Estimated Changes in Headboat Landings for Select Species: Comparing Per Angler and Per Vessel Limits

Council Staff
March 2026

Information Requested

In December 2025, the Council requested an exploratory analysis of the impact of changing from a per vessel limit for Gag and Black Grouper, Scamp, and Snowy Grouper to a one fish limit per every 6 passengers.

Vessel limits were established for Gag and Black Grouper in 2023 (Amendment 53) and revised in Regulatory Amendment 36 (under review), Scamp and Yellowmouth Grouper in 2024 (Amendment 55 under review), and Snowy Grouper in 2015 (Regulatory Amendment 20). Due to the recent changes for some species, a comparison to the previous management measures will be included.

Conclusions:

Gag and Black Grouper

- Stock Status – Gag – Overfished and Overfishing, Black Grouper – Not Overfished nor Experiencing Overfishing (NOAA Fisheries 2025)
- The management scenario of 2 Gag or Black Grouper per vessel limit, which is under review by NOAA Fisheries for implementation, is significantly more restrictive than the previous 1 fish per angler baseline (pre-September 2023 levels).
- The requested scenario of 1 Gag or Black Grouper per 6 anglers would relax restrictions compared to management scenario under review (2 fish per vessel), recovering catch rates to near levels of harvest with 1 fish per person ($p = 1.00$) and produces higher retention than 2 Gag or Black Grouper per vessel ($p < 0.001$).
- The management shift would result in a modest 1% increase in total landings relative to the annual catch limit**.** While statistically and operationally meaningful in terms of individual trip behavior, the aggregate impact on total headboat landings for Gag and Black Grouper is small relative to the recreational annual catch limit (ACL).
- The recreational ACL was exceeded in 2024 and 2025.

Scamp and Yellowmouth Grouper

- Stock Status – Scamp and Yellowmouth Grouper – Overfished (NOAA Fisheries 2025)

- The ACL for Scamp and Yellowmouth Grouper will reduce when Amendment 55 is implemented (116,369 whole weight for Scamp to 23,678 lbs in 2025 for Scamp and Yellowmouth Grouper).
- The shift from 1 fish per vessel (Amendment 55 under review) to 1 fish per 6 anglers (requested scenario) was estimated to increase landings relative to the 2025 ACL by 5.2%, with the headboat fishery accounting for 8% of total recreational landings.

Snowy Grouper

- Stock Status – Snowy Grouper – Overfished and Overfishing (NOAA Fisheries 2025)
- Due to limited number of vessels reporting Snowy Grouper, much of the information on Snowy Grouper would be confidential based on the rule of three to display information.
- Very few trips reported having released Snowy Grouper from 2021 to 2025.
- Changing to a 1 fish per 6 anglers could result in new trips targeting Snowy Grouper.
- Recreational ACL was exceeded in 2024 and 2025.

Data

This analysis used trip-level data collected through the Southeast Region Headboat Survey (SRHS) from 2021 to 2025 for the South Atlantic region. Individual species records were aggregated to the trip level using a unique trip identifier (Collection). Trips that landed any species in the Snapper Grouper Fishery Management Unit plus trips that landed species in the top 10 by weight or number of fish reported to the Council in December 2024 (Council Session 1 Attachment 6 December 2024) were included.

For each trip, encounters were defined as the sum of retained and released Gag and Black Grouper, Scamp and Yellowmouth Grouper, or Snowy Grouper observed on that trip. Trips with none of the targeted species or group for the analysis were retained and coded as zero-encounter trips. The number of trips with neither Gag nor Black Grouper was over 90% in all years. Scamp and Yellowmouth Grouper and Snowy Grouper had even higher percentages of trips with none reported.

Statistical Approach for Zero-Inflated Data: Given the high proportion of zero-catch trips, the analysis focused on trips with landings (number kept) ≥ 1 to evaluate the impact of regulatory scenarios on fish retention among trips with actual catch. This approach isolates the effect of bag limit regulations on successful fishing trips, which is more relevant for management decisions than estimates dominated by zero-catch trips. Non-parametric methods (Kruskal-Wallis test and post-hoc Dunn test) were used due to the non-normal distribution of catch data even after filtering.

Trip-level covariates included vessel identifier, number of anglers, trip effort category (half day, three-quarter day, full day, other [usually more than a full day trip]), month, year, and area.

Gag and Black Grouper

Three landing scenarios were evaluated for Gag and Black Grouper (**Figure 1**):

1. Regulations pre-September 2023
    - 1 Gag or Black Grouper per person (1pp)
2. Regulations Under Review
    - 2 Gag or Black Grouper per vessel (2pv)
3. Requested Scenario
    - 1 Gag or Black Grouper per every 6 anglers on board (1p6a)
    - Starting at 1 fish for 1 angler and increasing on multiples of 6

The current regulation in place is two Gag and two Black Grouper per vessel and was not analyzed due to the low number of trips catching both Gag and Black Grouper from 2021 to 2025.

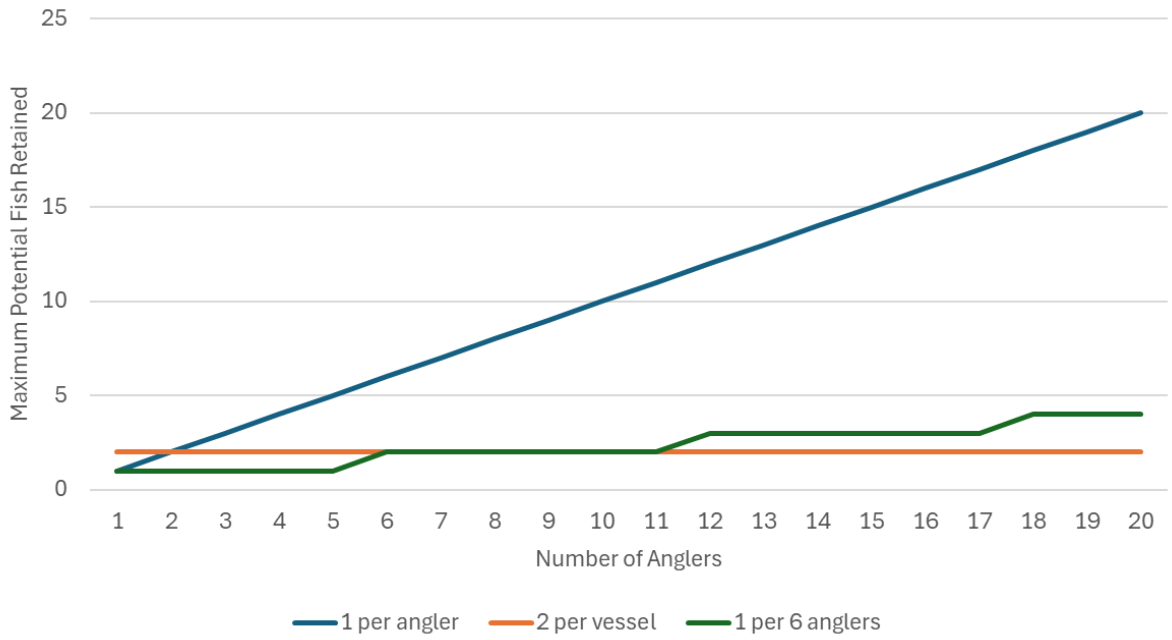

Figure 1. Number of Gag and Black Grouper combined that can be retained by number of anglers under three different management scenarios: 1 Gag and Black Grouper per angler, 2 Gag and Black Grouper per vessel, and 1 Gag and Black Grouper per every 6 anglers.

Gag and Black Grouper: Trip Type and Angler Effects

A preliminary investigation examined whether trip type and angler numbers affected Gag or Black Grouper catch (**Figures 2** and **3**). The number of Gag and Black Grouper kept on a trip did not appear to change substantially based on the number of anglers on a trip, except for "Other trips" (extended trips). However, trip type showed two clear differences: the number of fish kept was lowest for half-day and three-quarter-day trips for most angler counts (though sample sizes

were very low for trips with fewer than 5 anglers) and the number of fish caught (landed plus released) decreased at varying rates amount trip types with 1 to approximately 40 anglers. Above 40 anglers, trends in number of fish caught varied across trip types.

The transition to the two Gag and two Black Grouper vessel bag limit in September 2023 appeared to have a substantial impact on fish retained (**Figure 3**). Landings dropped from 597 fish in 2022, to 485 in 2023 (partial year under 2-fish vessel limit), and to 171 and 215 fish in 2024 and 2025, respectively. This over 50% reduction in landings could reflect the vessel limit regulation, changing abundance of Gag and Black Grouper, or both. The drop in fish kept was not associated with trends in the number of fish released, changes in the percent of trips with landings of Gag or Black Grouper, or changes in mean fish per trip. These complexities associated with the regulation change along with varying trends among trip type and changing number of trips by trip type underscore the difficulty in predicting how trips would respond to changes in bag limits using purely predictive models.

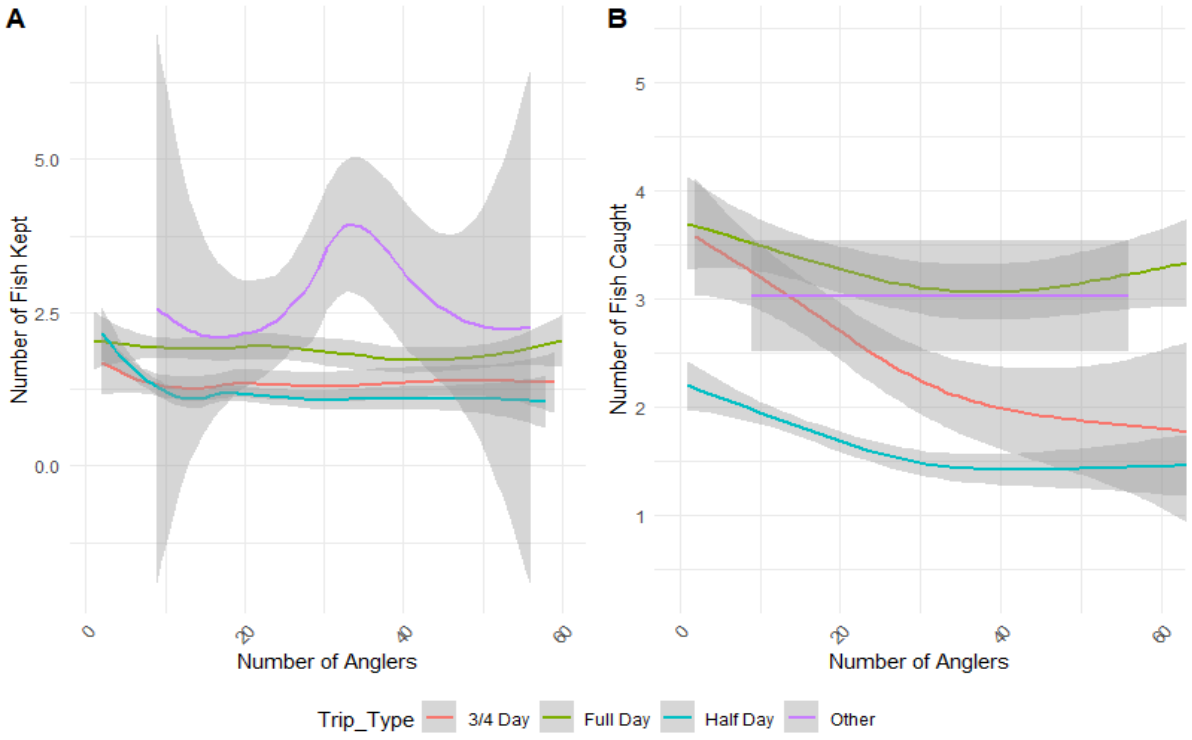

Figure 2. Number of Gag and Black Grouper kept (A) and caught (B) by trip type from 2021 to 2025. The line represents the smoothed conditional means for trips that caught at least 1 Gag or Black Grouper. The shaded areas are the 95% confidence bands based on the model. Source: SRHS

Gag and Black Grouper - Comparing Scenarios

Trips were modified based on the regulatory scenarios described above. **Table 1** describes how the regulations under review (2 fish per vessel) and requested scenarios (1 fish per every 6 anglers) would be applied to trips and catch that occurred in the period 2021 to September 2023 when regulations were 1 Gag or Black Grouper per person.

The key analytical challenge was determining how the number of kept fish would change from the current regulation which allows 2 Gag and 2 Black Grouper per vessel. However few trips landed both species; therefore, the analysis focuses on changes from 2 fish per vessel to the requested scenario. Each trip had the number of fish adjusted based on whether the trip reported a release and reached the two-fish vessel limit. On constrained trips under a 2 fish vessel limit, the number kept was increased to the minimum of either the sum of retained and released fish or the applicable bag limit for: (a) 1 fish per angler or (b) 1 fish per 6 anglers.

Two methods were employed to investigate potential changes in catch:

1. Point Estimate: Rules were applied deterministically to develop landings estimates for each scenario.
2. Parametric Bootstrap**:** Random sampling of trips was used to develop uncertainty estimates for each scenario. This approach preserves year-to-year variability, maintains trip catch distributions based on observed data, and provides confidence intervals for regulatory impacts.

Note: Several zero-inflated models were explored to predict changes in landings under each scenario; however, the over 50% reduction in landings combined with effects of trip type, seasonality, angler numbers, vessel identity, and area effects resulted in models that did not adequately match the observed data. Therefore, the scenario-based approach with bootstrap uncertainty was adopted.

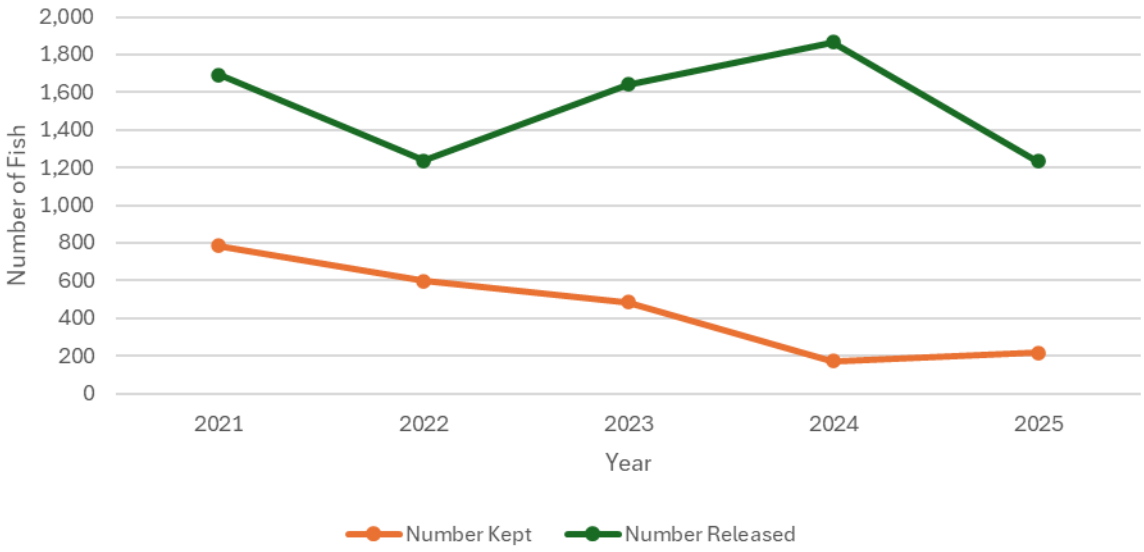

Figure 3. Number of Gag and Black Grouper kept and released in the headboat fishery in the South Atlantic region from 2021 to 2025. Source: SRHS

Table 1. Description of how number of fish retained on trips under the pre-September 2023 regulation of 1 Gag or Black Grouper would change under a 2 fish per vessel regulation (under review) and a 1 Gag or Black Grouper per every 6 anglers (requested). The trip description is based on observed data based for 2021 to 2023.

Trip description (1 fish per person)	**Observed data example**	**Interpretation of releases**	**Retained under 2 fish per vessel bag limit**	**Retained under requested (1 per 6 anglers)**	**Why**
Closed season	Released = 5; Kept = 0	Possession prohibited	0	0	Closure overrides everything
All fish released in open season (size-limited trip)	Released = 4; Kept = 0	Releases are mostly undersized or voluntary	0	0	Keep unkept fish as unkept potentially due to undersized fish
Bag limit binds (2 fish/vessel, after 9/2023)	Released = 1; Kept = 2	At least some releases could be legal but constrained	2	2 to 3 depending on anglers	Policy increases retention only when legal encounters
Encounters do not exceed bag limit	Released = 0; Kept = 1	Not bag-limited	1	1	Same encounters, no binding cap

Mixed releases (uncertain size)	Released = 1; Kept = 1	Release could be undersized or voluntary	1	1	Previous releases were due to constraints beyond bag limit
Mixed releases (uncertain size)	Released =5; Kept=6	Release could be undersized or voluntary	2	1 or up to 11 depending on anglers	Proposed regulation allows scaling with angler count

Gag and Black Grouper - Results

Kruskal-Wallis Test

A non-parametric Kruskal-Wallis test was conducted to test for significant differences in fish retention across the three regulatory scenarios. The test statistic was highly significant ($p < 0.001$, Table 2), indicating that regulatory scenarios have a statistically significant effect on the distribution of Gag and Black Grouper retained on headboat trips with catch. This should not be surprising given that the rules restrict the vessel limit scenario more than the other two scenarios.

Table 2. Post-hoc comparisons of three management scenarios for headboat trips landing 1 or more Gag or Black Grouper from 2021 to 2025 using Dunn Test with Bonferroni Adjustment.

Comparison	Z-statistic	P-value (adj)	Interpretation
1 per person vs 2 per vessel	7.88	9.52x10-15	Highly Significant
1 per person vs 1 per 6 anglers	0.41	1	Not Significant
2 per vessel vs 1 per 6 anglers	-7.47	2.33x10-13	Highly Significant

The number of headboat trips with Gag or Black Grouper caught was low, with greater than 90% of trips reporting neither landed nor released Gag or Black Grouper. The analysis focused on trips that reported catch (landed or released) Gag and Black Grouper.

As developed, the 1 fish per person mean catch matched observed catch in 2021 and 2022, and the 2 fish per vessel matched observed catch in 2024 and 2025 (**Figure 4**). The observed catch in 2023 did not match either scenario due to the regulation change mid-year. When expanding to total catch, the 1 fish per person scenario matched 2021–2022 landings, and the 2 fish per vessel scenario matched 2024–2025 landings (**Figure 5**). This was done to confirm the changes to the trip based on the changing bag limits was having the expected effect and estimate the change in annual landings for the management scenario.

The difference in point estimates for 2 fish per vessel and 1 fish per 6 anglers is less than 100 fish per year (**Table 3**). When the point estimate in number kept is converted to weight based on the average weight of landed Gag on headboat trips, the shift from the 2 fish per vessel limit to the 1 fish per 6-angler limit is expected to increase headboat landings by approximately 1% relative to the ACL (converted to whole weight using a 1.18 multiplier). Although a small increase, the recreational ACL was exceeded in 2024 and 2025.

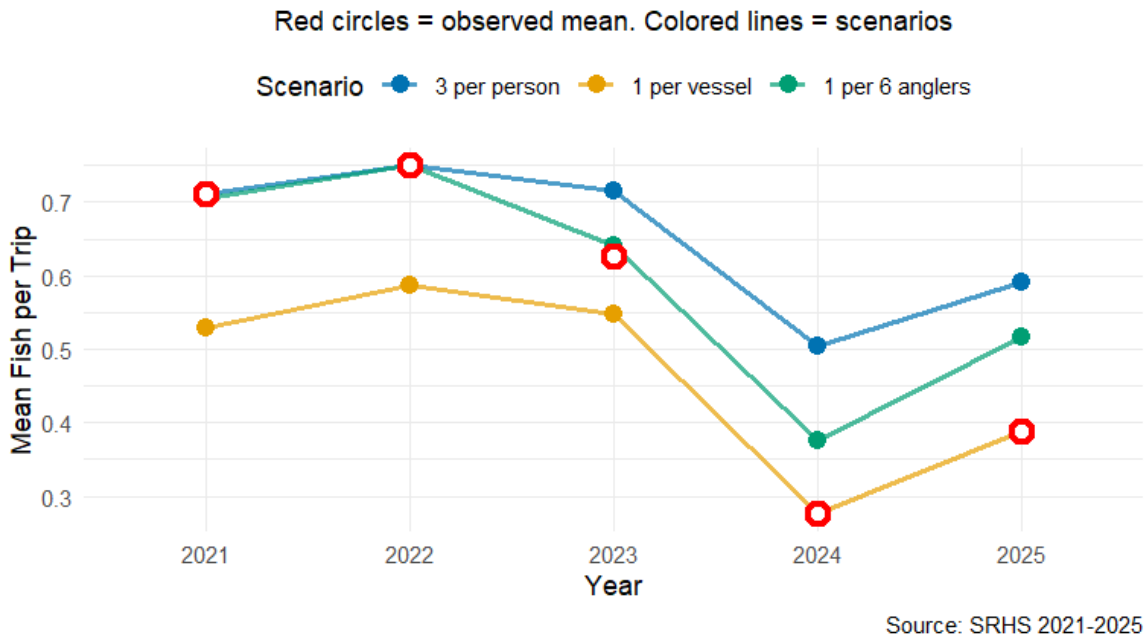

Figure 4. Mean Gag or Black Grouper landed (observed, open circles) for trips landing or catching Gag or Black Grouper. One fish per angler (blue, regulations in place 2021 to Sept-2023), 2 fish per vessel (yellow, Sept-2023 to 2025), and 1 fish per every 6 passengers (green). Source: SRHS

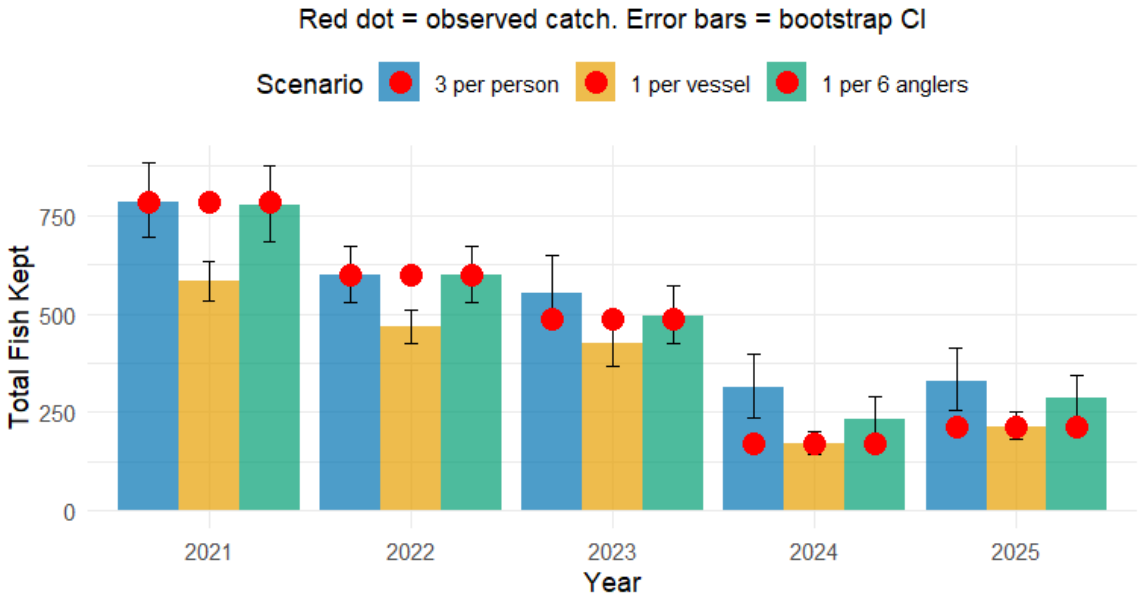

Figure 5. Estimated total number of Gag and Black Grouper kept under the three management scenarios: 1 fish per person (salmon), 2 fish per vessel (green), and 1 fish per 6 anglers (blue), uncertainty estimates based on parametric bootstraps, and point estimate based on observed catch (red dot). Source: SRHS

Table 3. Point estimate differences between 2 fish per vessel and 1 fish per 6 anglers scenario of headboat landings of Gag and Black Grouper from 2023 to 2025. The average whole weight is the summed number of Gag Grouper landed on headboats/summed whole weight of Gag. Percent of the annual catch limit is based on the ACL converted to whole weight (1.18).

Year	Difference between 2 fish per vessel and 1 fish per 6 anglers	Average Whole Weight (ww)	% of ACL (ww)
2023	-72	10.20632	0.7%
2024	-62	11.57493	0.7%
2025	-71	16.31098	1.1%

Scamp and Yellowmouth Grouper

Three regulatory scenarios were evaluated for Scamp and Yellowmouth Grouper (Figure 6):

1. Regulations in Place
    - 3 Scamp or Yellowmouth Grouper per person
2. Regulations Under Review
    - 1 Scamp or Yellowmouth Grouper per vessel
3. Requested Scenario
    - 1 Scamp or Yellowmouth Grouper per every 6 anglers on board
    - Starting at 1 fish for 1 angler and increasing on multiples of 6

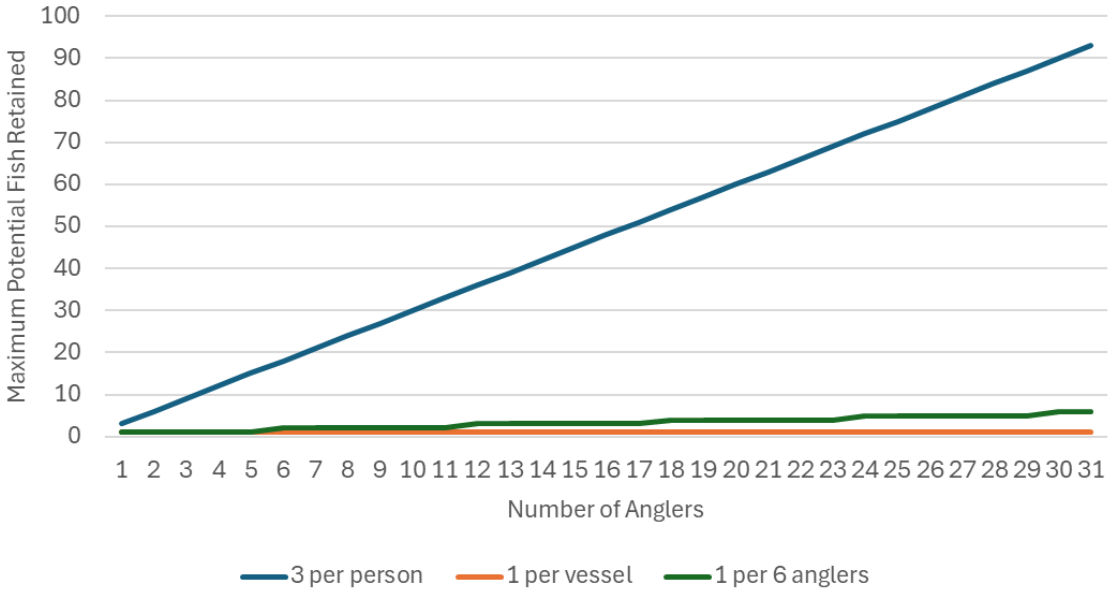

Figure 6. Number of Scamp and Yellowmouth Grouper combined that can be retained by number of anglers under three different management scenarios: 3 Scamp or Yellowmouth

Grouper per angler, 1 Scamp or Yellowmouth Grouper per vessel, and 1 Scamp or Yellowmouth Grouper per every 6 anglers.

Scamp and Yellowmouth Grouper - Trip Type and Angler Effects

The landings of Scamp and Yellowmouth Grouper occurred primarily on full day trips and trips exceeding full day trips. Although there were some catches of Scamp and Yellowmouth on half day and ¾ day trips, there were not sufficient to compare. The number of Scamp and Yellowmouth Grouper peak between 20 and 25 anglers (**Figure 7A**). The number kept increased from 3 fish to over 6 fish on the trip. On these same trips, the number of released fish increased as the number of anglers increased (**Figure 7B**). Based on number of fish kept, bag limits did not appear to limit landings of Scamp and Yellowmouth Grouper on most trips.

Landings of Scamp and Yellowmouth Grouper ranged between 600 and 850 fish per year (**Figure 8**). The number of releases exceeded landed fish from 2023 to 2025 and ranged between 700 and 1,000 fish per year.

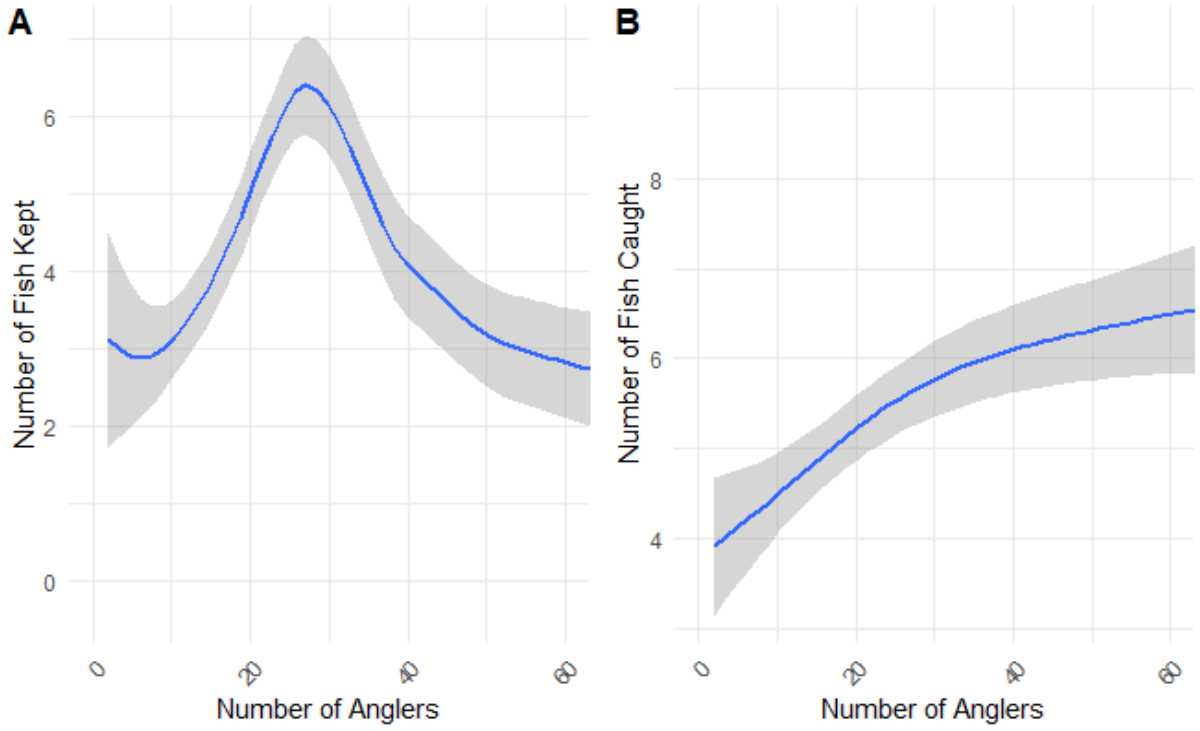

Figure 7. Number of Scamp and Yellowmouth Grouper kept (A) and caught (B) by trip type from 2021 to 2025. The line represent the smoothed conditional means for trips that caught at least 1 Scamp and Yellowmouth Grouper. The shaded areas are the 95% confidence bands based on the model. Source: SRHS

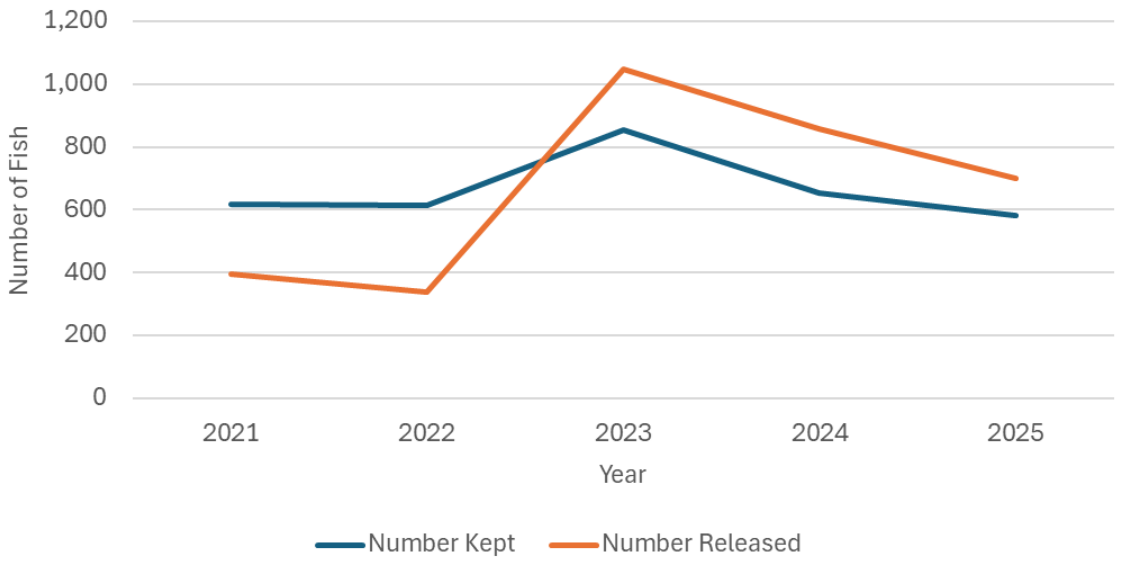

Figure 8. Number of Scamp and Yellowmouth Grouper kept and released in the headboat fishery in the South Atlantic region from 2021 to 2025. Source: SRHS

Scamp and Yellowmouth Grouper Comparing Scenarios

Trips were modified based on the regulatory scenarios described above. **Table 4** describes how the 1 fish per vessel, which is under rule making, and the requested management scenarios (1 fish per every 6 anglers) would be applied to the baseline period when 3 Scamp or Yellowmouth Grouper were allowed per person.

See Gag and Black Grouper on methods for comparing alternatives.

Table 4. Description of how number of fish retained on trips under the regulation of 3 Scamp or Yellowmouth Grouper would change under a 1 fish per vessel regulation (under review) and a 1 Scamp or Yellowmouth Grouper per every 6 anglers (requested). The trip description is based on observed data based for 2021 to 2025.

Trip description	Observed data example	Interpretation of releases	Retained under 1 fish per vessel bag limit	Retained under 1 per 6 anglers	Why
Closed season	Released = 5; Kept = 0	Possession prohibited	0	0	Closure overrides everything
All fish released in open season (size-limited trip)	Released = 4; Kept = 0	Releases are mostly undersized or voluntary	0	0	Keep unkept fish as unkept potentially due to undersized fish
Encounters do not	Released = 0; Kept = 1	Not bag-limited	1	1	Same encounters, no binding cap

exceed bag limit					
Mixed releases (uncertain size)	Released = 3; Kept = 2	Release could be undersized or voluntary	1	1 or 2 depending on number of anglers	Previous releases were due to constraints beyond bag limit
Mixed releases (uncertain size)	Released =5; Kept=6	Release could be undersized or voluntary	1	1 or up to 6 depending on number of anglers	Proposed regulation allows scaling with angler count

Scamp and Yellowmouth Grouper - Results

Kruskal-Wallis Test

Under Baseline conditions, the median Scamp retention was 2 fish per trip (IQR: 1-4), with 44.1% of trips retaining 3 or more fish. Simulation of 1 fish per vessel would compress retention dramatically: 77.3% of trips would be capped at exactly 1 fish, with a median of 1 fish and zero trips exceeding the limit ($Z = 56.55$, $p < 0.0001$ vs. 3 fish per person). The 1 fish per 6 anglers scenario would shift the distribution to near levels harvested with 3 fish per person, with a median of 2 fish and 35.3% of trips retaining 3 or more fish ($Z = -48.66$, $p < 0.0001$ vs. 1 fish per vessel)

Table 5. Post-hoc comparisons of three management scenarios for headboat trips landing 1 or more Scamp or Yellowmouth Grouper from 2021 to 2025 using Dunn Test with Bonferroni Adjustment.

Comparison	Z	P.adj	Interpretation
3 per person vs 1 per vessel	31.17766	6.42E-213	Highly Significant
3 per person vs 1 per 6 anglers	9.763455	4.85E-22	Highly Significant
1 per vessel vs 1 per 6 anglers	-21.4142	2.96E-101	Highly Significant

The number of headboat trips with Scamp and Yellowmouth Grouper caught was low, with greater than 95% of trips reporting neither landed nor released Scamp or Yellowmouth Grouper. The analysis focused on trips that reported catch (landed or released) Scamp and Yellowtail Grouper.

As developed, 3 fish per person matched observed catch from 2021 to 2025 (**Figure 9**). The mean fish kept was estimated to be over 2.5 fish per trip in the 3 fish per person scenario, 0.75 for 1 fish per vessel under review, and 1.75 for 1 fish per 6 anglers. Based on mean catch, the requested scenario (1 per 6 anglers) was expected to be a 30% reduction from the 3 per person and a 130% increase from the 1 fish per vessel. When expanding the mean landings to total catch, the 3 fish per person matched 2021–2025 landings. For the 1 fish per vessel and 1 fish per 6 anglers, the expected landings were significantly lower (**Figure 10**).

Converting the point estimates to weight using average Scamp whole weight, the difference between 1 fish per vessel and 1 fish per 6 anglers is approximately 200-334 fish per year (**Table 6**). Relative to the 2021-2024 ACL of 116,369 lbs, this represents approximately 0.8-1.5% of the ACL. However, with the substantial ACL reduction (drop to 23,678 lbs in 2025 although not currently in place) that would be implemented in Amendment 55 (in rule making), the headboat fishery's proportional impact would increase: the shift from 1 per vessel to 1 fish per 6 anglers would represent a 5.2% increase in landings relative to the 2025 ACL, with the headboat fishery accounting for 8% of total recreational landings.

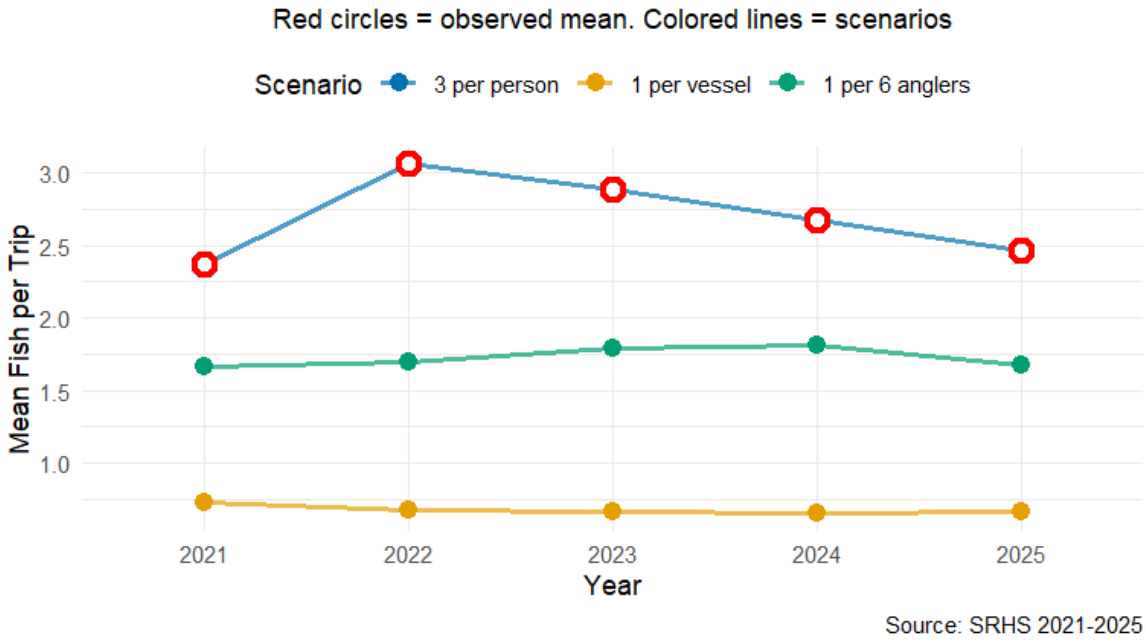

Figure 9. Mean Scamp or Yellowmouth Grouper landed (observed, open circles) under different management scenarios for trips landing or catching Scamp or Yellowmouth Grouper. Scenarios: 3 fish per person (blue), 1 fish per vessel (yellow), and 1 fish per every 6 passengers (green). Source: SRHS

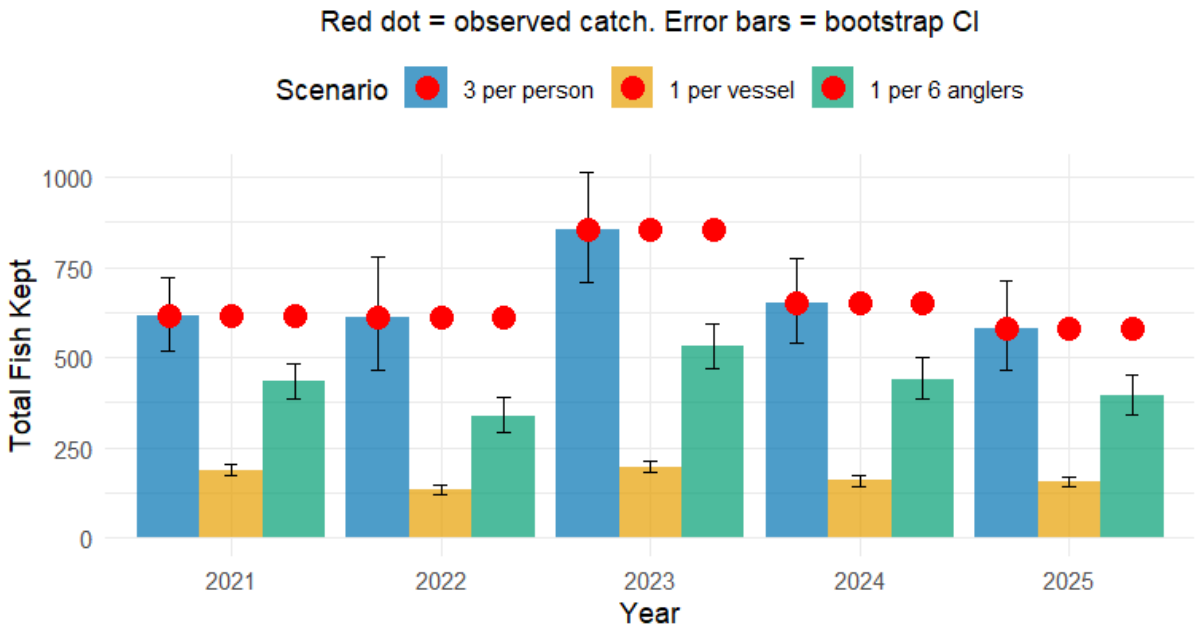

Figure 10. Estimated total number of Scamp or Yellowmouth Grouper kept under the three management scenarios (3 fish per person, blue, 1 fish per vessel, yellow, and 1 fish per 6 anglers, green), uncertainty estimates based on parametric bootstraps, and point estimate based on observed catch (red dot). Source: SRHS

Table 6. Point estimates of simulated total landings (kept catch) for Scamp and Yellowmouth Grouper from 2021–2025 under alternative bag limit scenarios (3 fish per person: 3pp; 1 fish per vessel: 1pv; and 1 fish per 6 anglers: 1p6a). Estimates for the 3 fish per person and 1 fish per vessel scenarios are compared to the requested 1 fish per angler scenario (Difference). The estimated whole weight change is calculated as the difference in numbers kept multiplied by the average whole weight (average whole weight = total whole weight of Scamp landed on headboats divided by the total number of Scamp landed on headboats). Annual Catch Limits (ACLs) for 2021–2025 are provided, along with the percent change relative to the ACL; negative values indicate reduced ACL availability for other recreational components. The 2025 ACL value is included to illustrate the projected reduction associated with implementation following review of Amendment 55.

Year	Scenario	Simulated Total Kept	Difference from 1 fish per 6 anglers	Estimated Whole Weight Change	ACL (lbs whole weight)	% Change Relative to ACL
2021	3 pp	616	182	722	116,369	0.6%
2022	3 pp	612	273	1,088	116,369	0.9%
2023	3 pp	855	324	1,753	116,369	1.5%
2024	3 pp	653	212	964	116,369	0.8%
2025	3 pp	580	186	972	23,678	4.1%
2021	1 pv	189	-245	-972	116,369	-0.8%

2022	1 pv	135	-204	-813	116,369	-0.7%
2023	1 pv	197	-334	-1,807	116,369	-1.6%
2024	1 pv	159	-282	-1,283	116,369	-1.1%
2025	1 pv	157	-237	-1,238	23,678	-5.2%
2021	1p6a	434				
2022	1p6a	339				
2023	1p6a	531				
2024	1p6a	441				
2025	1p6a	394				

Snowy Grouper

Due to the limited number of vessels landing Snowy Grouper and the very low number of releases observed from 2021 through 2025, detailed data summaries could risk disclosure of confidential information. Less than one percent of Snowy Grouper catch in the headboat sector was released during this period. Given the low incidence of releases, changes to the vessel limit would likely incentivize additional vessels to target Snowy Grouper. Such behavioral responses cannot be reliably modeled, and any resulting data would likely raise confidentiality concerns and therefore could not be presented.

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