



# **AMENDMENT 17A to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region**

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#### 4.2.2.2 Economic Effects

##### *Recreational fishery*

The alternative rebuilding strategies and their implied ACLs have no direct economic impacts, but management measures implemented to support a rebuilding strategy would have both short-term and long-term economic effects. In general, a lower ACL would imply more stringent management measures, and consequently larger adverse economic effects in the short-run. Abstracting from **Alternative 1 (Status Quo)**, which is the status quo, and **Alternative 8**, which is mainly administrative in nature, all management measures provided in **Section 4.6** would virtually close the red snapper fishery to both the commercial and recreational sectors. The only exception here is **Alternative 7**, which would allow harvest of red snapper by the recreational sector at reduced bag limit. **Alternative 7** of **Section 4.6** may also mean that the commercial sector would be allowed to continue harvesting red snapper, but this time subject to the ACL implied in each of the rebuilding strategies. Thus, at least two possible scenarios can occur. Given **Alternatives 2** through **6** of **Section 4.6**, all rebuilding strategies would have identical short-run and long-run economic implication on the recreational (and commercial) sector. In principle, the lower the implied ACL, the better would be the long-run economic status of the recreational (and commercial) sector, because the red snapper fishery could be open sooner. However, this would be valid only if lower ACLs were associated with more stringent management measures. Given **Alternative 7**, all rebuilding strategies would have identical short-run economic implications on the recreational sector if the implied ACLs were not binding constraints. If the ACLs were binding constraints such that the fishery closed when harvests reached the ACL, the various rebuilding strategies would have different economic implications. Lower ACLs would result in larger adverse economic effects in the short-run and potentially larger positive economic effects in the long run.

#### 4.3.2. Economic Effects

##### *Recreational Sector*

The methodology employed in this assessment follows the methodology employed in NMFS (2008a and 2008b). NMFS (2008a) analyzed the expected economic effects of a recreational closure of the red snapper fishery in the Gulf of Mexico in 2008. The methodology for that assessment is thoroughly documented in that report and is incorporated herein by reference. NMFS (2008b) analyzed the expected economic effects of the interim rule to close the red snapper fishery in the South Atlantic, and the methodology described in that document is incorporated herein by reference. A general description of the methodology employed for the current amendment is provided below. Appendix XX provides more details on the method used to estimate the economic effects of this amendment on the recreational sector.

This assessment evaluated the expected change in economic value relative to the status quo to fishers and for-hire vessels in response to the proposed alternatives. The change in economic value is measured in terms of the consumer surplus (CS) per angler fishing trip and net operating revenues (NOR) per angler trip to for-hire businesses. NMFS (2009a) recently derived estimates of CS and NOR based on studies in the Southeast over the last ten years (see Appendix XX). For the current purpose, the following estimates in 2009 dollars are used: \$80 for CS, \$128 for charter NOR, and \$68 for headboat NOR. **The economic effects of the various alternatives are presented in the tables below.**

Some of the alternatives considered in this amendment would close certain areas to fishing for all snapper grouper species, except golden tilefish, in the FMU. These area closures would be in addition to the red snapper fishery closure in all South Atlantic EEZ. For the current purpose, the same CS and NOR values are used to estimate the economic effects of alternatives affecting these other species.

Computation of the total expected change in economic value associated with the various alternatives involves multiplication of the change in the appropriate economic value, as described in the previous paragraphs, times the appropriate number of red snapper or other species individual angler target trips. The number of red snapper and other species target trips was calculated using the methods described in Holiman (1996), as modified by SERO and SEFSC staff. Target trips in both EEZ and state waters are calculated. In the particular case of Florida, partitioning of total target trips is done by using the estimated ratio of red snapper landings between Northeast Florida and Southeast Florida as reported in SERO LAPP 2009-05. This methodology applies only to the MRFSS data, which includes recreational fishing data for various fishing modes.

The headboat data does not contain information collected at the angler level, nor does it collect target intent information. Therefore, an alternative approach to estimating target effort is required for the headboat sector. This alternative approach differs from the method employed in assessing the economic effects of the interim rule on red snapper which used only the headboat trips (angler days) in Georgia and northeast Florida, considering the two areas to be the center of the South Atlantic red snapper fishery. The current approach in deriving headboat target trips for red snapper uses headboat trips in all areas as adjusted by a factor appropriate for each area. This factor, developed for each area, is calculated as the ratio of headboat angler trips with red snapper landings to total headboat angler trips. This assumption is expected to result in an overestimation of the amount of true red snapper target effort from these areas as some trips may not fish were red snapper are available, and many anglers would be expected to not be concerned with targeting any specific species. For all other species, the approach taken is to assume all headboat trips to be target trips for any snapper grouper species. This would also result in overestimation of headboat target trips for all other species. The estimates of target trips for all sectors are provided in Table 4-22, using the period 2005-2008. Charter and private mode trips are estimated trips for the EEZ only. Headboat trips include EEZ and state water trips.

Table 4-22. Average target trips in the South Atlantic, 2005-2008.

	Charterboat	Headboat*	Private	Total
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Northeast Florida				
Red Snapper	2,716	40,077	31,970	74,763
Snapper Grouper	11,032	49,378	67,777	128,187
Southeast Florida				
Red Snapper	530	7,299	6,242	14,071
Snapper Grouper	2,154	106,225	13,234	121,613
Georgia				
Red Snapper	515	1,127	1,822	3,464
Snapper Grouper	769	1,365	5,031	7,165
South Carolina				
Red Snapper	301	4,714	2,971	7,986
Snapper Grouper	3,975	49,532	22,157	75,664
North Carolina				
Red Snapper	0	2,558	0	2,558
Snapper Grouper	2,775	25,823	22,062	50,660

\*Headboat trips are total headboat angler days and so are likely to overestimate target effort.

Using these estimates of target effort and the economic values mentioned above, the baseline economic values in terms of CS and NOR are calculated. The economic effects of **Alternative 2** are presented in Table 4-23a Table 4-22a. The CS values are computed by multiplying the number of red snapper target trips times the CS per trip (\$80). The NOR values are computed by multiplying the number of for-hire trips times the NOR per trip. It may be noted again that partly due to the overestimation of target trips, the resulting CS and NOR reductions may be considered overestimates. In addition, it may be noted that the CS value used is uniform for all fishing modes. Headboat anglers may value red snapper differently, on average, than private and charterboat anglers. The direction and magnitude of difference are unknown, though the higher cost of fishing to charterboat anglers suggests the CS to headboat anglers would be less than that to charterboat anglers. Moreover, the NOR values used are uniform across all areas, and thus no account is taken for area variations in charter and headboat NOR.

Table 4-23a. Reductions in consumer surplus (CS) and for-hire net operating revenues (NOR) due to Alternative 2, in 2009 dollars.

	Charterboat	Headboat	Private	Total
Northeast Florida				
CS Trips	217,242	3,206,159	2,557,612	5,981,014
NOR	347,588	2,725,235		3,072,823
Total	564,830	5,931,395	2,557,612	9,053,837
Southeast Florida				
CS Trips	42,418	583,950	499,388	1,125,756
NOR	67,868	496,358		564,226
Total	110,286	1,080,308	499,388	1,689,981
Georgia				
CS Trips	41,200	90,139	145,740	277,079
NOR	65,920	76,618		142,538
Total	107,120	166,756	145,740	419,616

<b>South Carolina</b>				
CS-Trips	24,100	377,084	237,660	638,844
NOR	38,560	320,524		359,084
Total	62,660	697,605	237,660	997,925
<b>North Carolina</b>				
CS-Trips	0	204,646	0	204,646
NOR	0	473,949		473,949
Total	0	378,595	0	378,595

Table 4-22a. Reductions in consumer surplus (CS) and for-hire net operating revenues (NOR) due to Alternative 2, in 2009 dollars.

	Charterboat	Headboat	Private	Total
<b>Northeast Florida</b>				
CS-Trips	761,429	633,891	2,148,532	3,543,852
NOR	347,588	2,727,731		3,075,319
Total	1,109,017	3,361,622	2,148,532	6,619,170
<b>Southeast Florida</b>				
CS-Trips	148,673	54,578	419,513	622,764
NOR	67,868	487,576		555,444
Total	216,542	542,153	419,513	1,178,207
<b>Georgia</b>				
CS-Trips	126,200	65,035	249,560	440,795
NOR	65,920	92,840		158,760
Total	192,120	157,875	249,560	599,555
<b>South Carolina</b>				
CS-Trips	23,560	126,342	93,840	243,742
NOR	38,560	316,766		355,326
Total	62,120	443,108	93,840	599,068
<b>North Carolina</b>				
CS-Trips	0	6,702	0	6,702
NOR	0	161,989	0	161,989
Total	0	168,691	0	168,691

Table 4-23b **Table 4-22b** presents the economic effects of **Alternative 5**. Due primarily to the difficulty of distinguishing trip activities in each grid by depth, the economic effects of **Alternative 3** cannot be quantified. It may only be remarked that, in principle, **Alternative 3** would result in relatively smaller economic effects than **Alternative 5** as some areas in the designated grids would be left open to fishing for snapper grouper, except red snapper. However, some of these “open” areas under **Alternative 3** may be subject to seasonal closures imposed under previous amendments.

**Alternative 5** would close certain fishing areas for recreational fishing of all snapper grouper fishing, except golden tilefish, in addition to prohibiting red snapper fishing in the EEZ year

round. The reductions in CS and NOR shown in Table 4-23b Table 4-22b incorporate the red snapper closure found in Table 4-23a Table 4-22a and additional reductions in CS and NOR due to the closure of snapper grouper fishing in certain areas. Additional CS and NOR reductions are calculated by multiplying the number of target trips in the subject areas by the same CS and NOR values presented earlier. The target trips for headboats in the four designated grids are estimated by applying on total headboat angler trips, by area, an adjustment factor. This factor is derived as a ratio of the number of angler trips in the four designated grids to the total number of angler trips that reported fishing locations. The same ratio is applied on the charter and private target trips, by area, to arrive at the number of charter and private target trips for each grid.

Table 4-23b. Reductions in consumer surplus (CS) and for hire net operating revenues (NOR) due to Alternative 3 or Alternative 5, in 2009 dollars.

	Charterboat	Headboat	Private	Total
<b>Northeast Florida</b>				
CS Trips	1,008,681	6,748,548	7,419,954	15,177,183
NOR	1,613,889	5,736,266		7,350,155
Total	2,622,570	12,484,814	7,419,954	22,527,338
<b>Southeast Florida</b>				
CS Trips	42,418	583,950	499,388	1,125,756
NOR	67,868	496,358		564,226
Total	110,286	1,080,308	499,388	1,680,981
<b>Georgia</b>				
CS Trips	73,699	147,842	358,494	580,035
NOR	117,918	125,665		243,583
Total	191,617	273,507	358,494	823,618
<b>South Carolina</b>				
CS Trips	24,100	377,084	237,660	638,844
NOR	38,560	320,521		359,081
Total	62,660	697,605	237,660	997,925
<b>North Carolina</b>				
CS Trips	0	204,646	0	204,646
NOR	0	173,949		173,949
Total	0	378,595	0	378,595

Table 4-22b. Reductions in consumer surplus (CS) and for-hire net operating revenues (NOR) due to Alternative 3 or Alternative 5, in 2009 dollars.

	Charterboat	Headboat	Private	Total
<b>Northeast Florida</b>				
CS-Trips	2,279,495	656,482	8,232,365	11,168,342
NOR	600,474	3,329,048		3,929,523
Total	2,879,969	3,985,531	8,232,365	15,097,865
<b>Southeast Florida</b>				
CS-Trips	148,673	54,578	419,513	622,764
NOR	67,868	487,576		555,444

Total	216,542	542,153	419,513	1,178,207
<b>Georgia</b>				
CS-Trips	179,074	65,085	278,689	522,848
NOR	66,974	94,154		161,128
Total	246,048	159,239	278,689	683,976
<b>South Carolina</b>				
CS-Trips	23,560	126,342	93,840	243,742
NOR	38,560	316,766		355,326
Total	62,120	443,108	93,840	599,068
<b>North Carolina</b>				
CS-Trips	0	6,702	0	6,702
NOR	0	161,989	0	161,989
Total	0	168,691	0	168,691

Table 4-23e Table 4-22c presents the economic effects of **Alternative 6**. Due primarily to the difficulty of distinguishing trip activities in each grid by depth, the economic effects of **Alternative 4** cannot be quantified. It may only be remarked that, in principle, **Alternative 4** would result in relatively smaller economic effects than **Alternative 6** as some areas in the designated grids would be left open to fishing for snapper grouper, except red snapper. However, some of these “open” areas under **Alternative 4** may be subject to seasonal closures imposed under previous amendments.

**Alternative 6** would close certain fishing areas for recreational fishing of all snapper grouper fishing, except golden tilefish, in addition to prohibiting red snapper fishing in the EEZ year round. This alternative would close three grid areas in addition to the four provided under **Alternative 5**. The reductions in CS and NOR shown in Table 4-23e Table 4-22c incorporate those of the red snapper closure found in Table 4-23a Table 4-22a, the four grid closures presented in Table 4-23b Table 4-22b, and additional reductions in CS and NOR due to the closure of three more grid areas. Additional CS and NOR reductions are calculated in the same way done for **Alternative 5**.

Table 4-23c. Reductions in consumer surplus (CS) and for-hire net operating revenues (NOR) due to Alternative 4 or Alternative 6, in 2009 dollars.

	Charterboat	Headboat	Private	Total
<b>Northeast Florida</b>				
CS-Trips	1,008,684	6,748,548	7,419,954	15,177,183
NOR	1,613,889	5,736,266		7,350,155
Total	2,622,570	12,484,814	7,419,954	22,527,338
<b>Southeast Florida</b>				
CS-Trips	42,418	583,950	499,388	1,125,756
NOR	67,868	496,358		564,226
Total	110,286	1,080,308	499,388	1,689,984
<b>Georgia</b>				
CS-Trips	75,698	151,390	371,579	598,667

NOR	421,116	128,682	0	249,798
Total	496,814	280,072	371,579	848,465
<b>South Carolina</b>				
CS Trips	88,510	1,179,777	596,730	1,865,017
NOR	441,615	1,002,811	0	1,144,426
Total	230,125	2,182,588	596,730	3,009,443
<b>North Carolina</b>				
CS Trips	0	204,646	0	204,646
NOR	0	173,949		173,949
Total	0	378,595	0	378,595

Table 4-22c. Reductions in consumer surplus (CS) and for-hire net operating revenues (NOR) due to Alternative 4 or Alternative 6, in 2009 dollars.

	Charterboat	Headboat	Private	Total
<b>Northeast Florida</b>				
CS-Trips	2,279,495	656,482	8,232,365	11,168,342
NOR	600,474	3,329,048		3,929,523
Total	2,879,969	3,985,531	8,232,365	15,097,865
<b>Southeast Florida</b>				
CS-Trips	148,673	54,578	419,513	622,764
NOR	67,868	487,576		555,444
Total	216,542	542,153	419,513	1,178,207
<b>Georgia</b>				
CS-Trips	179,074	65,085	278,689	522,848
NOR	66,974	94,154		161,128
Total	246,048	159,239	278,689	683,976
<b>South Carolina</b>				
CS-Trips	537,839	164,762	848,174	1,550,774
NOR	103,231	744,925		848,156
Total	641,069	909,688	848,174	2,398,930
<b>North Carolina</b>				
CS-Trips	0	6,702	0	6,702
NOR	0	161,989	0	161,989
Total	0	168,691	0	168,691

For purposes of the succeeding discussions, Table 4-22d is presented below. This table summarizes the more detailed tables presented above.

Table 4-22d. Summary of economic effects, in 2009 dollars.

		FL-NE	FL-SE	GA	SC	NC	TOTAL
ALT. 2	CS	3,543,852	622,764	440,795	243,742	6,702	4,857,855
	NOR	3,075,319	555,444	158,760	355,326	161,989	4,306,837
	TOTAL	6,619,170	1,178,207	599,555	599,068	168,691	9,164,692

ALT. 3,5	CS	11,168,342	622,764	522,848	243,742	6,702	12,564,398
	NOR	3,929,523	555,444	161,128	355,326	161,989	5,163,410
	TOTAL	15,097,865	1,178,207	683,976	599,068	168,691	17,727,808
ALT. 4,6	CS	11,168,342	622,764	522,848	1,550,774	6,702	13,871,430
	NOR	3,929,523	555,444	161,128	848,156	161,989	5,656,239
	TOTAL	15,097,865	1,178,207	683,976	2,398,930	168,691	19,527,670

Under **Alternative 1 (Status Quo)**, the red snapper recreational fishery could continue to operate as it currently does, with no short term reductions in the number of harvested fish, trips taken, or changes in economic values from the calculated baseline. Because the resource is overfished, these conditions would not be expected to persist, nor could they legally be allowed to continue. Biological conditions in the resource would be expected to worsen, requiring more stringent harvest restrictions as stipulated in the rest of the alternatives.

**Alternative 2** would prohibit all harvest (retention) of red snapper in the South Atlantic EEZ as well as red snapper harvested by federally permitted for-hire vessels that fish in state waters. At present, it is not known how long this prohibition would last. Assuming no trip cancellations, this alternative may be expected to result in a total reduction in CS of approximately ~~\$8.2~~ **\$4.9** million (2009 dollars).

Under the assumption that the prohibitions of **Alternative 2** result in the cancellation of all red snapper target trips, this alternative would be expected to result in a reduction in NOR of approximately \$520 thousand to charterboat vessels, and a reduction in NOR of approximately \$3.8 million to headboats, or a total reduction in economic value of approximately \$4.3 million. The assumption that all red snapper target trips would be cancelled is expected to result in overestimation of the actual number of trips and resulting economic values lost to the fishery. In reality, most red snapper anglers would be expected to continue to fish, but shift their effort to other species.

There is little expectation that all red snapper target trips would be cancelled under **Alternative 2**. On average, red snapper is only the third most important species in terms of the numbers of fish caught on private and charter trips and the fifteenth most important species in terms of the number of pounds of fish harvested on headboat trips (NMFS 2008b). Thus, most of the historic trips that previously targeted red snapper would be expected to continue to be taken but would target other species. Target effort for grouper, dolphin, and king mackerel was projected to increase from 13 percent (grouper) to 31 percent (dolphin) in response to the red snapper closure in the Gulf of Mexico (NMFS 2008a). Absent specific data to suggest the proportion of red snapper target trips that would be expected to be cancelled, this analysis simply assumes the cancellation of all red snapper target trips constitutes an upper bound of the expected change in economic value to the recreational fishery as a result of **Alternative 2**. Overall, **Alternative 2** is expected to result in a reduction in short-term economic value of ~~\$12.5~~ **\$9.2** million (CS +

NOR). If the prohibition is permanent, reductions in economic value could top approximately \$178 \$131 million, under a 7 percent discount rate.

As shown in ~~Table 4-23a~~ Table 4.22a, Florida would experience the largest economic effects, followed by South Carolina, then closely by Georgia, and lastly by South Carolina. The reported absence of target trips for red snapper in North Carolina is primarily responsible for zero effects of red snapper fishing prohibition for this state. North Carolina landed some red snapper, but apparently, there is not much demand for red snapper trips in this state. The headboat sector appears to be the largest target mode, but this is very likely due to the assessment assumptions and, as discussed above, overall, the estimates of headboat effort are believed to exceed actual totals. Private and charterboat anglers are relatively large component of the red snapper recreational sector.

**Alternatives 3, 4, 5 and 6** would prohibit recreational harvest, possession, and retention of species in the Snapper Grouper FMU year-round in certain areas in the South Atlantic, in addition to the red snapper fishery closure. As noted earlier, each of these alternatives would result in economic losses in addition to the losses estimated for **Alternative 2**. These losses would mainly come from reductions in economic values derived from Snapper Grouper species other than red snapper. In addition, the assumption on trip cancellations mentioned with respect to **Alternative 2** would become more valid under any of these four alternatives. The issue of trip cancellation that would affect other Snapper Grouper species would also arise under any of these four alternatives. It is likely that fishing effort would shift to the open areas or to species whose harvest is allowed in areas considered in any of these four alternatives, but effort shifting would carry certain costs that could be relatively high for some fishing participants.

The estimated economic effects of **Alternative 3** cannot be distinguished from those of **Alternative 5**. ~~Table 4-23b~~ Table 4-22b presents the economic effects of **Alternative 5**, and from there one can infer that the economic effects of Alternative 3 would be smaller than but close to those of **Alternative 5**. Given the location of the grids for closure, the areas affected by ~~with additional effects~~ from ~~area closures under~~ **Alternative 5** would be Northeast Florida and Georgia. All other areas are estimated to remain unaffected by ~~area closures under~~ **Alternative 5**. This explains the reason why the economic effects presented in ~~Table 4-23b~~ Table 4-22b differ from those presented in ~~Table 4-23a~~ Table 4-22a only in the cases of Northeast Florida and Georgia.

**Alternative 5** may be expected to result in a total reduction in CS of approximately \$17.7 \$12.6 million (2009 dollars), in charter NOR of \$1.8 million \$774 thousand, and headboat NOR of \$6.9 \$4.4 million. Overall, **Alternative 2 5** is expected to result in a reduction in short-term economic value of \$26.4 \$17.7 million (CS + NOR). If the prohibition is permanent, reductions in economic value could top approximately \$377 \$253 million, under a 7 percent discount rate. Again, one has to pay attention to the possible overestimation of these economic values partly due to the overestimation of angler trips. The distribution of economic effects of **Alternative 5**, in terms of areas and modes, follows closely that of **Alternative 2**.

As with the previous pair of alternatives, the estimated economic effects of **Alternative 4** cannot be distinguished from those of **Alternative 6**. ~~Table 4-23e~~ Table 4-22c presents the economic

effects of **Alternative 6**, so the economic effects of **Alternative 4** may be inferred to be smaller and close those values in the table. Given the location of the grids for closure, the areas affected by **area closures** under **Alternative 6** would be Northeast Florida, Georgia, and South Carolina. All other areas are estimated to remain unaffected by **area closures under Alternative 6**. ~~In addition to adding South Carolina as among the affected areas, Alternative 6 would also increase the effects on Georgia.~~

**Alternative 6** may be expected to result in a total reduction in CS of approximately \$19 **\$13.9** million (2009 dollars), in charter NOR of \$1.9 **\$1.0** million, and headboat NOR of \$7.5 **\$5.5** million. Overall, **Alternative 6** is expected to result in a reduction in short-term economic value of \$28.4 **\$19.5** million (CS + NOR). If the prohibition is permanent, reductions in economic value could top approximately \$405 **\$279 million**, under a 7 percent discount rate. Again, one has to pay attention to the possible overestimation of these economic values partly due to the overestimation of angler trips. **The distribution of economic effects of Alternative 6, in terms of areas and modes, follows closely that of Alternative 2.**

In addition to the direct economic effects described above, the various alternatives would entail consequent effects on the industries supporting the fishing industry and the regional economies. Gentner and Steinback (2008) estimated the economic impacts of the recreational sector's expenditures on the regional economies of the South Atlantic states, showing the level of employment, among others, generated by angler expenditures. They estimated that in 2006, angler expenditure on saltwater trips supported 16,212 jobs in Florida (east coast), 2,435 jobs in Georgia, 2,435 in South Carolina, and 11,316 jobs in North Carolina. Dumas et al.(2009) estimated the economic impacts of the for-hire industry in North Carolina, showing that for-hire fishing expenditures supported about 10,200 jobs in North Carolina. Thus, any reductions in angler trips and expenditures would have repercussions on the region's employment and other socioeconomic environment.

**Alternative 7** is an enforcement measure that would provide anglers some cushion from being unduly penalized. This would also allow anglers to cut fishing costs by not being compelled to possibly take a longer route to and from a fishing area. The mitigating effects of this alternative would be minimal relative to the economic effects of any of the restrictive management measures discussed above. **Alternatives 8a and 8b** would affect recreational anglers more than **Alternative 8c** given the relative absence of recreational fishing in the wreckfish fishery.