

**SSC review of simulations**  
**(TAB B, No. 11b)**

**Sustainable Fisheries Committee**  
**January 29, 2018**

# Scope of work

- Review SEFSC simulations of the effect of carrying over unused ACL for red snapper and king mackerel.
- Review draft generic amendment and comment on the scientific basis for the alternatives.



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# Update to Unharvested Gulf of Mexico Red Snapper Quota Carry-over Analysis

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# Previous Analysis

Provide recommendations on the **percentage of unharvested quota that can be carried over** without negatively impacting the red snapper rebuilding plan.

- **Goal:** Demonstrate that 100% of unharvested quota could be carried over without negative consequences to the rebuilding plan
- **Assume:** One 20% underage across all directed fleets carried over the following year
- **Result:** Carry-over did not affect rebuilding schedule

# Council Request to SEFSC

- Simulate fleet-specific carry-over events that are consecutive along with one-year and multi-year intervals.
  - Discount carry-overs for natural mortality
  - Cap carry-overs at 95% of the annual OFL.
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- **Goal:** Demonstrate how the rebuilding timeline is affected when multiple carry-overs occur with and without being discounted for M and with and without being capped by OFL.

# Methods

- Used base projection model (SS3) from 2014 update to SEDAR 31 with a terminal data year of 2014
  - Updated 2014, 2015 and 2016 landings data. Projections began in 2017
  - Bycatch rates fixed at values from SEDAR 31 update
- Conducted six projection scenarios:
  - Base cases:**  $F_{\text{REBUILD}}$ ; ABC time-series accounting for updated landings  
 $F_{\text{SPR26\%}}$ ; OFL time-series accounting for updated landings
  - Carry-over:** Fixed annual landings at the ABC, the ABC – underage, or ABC + carry-over. Carry-over amount was capped in one of 4 ways
    - a) No adjustment for M; OFL cap not applied
    - b) No adjustment for M, OFL cap applied
    - c) Adjust for M; OFL cap not applied
    - d) Adjust for M; OFL cap applied

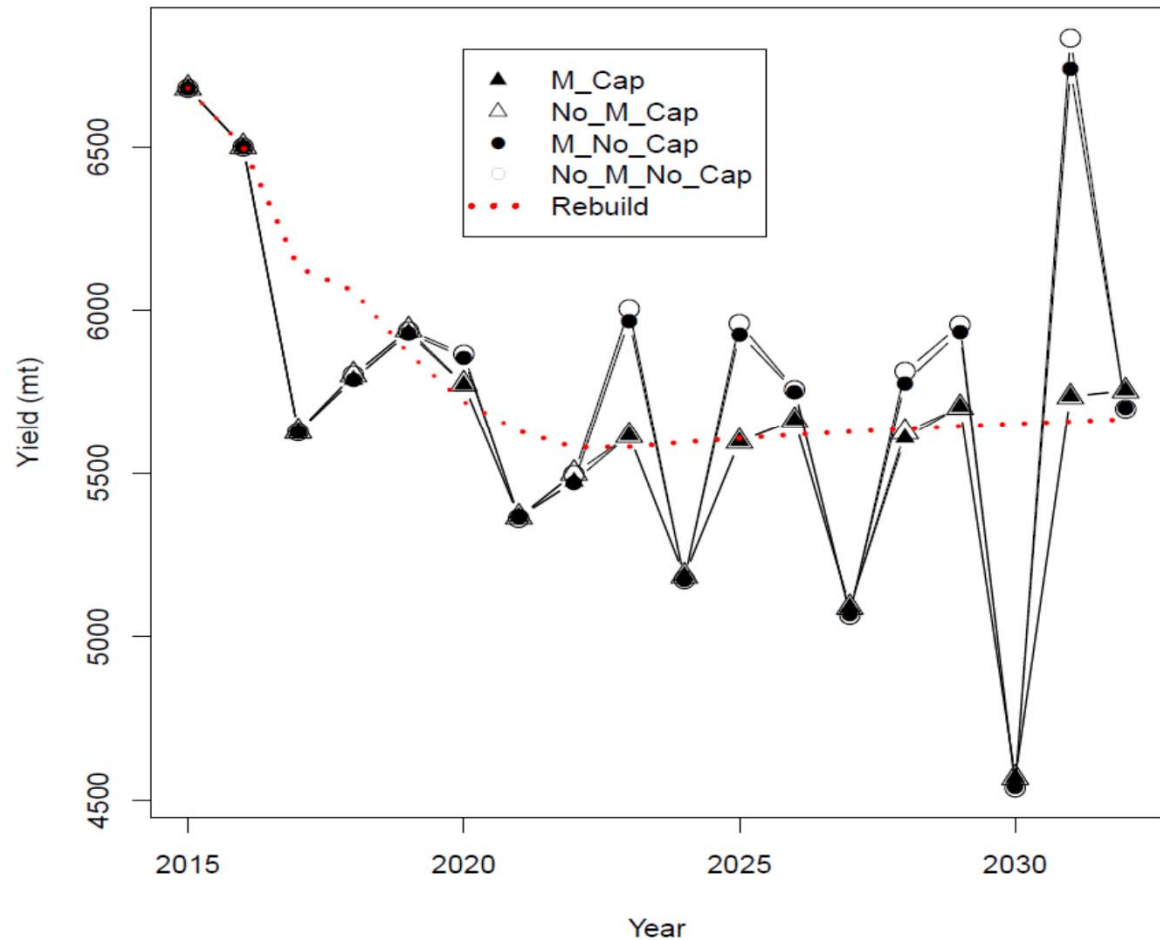
# Compute Underage

- Underage range 5 – 20%
- One consecutive, one single-year interval & three multi-year intervals
- Rec. private (80.2% east, 19.8% west); Rec. for-hire (72.2% east, 27.8% west)

% underage by SERO Fleet				Underage by SERO fleet and region (metric tons)					
Year	Rec. Private	Rec. For-Hire	Commercial	Private East	Private West	For-Hire East	For-Hire West	Commercial	
2015	0	0	0	0	0	0	0	0	
2016	0	0	0	0	0	0	0	0	
2017	20	0	5	278.1	68.6	0	0	156.3	
2018	10	20	0	137.4	33.9	181.6	69.6	0	
2019	0	10	0	0	0	87.9	33.7	0	
2020	0	0	0	0	0	0	0	0	
2021	0	0	10	0	0	0	0	287.2	
2022	10	20	0	126.5	31.2	167.2	64.1	0	
2023	0	0	0	0	0	0	0	0	
2024	10	0	10	126.9	31.3	0	0	285.4	
2025	0	10	0	0	0	84.0	32.2	0	
2026	0	0	0	0	0	0	0	0	
2027	20	10	5	255.3	63.0	84.3	32.3	143.5	
2028	0	0	10	0	0	0	0	287.5	
2029	0	0	0	0	0	0	0	0	
2030	20	20	20	256.4	63.3	169.4	64.9	576.6	
2031	0	0	0	0	0	0	0	0	
2032	0	0	0	0	0	0	0	0	

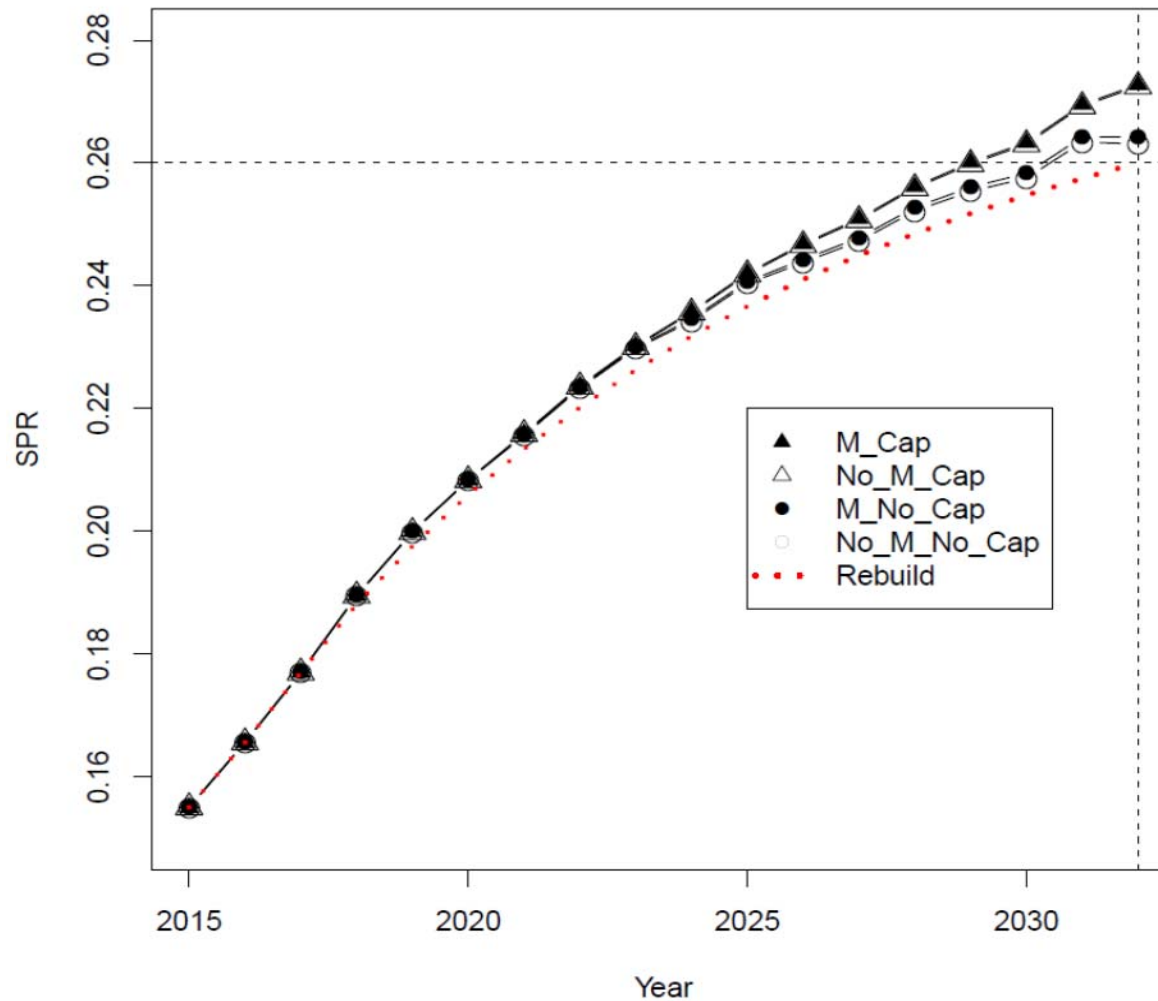
# Results (Yield)

- M adj. little effect on carry-over yield
- OFL cap major effect on carry-over yield





# Results (SPR)



# Important Assumptions/Caveats

- Results are hypothetical and are **not meant as the basis for management advice**
- Results are expected to hold for underages <20% and/or fewer fleets with underages (still < 20%), but extreme underages (>20%) and their resulting carry-over are untested and may demonstrate different dynamics
- Results only hold if carryover is applied to the fleet for which the underage occurred
  - Differing selectivities by fleet imply that **carry-overs are non-transferable across fleets**
- The same approach is **not** expected to hold for an overage and subsequent underage



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# GULF OF MEXICO KING MACKEREL CARRY OVER SIMULATIONS

Gulf of Mexico Fisheries Management Council  
Standing, Socioeconomic  
Reef Fish Scientific and Statistical Committee  
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# The Request

- The amount of uncaught quota to be carried over will be added to the ABC for the following fishing year, and the new ABC cannot exceed 95% of that year's OFL.
- Simulate successive carry-overs, and one-year intervals between carry-overs
- Natural mortality for fish selected by the fishing fleets must be discounted from the uncaught quota and be considered in the carry-over provision
- The uncaught quota to be carried over may only be applied to the ACL of the smallest divisible fishing sector component from whence it came (e.g., for king mackerel, the Gulf Western Zone\*)

\*This was not possible as the commercial GWZ was not modeled as a separate area/fishery. The carry-over is applied to the commercial sector as a whole, and it won't matter where the carry over is applied since the gear selectivity is uniform throughout zones

# King mackerel situation and results summary

- GOM king mackerel is not overfished and not undergoing overfishing
- Neither the commercial nor the recreational sector land their allotted catch. Even if the underage is carried over, it is highly unlikely that all of it would be caught
- Simulations explored a scenario where the stock is fished at FSPR30 except when underages or carry-over occur (i.e. overall a higher level of exploitation than currently realized).
- Carry-over under these assumptions had no effect on the future status of the GOM king mackerel stock

# Summary of simulations review

- The simulation studies have shown that carry-over according to provisions in the draft generic amendment are unlikely to impact negatively on the rebuilding timeline of red snapper or the status of king mackerel.
- None of the alternatives explored resulted in a lengthening of the rebuilding timeline for red snapper. Some tradeoffs are evident between catch levels and speed of rebuilding.
- It is unclear how generalizable these results are to other stocks, fisheries and situations (!)

## General SSC comments

- Carry-over is likely to be appropriate and effective only when the underage has occurred due to regulatory action
- Carry-over would be problematic if the underage had occurred due to stock decline
- The scientific information available (limited simulation studies on two fisheries) does not provide a strong basis for choosing between the alternatives set out in the draft document or for generalizing performance of the approach to other fisheries
- The same procedures can not be used to carry-over (pay back) overages and may be also be problematic when e.g. an underage is preceded by an overage



## General SSC comments

- An alternative to the proposed framework might include annually re-running projections with actual catches, which would account more fully for biological processes (mortality, growth and reproduction) and can be applied to overages as well as underages
- This would, however, require an additional step (re-running projections) after the catch estimates have been compiled