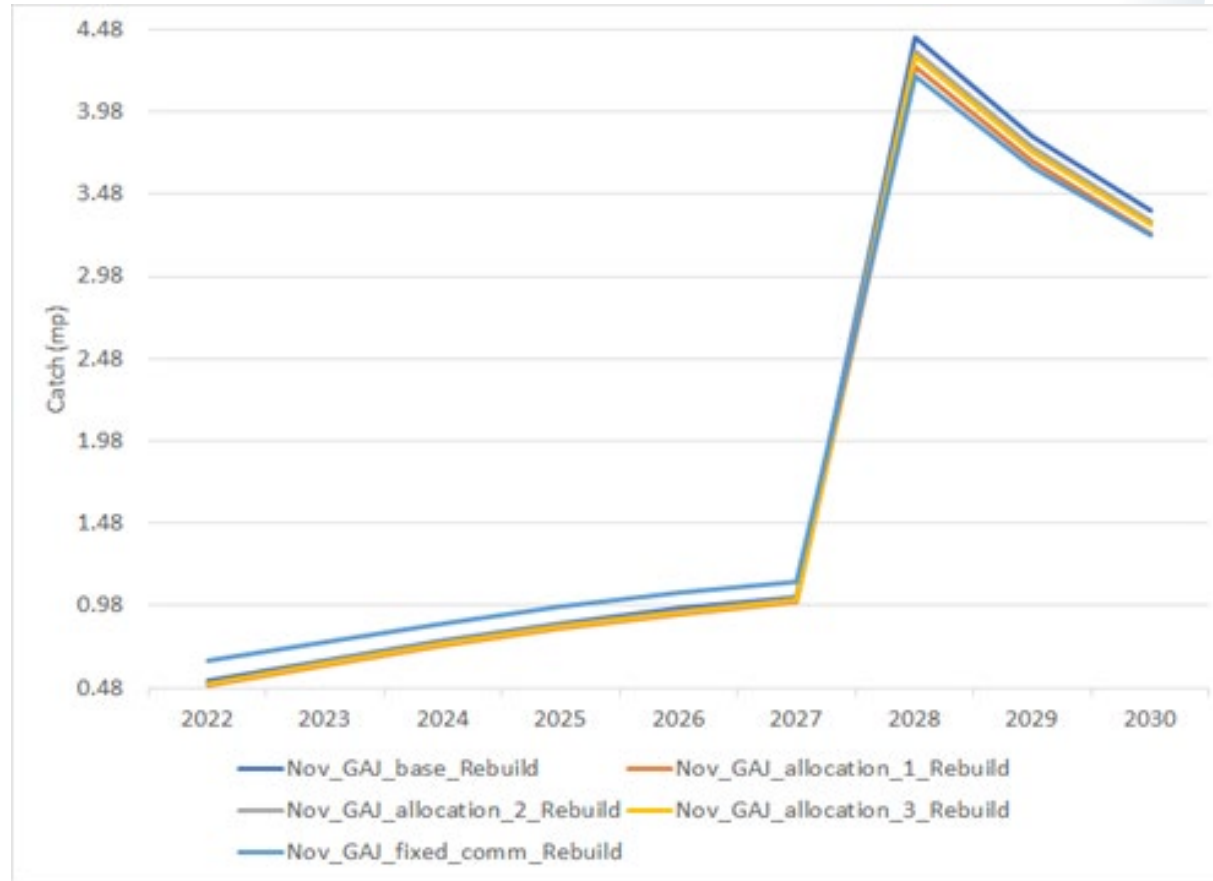
- Approximately a 5% change (max) in OFL across scenarios.



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# All rebuild results across allocation scenarios

- Low catches until the rebuilding year, then fished at  $F_{SPR30\%}$
- Approximately 22.5% difference between the constant commercial catch scenario and the base



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# SSC Recommendations

**Motion: The SSC determined that the projection methods presented for the SEDAR 70 Gulf Greater Amberjack stock represent the best scientific information available and are appropriate for consideration by the Council. **Based on these projection settings the stock is overfished and undergoing overfishing.****

# SSC Recommendations: Allocation Scenarios

- **Motion: Based on the projection settings accepted by the SSC for the SEDAR 70 operational assessment the SSC recommends the following catch level recommendations for Gulf Greater Amberjack:**
  - **OFL be set as the yield (million pounds whole weight) at  $F_{30\%SPR}$ , and**
  - **ABC at the yield (mp ww) at  $F_{Rebuild}$  through the end of the projected rebuilding period of 2027.**

# SSC Recommendations: Allocation Scenarios

Recreational: 73%; Commercial: 27%

Year	OFL	ABC	Allocation Rec-Com
2022	2.102	0.521	73-27
2023	2.236	0.649	73-27
2024	2.343	0.77	73-27
2025	2.419	0.875	73-27
2026	2.472	0.964	73-27
2027	2.507	1.035	73-27



# SSC Recommendations: Allocation Scenarios

Recreational: 84%; Commercial: 16%

Year	OFL	ABC	Allocation Rec-Com
2022	1.996	0.497	84-16
2023	2.13	0.621	84-16
2024	2.234	0.739	84-16
2025	2.305	0.842	84-16
2026	2.354	0.929	84-16
2027	2.387	0.999	84-16

# SSC Recommendations: Allocation Scenarios

Recreational: 78%; Commercial: 22%

Year	OFL	ABC	Allocation Rec-Com
2022	2.052	0.509	78-22
2023	2.186	0.636	78-22
2024	2.292	0.756	78-22
2025	2.365	0.86	78-22
2026	2.417	0.947	78-22
2027	2.451	1.018	78-22

# SSC Recommendations: Allocation Scenarios

Recreational: 80%; Commercial: 20%

Year	OFL	ABC	Allocation Rec-Com
2022	2.033	0.505	80-20
2023	2.167	0.631	80-20
2024	2.272	0.75	80-20
2025	2.345	0.854	80-20
2026	2.395	0.941	80-20
2027	2.429	1.012	80-20

# SSC Recommendations: Allocation Scenarios

Recreational: Balance; Commercial: Fixed at 484,380 lbs ww

Year	OFL	ABC	Allocation Rec; Com
2022	2.028	0.641	ABC-Com; Fixed
2023	2.16	0.757	ABC-Com; Fixed
2024	2.265	0.87	ABC-Com; Fixed
2025	2.339	0.97	ABC-Com; Fixed
2026	2.389	1.055	ABC-Com; Fixed
2027	2.423	1.124	ABC-Com; Fixed