Appendix XX

Methodology and Assumptions in Calculating the Economic Effects of the South Atlantic Snapper Grouper Amendment 17A on the Recreational Sector

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1.0 Introduction

The procedure for calculating the expected changes in consumer surplus and net operating revenues as a result of the alternative management measures on red snapper proposed in Snapper Grouper Amendment 17A follows the procedure employed in previous snapper grouper plan amendments (Amendments 15A and 16) and the red snapper interim rule (NMFS 2008b). It also draws upon the general method used in the economic analysis for the red snapper fishery closure in the Gulf of Mexico (NMFS 2008a).

2.0 Parameters and Values

The basic parameters used in estimating the economic effects of Amendment 17A are recreational target effort, consumer surplus (CS), and net operating revenues (NOR). For the charter and private modes, target effort refers to trips taken by charter and private mode anglers who stated targeting a species as reported in the MRFSS. For headboats, some approximations of target trips were developed as the headboat data collection program does not report targeting of individual species by anglers. Data for the years 2005-2008 were used in estimating baseline target trips for charter, headboat, and private angler target trips. CS refers to the net benefits anglers derive from charter, headboat, or private fishing trips for the subject species. NOR refers to charter or headboat revenue minus the costs for fuel, ice, bait, and other supplies.

2.1 Headboat Target Trips

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 was required for the headboat sector. For snapper grouper species, all headboat angler trips (angler days) were assumed to target snapper grouper species. This assumption is expected to overestimate snapper grouper target trips, because some species other than snapper grouper (e.g., mackerel, dolphin) may be targeted by headboat anglers. In addition, some anglers may not target any particular species. In estimating red snapper target trips, an adjustment factor was applied to the total headboat angler trips. This adjustment factor was calculated from the headboat catch and effort data file. This data file contains information on, among others, the area from which the headboat trip originated, the location where the headboat fishing occurred, the number of anglers on the trip, the type of trip differentiated by the number of hours fished, and the species caught.

The following procedure was used to calculate the adjustment factor. First, unique headboat trips were identified. Second, angler trips were calculated by multiplying the type of trip

(normalized to 12 hours) by the number of anglers on the trip. Two types of angler trips were calculated: (1) angler trips for all trips regardless of the species caught; and, (2) angler trips for trips that caught red snapper. We term the first type as "restricted total angler trips" to distinguish it from the total headboat angler trips, and the second we term "red snapper angler trips." Third, the ratio of red snapper angler trips to restricted total angler trips was calculated. This ratio is the adjustment factor, and this was calculated by area – Northeast Florida, Southeast Florida, Georgia, South Carolina, and North Carolina.

To derive angler target trips affected by closing certain grid areas, a similar approach described above was used. That is, an adjustment factor was applied to total headboat angler trips. The reported "location" was used to identify specific grids. For each of the four grids under Alternative 3 or 5 and each of the seven grids under Alternative 4 or 6, angler trips were calculated. The ratio of these angler trips by grid to restricted total angler trips is the adjustment factor, which was also calculated by area. Alternative 3 or 5 would affect only Northeast Florida and Georgia, whereas Alternative 4 or 6 would affect Northeast Florida, Georgia, and South Carolina.

Alternative 3 differs from Alternative 5 only in the depth restriction included in Alternative 3. Target trips by depth cannot be estimated, thus target trips under Alternatives 3 and 5 are assumed to be identical for estimation purposes. In reality, the number of target trips under Alternative 3 would be expected to be fewer than those under Alternative 5. The same condition would be expected to apply for Alternative 4 compared to Alternative 6.

There are two points worth noting here. First, target angler trips for red snapper as well as those for snapper grouper, by area, should be considered overestimates of the respective actual target angler trips. This is primarily due to the use of total headboat angler trips as the basis for deriving target red snapper trips or target snapper grouper trips in those various grid areas. This overestimation becomes a little more apparent when taken against the backdrop of red snapper landing information. As can be gleaned from Table 3-33 and Table 3-35, headboats account for the smallest amount of red snapper landings among the various fishing modes, and yet the estimated headboat target trips are higher than those of the charter and private modes. Second, there are various issues associated with using the headboat data files in generating management oriented information. These issues are described in SERO-LAPP-2009-07.

Estimates of the number of headboat target trips are provided in Table A.1. "Total" refers to the total number of headboat trips, regardless of target or catch success. "Res. Total" refers to the total number of snapper grouper trips estimated from the headboat catch and effort data file." Red Snap" refers to the total number of angler trips for trips with red snapper catches. "Alt_5" and "Alt_6" refer to the total number of snapper grouper trips in the grids defined, respectively, under Alternative 5 and Alternative 65.

Table A.1. Average headboat target trips, 2005-2008.

Trip Type	FL_NE	FL_SE	GA	SC	NC	TOTAL
Total	49,378	106,225	1,365	49,532	25,823	232,322
Res. Total	45,749	31,397	385	40,095	11,872	129,496
Red Snap	37,132	2,576	318	3,816	1,176	45,017

Alt_5	41,026	0	203	0	0	41,229
Alt_6	0	0	216	8,122	0	8,338

Total = total number of headboat angler trips.
Res. Total = restricted number of snapper grouper angler trips.
Red Snap = total number of angler trips with red snapper catch.
Alt_5 = number of snapper grouper angler trips in the 4 grids defined under Alternative 5.
Alt_6 = number of snapper grouper angler trips in the 7 grids defined under Alternative 6.

2.2 Charter and Private Target Trips

The number of red snapper and all snapper grouper species target trips is calculated using the methods described in Holiman (1996), as modified by SERO and SEFSC staff. Target trips, by fishing mode, in both EEZ and state waters are calculated for each of the four states in the South Atlantic. Total target trips for Florida are partitioned into Northeast Florida and Southeast Florida using the estimated ratio of red snapper landings between the two areas as reported in SERO-LAPP-2009-07. This partitioning assumes red snapper and snapper grouper target trips are directly proportional to red snapper landings. In the absence of species targeting by grid, assignment of snapper grouper target trips to the various grids defined under Alternative 5 and Alternative 6 is done using the same ratio estimated for headboats. On top of assumptions regarding headboat trips in the designated grids, this assignment adds the assumption that charter and private trips are taken in about the same areas as headboat trips. Table A.2 presents the estimated average charter and private target trips for the period 2005-2008. Alternative 5(3) pertains to grids designated in Alternative 5 or Alternative 3 while Alternative 6(4) pertains to grids designated in Alternative 6 or 4.

Table A.2. Average target trips for snapper grouper and red snapper in state waters and EEZ, by area, by mode, 2005-2008.

	Snapper Grouper		Red Snapper		Alternative 5(3)		Alternative 6(4)	
	Charter	Private	Charter	Private	Charter	Private	Charter	Private
Northeast Florida								
State W.	9,701	280,105	183	1,695	0	0	0	0
EEZ	11,032	67,777	2,716	31,970	9,893	60,779		
Total	20,732	347,881	2,899	33,665	9,893	60,779	0	0
Southeast Florida								
State W.	1,894	54,692	36	331	0	0	0	0
EEZ	2,154	13,234	530	6,242	0	0	0	0
Total	4,048	67,926	566	6,573	0	0	0	0
Georgia								
State W.	10	14,992	0	0	0	0	0	0
EEZ	769	5,031	515	1,822	406	2,659	431	2,823
Total	778	20,023	515	1,822	406	2,659	431	2,823
South Carolina								
State W.	228	72,250	0	0	0	0	0	0
EEZ	3,975	22,157	301	2,971	0	0	805	4,488
Total	4,203	94,407	301	2,971	0	0	805	4,488
North Carolina								

State W.	315	38,344	0	0	0	0	0	0
EEZ	2,775	22,062	0	0	0	0	0	0
Total	3,090	60,406	0	0	0	0	0	0

2.3 Consumer Surplus and Net Operating Revenues

Recently, the Science Center developed estimates of recreational CS and for-hire NOR based on several studies (NMFS 2009a). For the current amendment, a CS value of $80, charter NOR value of $128, and headboat NOR value of $68 were chosen because these are based on a more recent study using data collected from a South Atlantic state. Other CS and NOR estimates are available but based on studies heavily reliant on data collected in the Gulf.

3.0 Calculation of Changes in Consumer Surplus and Net Operating Revenues

Estimates of the expected change in consumer surplus and net operating revenues were calculated by multiplying the number of affected trips by the appropriate value per trip.

For Alternative 2, changes in consumer surplus were calculated by multiplying red snapper target trips by CS per angler trip ($80). Changes in charter NOR were calculated by multiplying charter red snapper target trips by charter NOR per angler trip ($128), and changes in headboat NOR were calculated by multiplying headboat red snapper target trips by headboat NOR per angler trip ($68).

The economic effects of Alternatives 3 through 6 were estimated as a two-step process. First, snapper grouper target trips estimated to have been made in the designated grids were multiplied into the consumer surplus and net operating revenue per trip. Second, the resulting numbers were added to the estimates of changes in CS and NOR under Alternative 2.

4.0 Discussion and Caveats

The following provides some discussion and caveats on the model and assumptions. These are not listed in any implied order of importance.

a. Target trips – in addition to the usual issues (as noted in previous amendments) accompanying the use of target trips, as opposed to catch trips, harvest trips, or directed trips, the major issue for the current amendment pertains to the estimation of target trips by headboat anglers and target trips in the various grids subject for closure. The calculated headboat angler trips for red snapper and snapper grouper appear to be overestimates, with the headboat sector exhibiting more trips although generally landing less of fish than the other fishing modes. Overestimating the

number of target trips would directly translate into overestimating the economic effects of the measures in this amendment. Target trips in the various grids subject to closure are estimated using headboat logbook data, but as noted in SERO-LAPP-2009-07 there are issues regarding the assignment of grid catches. A ratio of angler trips assigned to each grid to restricted angler trips and applied to total angler trips is used to determine the number of angler trips in each grid. The same ratio is used to assign angler trips to the various grids for the charter and private trips. This method of trip assignment could lead to overestimation of headboat angler trips, and possibly charter and private angler trips, in the various grids.

b. Consumer surplus – a value of $80 was used for this amendment. This value is for a snapper grouper trip and is derived from a study conducted for North Carolina. Other estimates are provided by other studies, some higher and others lower. The value used was chosen because it was derived from a study using more recent data collected from a state in the South Atlantic. The value used is comparable to the values used in earlier amendments and is also close, on average, to the value generated in a recent study re-analyzing earlier survey data. Although the value used is less than the values derived from other studies, to some extent, this value should compensate for the likely overestimation of target trips discussed earlier. It should be noted that the use of a constant value of consumer surplus across all areas and fishing modes would not take into account possible differences in valuation across areas and modes. In addition, the value used is based on an estimate of a unit increase in targeted catch and keep and, thus, may not fully reflect the CS loss when the entire red snapper fishery is closed, or certain areas closed to snapper grouper fishing. However, because the value and methodology was used consistently across all alternatives, the ability to rank alternatives would not be affected.

c. Net operating revenue – The values of $128 and $68, respectively, for charter and headboat net operating revenue per angler trip were used in this amendment. Other estimates are provided by other studies, some higher and others lower. The NOR values used were chosen because they were derived from a study using more recent data collected from a state in the South Atlantic. The values used are comparable to the values used in earlier amendments as well as to the values from other studies. In addition, the use of these values as opposed to other values should not affect the ranking of alternatives and the relative distribution of changes in NOR.

d. Additional economic effects of closing certain grid areas – the economic effects of closing certain grid areas were estimated as losses accruing to losing trips located in those grid areas and added to the losses resulting from the closure of the red snapper fishery. This has the potential for double counting, particularly for the changes in for-hire net revenues, because of the assumption of trip cancellation. Those for-hire trips cancelled under Alternative 2 may be the same trips in the designated grids under Alternative 5 or Alternative 6.

e. Period of analysis – although the proposed alternatives would establish management measures that would remain in effect multiple year until lifted or replaced by other management measures, the estimated economic effects of the alternative prohibitions represent single year, annual effects. As such, they would be expected to re-occur in each subsequent year. However, as the measures remain in effect, anglers and fishing businesses would be expected to adapt to these measures, with anglers learning to target alternative species and for-hire operations developing new services or different

for-hire experiences to offer, thereby reducing the adverse effects in subsequent years. However, it is noted that some anglers may elect to substitute completely different recreational activities and some fishing businesses may not be able to adequately adapt to the new regulations and survive as a viable business operation.

f. Effects of pending amendments – several amendments are now in the process of being implemented. The effects of these previous amendments are not explicitly considered in estimating the economic effects of this current amendment. The overall economic effects of this amendment may be less than described if the effects of these other amendments reduce the baseline of the fishery from that used in this analysis. While such would not affect the cumulative effect of all these amendments, the incremental effect of this amendment would be reduced.

References

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