THE SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

Adding an economic component to the Snapper Grouper Management Strategy Evaluation

April 2026

Overview

- What does staff hope to get out of this discussion?
- Background information on the MSE
- General methodology
- Application of willingness to pay (WTP) estimates
- Challenges
- Questions

What does staff hope to get out of the discussion?

- Please keep in mind that the economic analysis is very early in the development process and still in the planning stage.
- Help staff:
  1) Further calibrate the methodology,
  2) Point out additional potential pitfalls to consider and how they can be overcome, and
  3) Identify additional sources of information that could be incorporated into the analysis.

Background

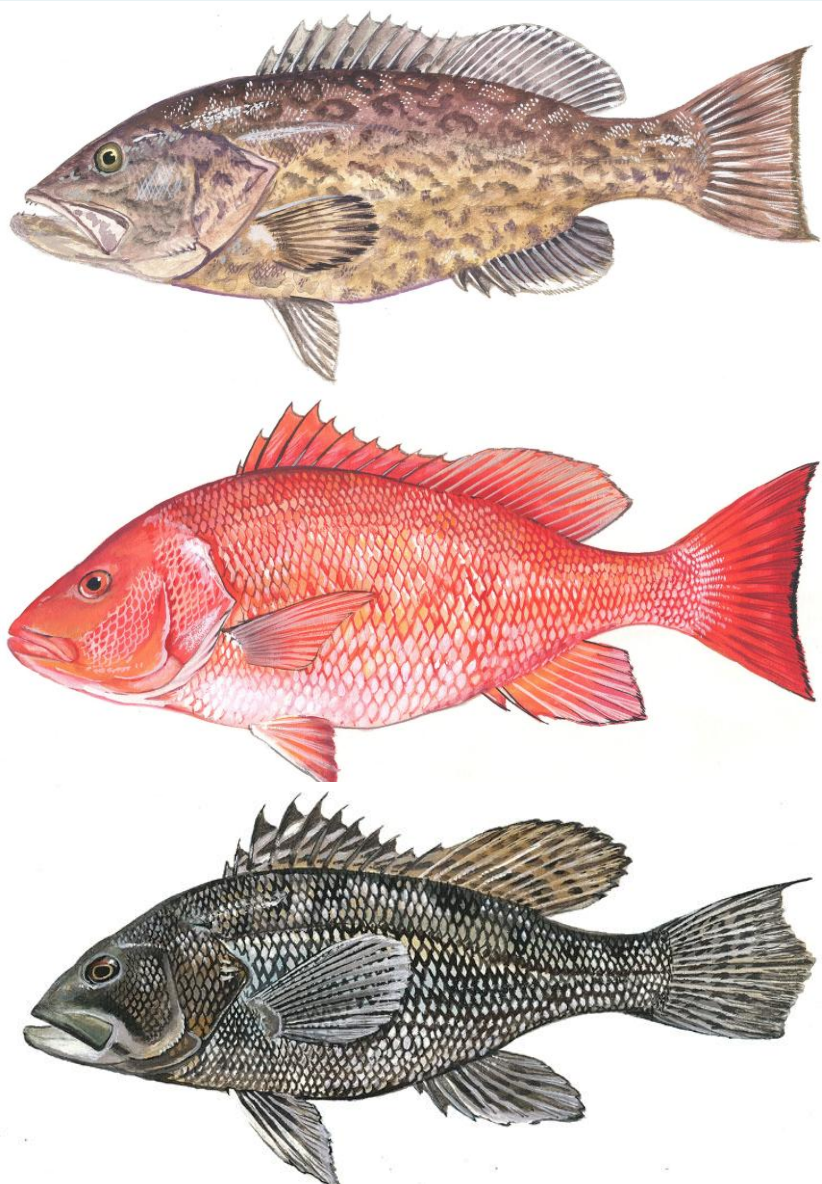
- Contactors and staff have been developing a management strategy evaluation (MSE) for the recreational snapper grouper fishery.
  - Concentrating on strategies to reduce the number of released fish to improve yield throughout the fishery.
  - Consider the need for fishery access and resource use while rebuilding overfished stocks and preventing overfishing.

- Focusing on red snapper, gag, black sea bass, and potentially other species.

Management measures being explored

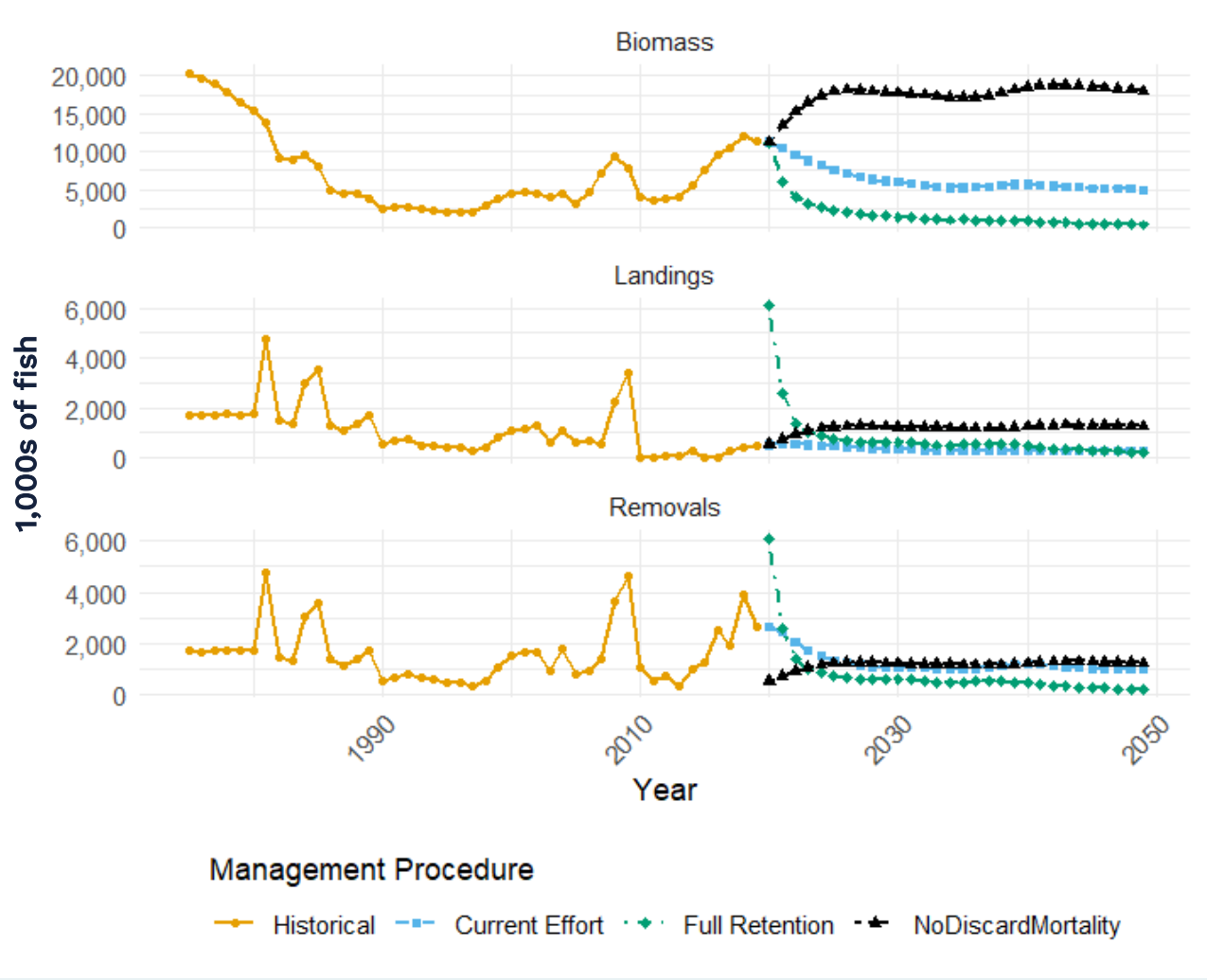
- Council direction to this point has been to evaluate the theoretical implementation of:
  - Aggregate bag limits,
  - Mandatory stopping,
  - Seasonal management, and
  - Spatial management (closed and open areas).

- All measures are applied for the recreational snapper grouper fishery.



Modeling outputs for management measures

- Projections of landed and discarded fish under various scenarios modeling management changes for the recreational sector.
  - Possible to apply economic value estimates for harvest and discards to estimate net economic benefits of the management options and evaluate tradeoffs.



General methods

- **Net economic benefits of modeled management action** = (CS for fish harvested + CS for fish released) – value of fish that do not survive release.
  - Benefit: Assumption is that anglers derive an economic benefit from fish harvested or released.
    - The marginal value of harvested fish is notably higher than that for released fish.
  - Cost: Fish that do not survive release (dead discards) are an economic cost to the fishery.
    - Dead discards are not available to be caught again in the fishery and thus potential future economic benefits are removed.

Measures of consumer surplus

- WTP estimates for harvested or discarded **red snapper** and **gag** provided in Carter and Liese (2012).
  - Apply MWTP estimate for **2nd kept fish** since gag and red snapper have low bag limits.
  - Apply MWTP estimate for **4th released fish** since this is a midpoint and it is unknown how many fish would be released on a trip.
    - Apply average of "release, minimum size" and "release, bag limit" since reason for theoretical releases in MSE will be unknown.

TABLE 4. Estimates of the marginal willingness to pay (MWTP; in 2003 dollars) for an additional fish kept, released due to the minimum size limit, or released due to the bag limit starting from a specific number of fish (ns = not significant).

Species	MWTP[a] for catch and:	Second fish	Third fish	Fourth fish	Fifth fish	Sixth fish	±95% confidence interval (%)
Groupers	Keep	80.40	53.60	39.51	31.13	25.65	8
	Release, minimum size	12.03	8.02	5.91	4.66	3.84	20
	Release, bag limit	9.95	6.63	4.89	3.85	3.17	26
Red snapper	Keep	62.97	41.98	30.94	24.39	20.09	9
	Release, minimum size	11.08	7.38	5.44	4.29	3.53	25
	Release, bag limit	6.86	4.57	3.37	2.66	2.19	43
Dolphinfish	Keep	11.81	7.87	5.80	4.57	3.77	28
	Release, minimum size	7.14	4.76	3.51	2.77	2.28	27
	Release, bag limit	–0.43	–0.29	–0.21	–0.17	–0.14	ns
King mackerel	Keep	77.59	51.72	38.12	30.05	24.75	9
	Release, minimum size	14.00	9.33	6.88	5.42	4.47	20
	Release, bag limit	37.62	25.07	18.48	14.57	12.00	10

[a]Marginal WTP based on random parameter logit estimates of the parameters in the 2003 stated preference choice experiment catch disposition model in WTP space. The 95% confidence intervals are calculated around the mean parameter estimates using the estimated SEs and the normal distribution. The parameter estimates were rescaled to 1-fish units.

Measures of consumer surplus

- WTP estimates for harvested **black sea bass** provided in Haab et al (2010).
  - Direct estimates of the WTP for black sea bass are not currently available and staff has not been able to identify an estimate applicable for the South Atlantic.
  - Apply WTP estimate for a "generic" snapper as an approximation of the individual CS an angler would derive from an additional black sea bass that is caught and kept.
  - Use estimate from the finite mixture model.
    - Takes into account the variation in the preferences of fishermen and had the best prediction rates of the four models.
- Still looking for a CS estimate that can be applied to released black sea bass.

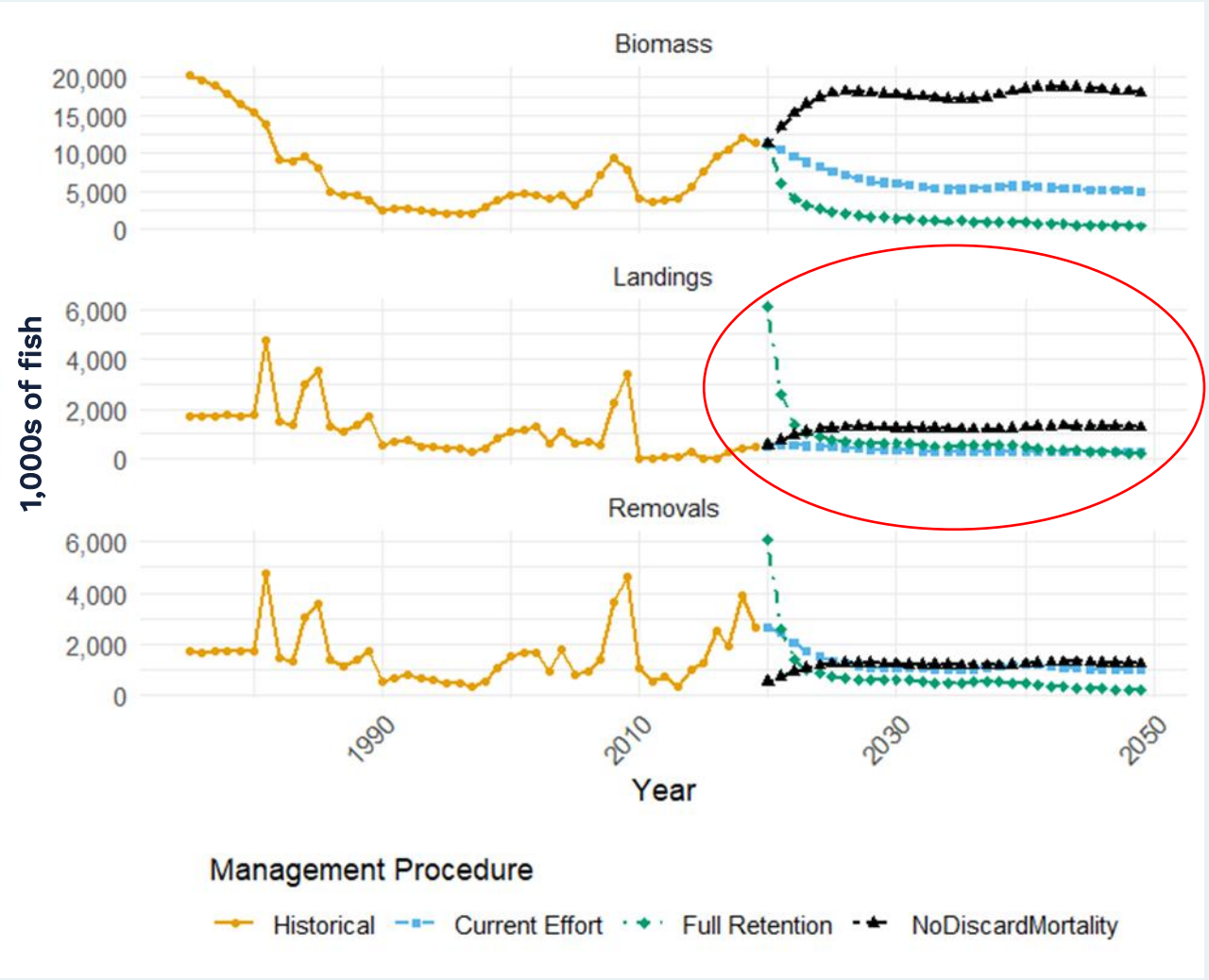
Table 7. Willingness-to-pay for One Additional Fish Caught and Kept

	Conditional Logit	Nested Logit	Mixed Logit[a]	Finite Mixture Model[b]
Pr_big dolphin	$123 ($100, $147)[c]	$103 ($81, $126)	$37 ($27, $48)	$412 ($272, $606)
Pr_small dolphin	$17 ($14, $19)	$11 ($8, $14)	$4 ($3, $5)	$23 ($13, $35)
Big Game	$40 ($2, $115)	$81 ($18, $142)	-$0.50 (-$14, $13)	$202 ($55, $340)
King mackerel	$19 ($3, $35)	$25 ($9, $41)	$6 (-$3, $15)	-$23 (-$83, $41)
Spanish Mackerel	-$10 (-$14, -$6)	-$8 (-$13, -$4)	-$6 (-$8, -$4)	$13 ($4, $24)
Small Game	$3 ($2, $4)	$3 ($2, $5)	$1 ($0, $2)	$19 ($13, $25)
Red drum	$13 ($9, $16)	$12 ($9, $16)	$12 ($8, $16)	$22 ($16, $27)
Seatrout	$8 ($7, $9)	$9 ($7, $10)	$7 ($5, $8)	$12 ($10, $14)
Red snapper	$123 ($113, $134)	$39 ($33, $45)	$114 ($103, $127)	$102 ($87, $121)
Grouper	$91 ($85, $96)	$32 ($28, $36)	$75 ($66, $85)	$98 ($88, $110)
Snapper	$25 ($20, $30)	$9 ($7, $11)	$22 ($15, $29)	$9 ($6, $13)

[a]Normal Distribution
[b]Mean WTP
[c]95% confidence interval in parentheses.

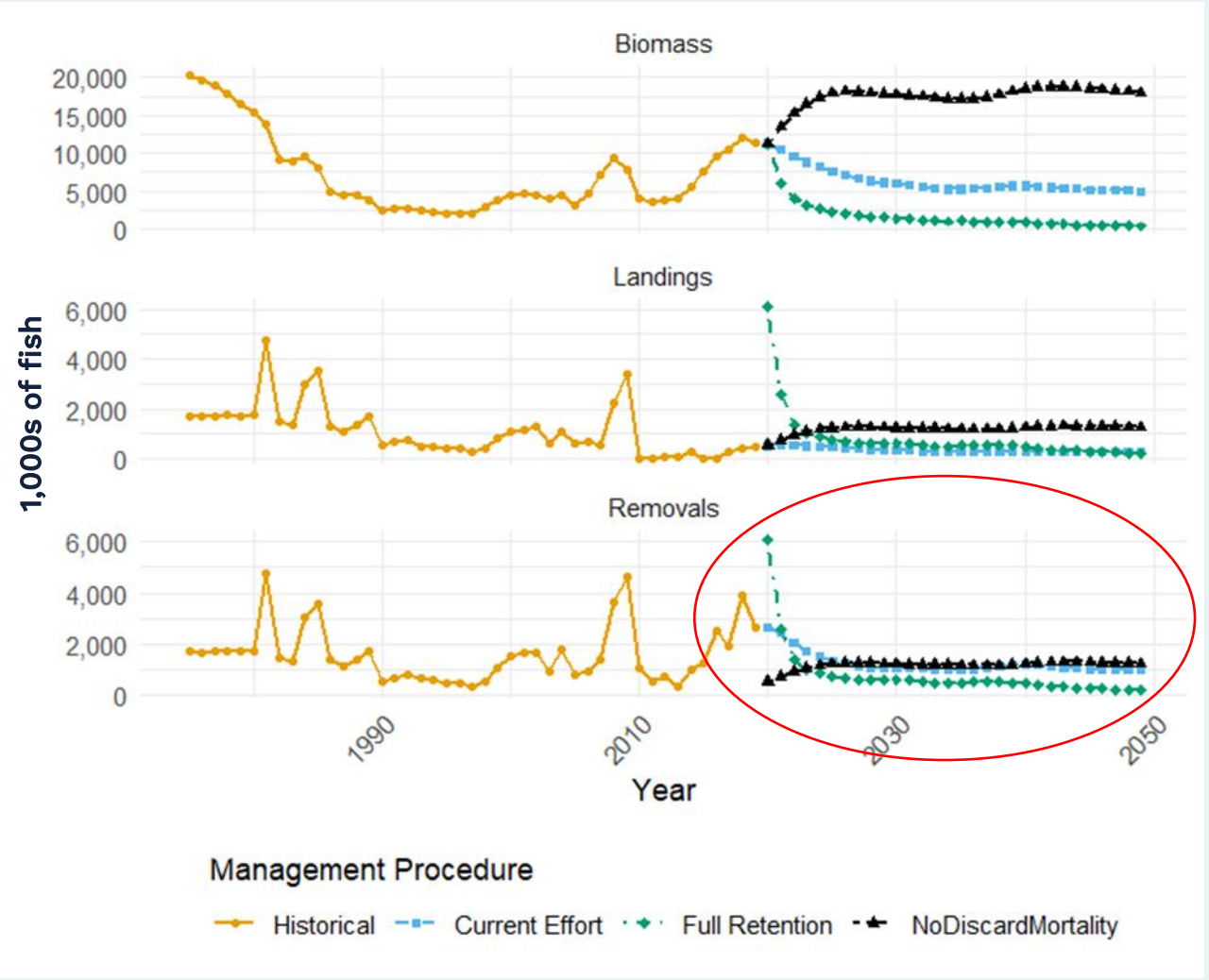
Application of CS for harvested fish

- Utilize projections for the number of fish landed.
  - Estimated benefit from harvest = # of fish * CS estimate.
    - Inflation adjusted WTP estimates from Carter and Liese (2012) will be used for gag and red snapper.
    - Inflation adjusted WTP estimate from Haab et al (2010) will be used for black sea bass.



Application of CS for discarded fish

- Utilize projections for removals.
  - Estimated benefit from discards = # of fish released (removals – landings) * CS estimate.
    - Inflation adjusted WTP estimates from Carter and Liese (2012) will be used for gag and red snapper.
    - Need to identify or develop an estimate for black sea bass and potentially other species not included in Carter and Liese (2012).



Application of CS for dead discards

- Utilize projections for removals.
  - Estimated cost from dead discards = (# of fish released * discard mortality rate) * CS estimate.
    - This one is kinda tricky!
    - Do not know whether a dead discard should be “valued” as a potential future harvest or a future discard in the fishery.
      - Perhaps the MSE model results can help with this but TBD.
    - Initially thinking of using an average of the WTP for harvest and discard to estimate the cost of a dead discard.

Discounting

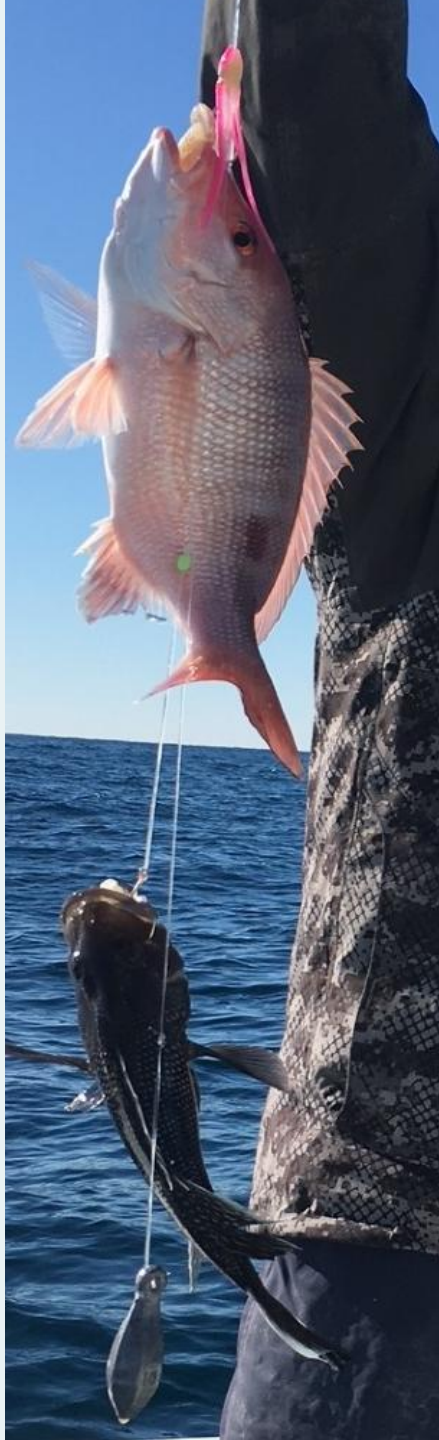
- The MSE can provide projected catches over several decades, thus discounting future benefits and costs will be appropriate.
  - Current federal guidance from the Office of Management and Budget is to utilize a discount rate of 3% and 7% when conducting benefit-cost analysis.
    - Provides a sensitivity analysis of sorts.
    - 7% rate estimates the pre-tax return on private capital (investment).
    - 3% rate represents the social rate of time preference (consumer consumption).

Known challenges and shortcomings

- CS estimates are static and do not change as more or fewer fish become available to the fishery.
  - Necessary information is not available to estimate a demand curve that would allow for a dynamic CS estimate as “the supply” of fish changes.
- Uncertainty for multiple reasons.
  - Modeling uncertainty.
  - Values applied to harvested and discarded fish.
- How do we estimate benefits when species-specific information is not available?
  - Applies to both catches and discards in some circumstances.
    - Potentially applies as other species are considered in the MSE.
    - Still need to find a way to address discards in the black sea bass fishery and potentially for other species.

What's the ideal outcome?

- Provide a way to compare the estimated net economic benefits of the various modeled management scenarios in the MSE across multiple species.
  - Get out of the "siloed" approach of looking at the fishery on a single species basis.
  - Assess tradeoffs between management options and between species.



Questions from the SEP?

- Up next, discussion questions for the SEP!

Discussion questions for the SEP

1) The MSE can provide projected catches over several decades, thus discounting future benefits and costs will be necessary. Current federal guidance is to utilize a discount rate of 3% and 7% when conducting benefit-cost analysis. Does the SEP suggest an additional discount rate outside of this range that should be explored when examining the net present value of benefits and costs for the management scenarios in the MSE? If so, what discount rate and why?

2) Does the SEP know of alternative estimates of consumer surplus for harvested or discarded fish that should be used instead of or in addition to those initially identified?
   a. Does the SEP know of consumer surplus estimates for released black sea bass?
   b. Could consumer surplus for non-groupers or red snapper be set a fraction of the consumer surplus for other species?

3) How would the SEP recommend determining that the conclusions are robust to the assumptions?
   a. It is important to note that we do not need a “perfect number” since we are looking a which management scenario is performing better compared to the others based on a certain set of assumptions. Those assumptions can include a range to provide a sensitivity analysis.

4) Does the SEP have any comments on the general methods and assumptions that are being proposed to add an economic component in the MSE?
   a. Assumption 1: For discarded red snapper or gag, utilize a WTP estimate that is the average value between a bag limit and minimum size limit release value since it is unknown whether discards in the MSE model are due to minimum size, bag limit, or other reasons.
      i. Also utilize the fourth fish estimate for red snapper and gag since it is unknown how many fish may be discarded on a hypothetical trip in the MSE.
   b. Assumption 2: Harvest and discards of these fish are considered a benefit and dead discards as a cost.
      i. Since the size and disposition (harvest vs discard) of a dead discard that hypothetically could have otherwise survived to be caught again in the fishery is unknown, the average of the WTP estimates for harvest and discards may be utilized to apply a value for the dead discards.