Appendix M

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

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1.0 Introduction

The South Atlantic Fishery Management Council has developed Snapper Grouper Amendment 17B to consider establishing annual catch limits (ACLs), accountability measures (AMs), and annual catch targets (ACTs) for certain species. The alternatives considered in this amendment are summarized below.

Speckled Hind and Warsaw Grouper

Alternative 1: no action

Alternative 2: ACL = 0 for speckled hind and Warsaw grouper; prohibit commercial and recreational fishing for speckled hind and Warsaw grouper.

Alternative 3: ACL = 0 for speckled hind and Warsaw grouper; prohibit commercial and recreational fishing for co-occurring deepwater species (speckled hind, Warsaw grouper, snowy grouper, yellowedge grouper, misty grouper, blueline tilefish, queen snapper, and silk snapper).

Preferred Alternative 4: ACL = 0 for speckled hind and Warsaw grouper; prohibit commercial and recreational fishing for co-occurring deepwater species beyond a depth of 240 feet.

Alternative 5: ACL = 0 for speckled hind and Warsaw grouper; prohibit commercial and recreational fishing for co-occurring deepwater species beyond a depth of 300 feet.

Golden Tilefish Allocation

Alternative 1: no action.

Alternative 2: 96% commercial, 4% recreational allocation based on 2006-2008 landings.

Preferred Alternative 3: 97% commercial, 4% recreational allocation based on 2006-2008 landings (50% weight) and 1986-2008 landings (50% weight).

Alternative 4: 50% commercial, 50% recreational allocation.

Golden Tilefish ACLs and AMs

Alternative 1: no action

Preferred Alternative 2: commercial ACL (quota) = 282,819 lbs gutted weight; recreational ACL = 1,578 fish (8,747 gutted weight); commercial AM is to close the fishery upon reaching the ACL; recreational AM is to reduce the length of the following fishing year when the current ACL is met.

Alternative 3: single commercial and recreational ACL = 291,566 lbs gutted weight; AM is to close the fishery for the commercial and recreational sectors upon reaching the ACL.

Alternative 4: recreational AM = 1 golden tilefish per vessel per day upon reaching the single

commercial and recreational ACL of 291,566 lbs gutted weight.

Alternative 5: single commercial and recreational ACL = 282,819 lbs gutted weight; AM for both commercial and recreational sectors is to close the fishery when commercial landings exceed the ACL.

Snowy Grouper

Alternative 1: no action.

Preferred Alternative 2: recreational daily bag limit of 1 snowy grouper per vessel; recreational AM is to reduce the following year's fishing season when the ACL is met in the current year; compare recreational ACL with recreational landings over a range of years.

Alternative 3: commercial and recreational ACL = 87,254 lbs gutted weight (current TAC); AM is to close the fishery to the commercial and recreational sectors when the ACL is met.

Alternative 4: ACL = 82,900 lbs gutted weight (commercial quota); commercial sector AM is to close the fishery when the ACL is met; recreational sector AM is 1 snowy grouper per vessel per day when the ACL is met.

Black Grouper, Black Sea Bass, Gag, Red Grouper, and Vermilion Snapper

Alternative 1: no action.

Alternative 2: establish commercial and recreational ACL:

Alternative 2a: commercial ACL = 86,886 lbs gutted weight for black grouper; commercial ACL = 221,577 lbs gutted weight for red grouper; recreational ACL = 31,863 lbs gutted weight for black grouper; recreational ACL = 276,740 lbs gutted weight for red grouper.

Preferred Alternative 2b: commercial ACL = 353,940 lbs gutted weight for gag; aggregate commercial ACL = 662,403 lbs gutted weight for gag, black grouper, and red grouper; recreational ACL = 340,060 lbs gutted weight for gag; aggregate recreational ACL = 648,663 lbs gutted weight for gag, black grouper, and red grouper; commercial AM is to close the shallow waters grouper fishery when either the ACL for gag or the aggregate ACL for gag, black grouper, and red grouper is met.

Alternative 3: establish ACT for the recreational sector:

Alternative 3a: ACT = 85% of recreational ACL.

Alternative 3b: ACT = 75% of recreational ACL.

Alternative 3c: ACT = (1-PSE)ACL or 50% of recreational ACL, whichever is greater.

Preferred Alternative 4: compare recreational ACL with recreational landings using only 2010 landings for 2010, average 2010 and 2011 landings for 2011, and 3-year running landings average for 2012 and beyond.

Alternative 5: implement recreational AM for black grouper, black sea bass, gag, red grouper, and vermilion snapper:

Alternative 5a: regardless of stock status, reduce the following year's fishing season when the ACL is met in the current year.

Preferred Alternative 5b: if a species is overfished, close the fishery for the species or species group upon reaching its ACL; regardless of stock status, reduce the following year's fishing season when the ACL is met in the current year.

Alternative 5c: if a species is overfished, close the fishery for the species or species

group upon reaching its ACT; reduce the following year's ACT for the species or species group when its ACT is reached in the current year.

The procedure for calculating the economic effects of these alternatives on the recreational sector involves estimating the expected changes in consumer surplus (CS) to anglers and net operating revenues (NOR) to for-hire vessels. This procedure follows the method employed in other snapper grouper plan amendments (Amendments 15A, 16, and 17A) 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). Data, averaged over the years 2005-2008, were used in estimating the economic effects of this amendment. The period 2005-2008 was chosen per agreement among the members of the Interdisciplinary Planning Team. In this document, the economic values are in 2009 dollars.

2.0 Method for Estimating the Expected Economic Effects

The expected change in CS was estimated using the following equation:

(1) $$\Delta(CS)_{i,j} = \Delta(TTRIP)_{i,j} \times (CS)_{0,0} \times (FISH)_{i,j}$$

where $\Delta(CS)_{i,j}$ is the change in consumer surplus for species or species group *i* using fishing mode *j* (charterboat, headboat, private). $\Delta(TTRIP)_{i,j}$ is the change in target trips per angler for species *i* using fishing mode *j*. $(CS)_{0,0}$ is the per angler, per target trip consumer surplus of keeping (landing) one fish. $(FISH)_{i,j}$ is the average fish kept per angler, per targeted trip of species *i* using fishing mode *j*. It may be noted that TTRIP and FISH are 2005-2008 averages.

CS in the present case is the net benefit an angler derives from an additional fish kept on a fishing trip and is equivalent to the difference between the monetized benefit an angler receives and the actual cost. This value is the appropriate measure of economic effects on recreational anglers as a result of changes in fishing regulations. For the current analysis, the CS of keeping one fish per angler trip ($CS_{0,0}$) was assumed constant across species and modes. Further, this value was assumed to remain constant and unaffected by changes in target trips resulting from changes in regulations.

The expected change in for-hire NOR was estimated using the following equation:

(2) $$\Delta(NOR)_{i,j} = \Delta(TTRIP)_{i,j} \times (NOR)_{0,j}$$

where $\Delta(NOR)_{i,j}$ is the change in net operating revenues for species or species group *i* using fishing mode *j* (charterboat, headboat). $\Delta(TTRIP)_{i,j}$ is the change in target trip per angler for species *i* using fishing mode *k*. $(NOR)_{0,j}$ is the baseline net operating revenue per angler target trip using mode *j* (charter, headboat).

NOR is the net operating revenue, expressed on a per angler basis, a charterboat or headboat derives from a fishing trip. NOR was calculated as revenue minus the costs for fuel, ice, bait, and other supplies. Producer surplus is the appropriate measure of economic effects on for-hire operations as a result of changes in fishing regulations. Estimates of the average producer

surplus for for-hire operations are not available, and this analysis used NOR as a proxy value. In the current analysis, NOR per angler trip was assumed constant across species but not across modes (charterboat and headboat). In addition, this value was assumed to be invariant to changes in the number of angler target trips resulting from changes in fishing regulations.

In assessing the economic effects of each alternative, the change in target trips [$\Delta(TTRIP)_{i,j}$] was first estimated, followed by the use of equation (1) to generate the expected change in CS and equation (2) to generate the expected change in NOR. The change in target trips was estimated by assuming cancellation of all target trips for the particular species. This approach would overestimate the economic effects if anglers continue fishing but shift their effort to target other species.

3.0 Data, Parameters, and Assumptions

The basic parameters used in estimating the economic effects of Amendment 17B were recreational angler target effort, angler consumer surplus, average fish kept per angler trip, and for-hire vessel net operating revenues.

3.1 Headboat Angler 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 was used to estimate angler target effort. Since the 1980s, NMFS (Beaufort) has conducted surveys of the headboat sector and has generated a measure of fishing effort in terms of angler days. The method of deriving total angler days from survey reports is a complex process. Here is a brief description of the process from the "Review of Headboat Survey, Questions and Answers" (NMFS 2004):

> *"First, reported effort is calculated from catch records. The term "reported" refers to data actually provided by the vessel personnel in the form of catch records. Data on effort are provided as number of anglers on a given trip. Numbers of anglers are standardized, depending on the type of trip (length in hours), by converting number of anglers to "angler days" (e.g., 40 anglers on a half-day trip would yield 40 * 0.5 = 20 angler days). Angler days are summed by month for individual vessels. Port agents enter the reported anglers from catch records on an internal worksheet called a headboat activity report (HAR). The reported anglers are converted to angler days and totaled. The monthly total of angler days is referred to as catch record angler days (CRADs). We then take every piece of information recorded on the HAR for that vessel for that month and use them to calculate estimated angler days, or EADs. This is the adjustment for non-reporting. This expansion to arrive at estimated angler days is often complex and usually labor intensive. If there is complete reporting by vessel personnel, i.e., a catch record submitted for every trip made, then CRAD=EAD and the process is simple. More often that not, however, there are varying degrees of incompleteness of reporting. The usual estimation procedure involves using sampler observations of activity and developing an adjustment ratio to expand the reported observations."*

The EADs noted above are for all headboat activities and are not broken down into EADs for specific species. For the current analysis, all headboat angler days (EADs) were assumed to be target angler trips for snapper grouper species. This assumption is expected to overestimate snapper grouper target trips, because some headboat anglers may not target any species while

others target species other than those considered Amendment 17B (e.g., mackerel, dolphin).

In estimating headboat target angler trips for a particular species, the following formula was used:

$$(3) \qquad (TTR)_i = \{ \frac{LAND_i}{LAND_{sg}} \} \times (EAD)$$

where $(TTR)_i$ is angler target trips for a particular species or species group, $(LAND)_i$ is the landings of species or species group *i*, $(LAND)_{sg}$ is total landings of snapper grouper, and (EAD) is the estimated total angler days.

For speckled hind, Warsaw grouper, and co-occurring deepwater species, equation (3) was applied on average 2005-2008 data by state in the South Atlantic and the results summed across states to arrive at angler target trips for this species group. For each of the snowy grouper and black sea bass species, equation (3) was applied on average 2005-2008 monthly data for all states in the South Atlantic. Monthly estimates were generated for snowy grouper and black sea bass since the ACLs/AMs for these species implied fishery closures for part of the year. Headboats recorded no landings of golden tilefish.

3.2 Charter and Private Target Trips

The number of target trips for a species or species group was calculated using the methods described in Holiman (1996), as modified by SEFSC and SERO staff. For snowy grouper, Warsaw grouper, and co-occurring deepwater species, target trips were calculated for each of the four states in the South Atlantic using average 2005-2008 data. The results were then summed across states to arrive at target trips for the species group. For golden tilefish, snowy grouper, and black sea bass, target trips were calculated using average 2005-2008 monthly data. Monthly estimates were generated for these species since their respective ACL/AM implied fishery closures for part of the year. Data for each MRFSS wave were equally divided between the two months comprising each wave.

3.3 Estimated Target Trips

Table A1 below presents the estimate target trips for the charter, headboat, and private/rental fishing modes. As discussed above, only the total target trips were calculated for deepwater species while monthly target trips were calculated for the other species.

Table A1. Average angler target trips, by mode, 2005-2008.

Deepwater Species*													
Chtr.													290
Head.													963
Priv.													1,566
Golden Tilefish													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chtr.	0	0	0	0	38	38	0	0	27	27	0	0	131

Head.	0	0	0	0	0	0	0	0	0	0	0	0	0
Priv.	161	161	0	0	0	0	0	0	89	89	0	0	499
Snowy Grouper													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Chtr.	0	0	0	0	61	61	0	0	0	0	0	0	122
Head.	9	15	8	14	13	8	5	4	10	7	1	0	94
Priv.	0	0	0	0	0	0	0	0	5	4	0	0	9
Black Sea Bass**													
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Ch.	810	492	492	259	259	106	106	5	5	305	305	968	4,111
Head.	2,225	4,220	3,030	897	878	804	1,133	901	974	2,656	3,108	2,019	22,844
Priv.	6,884	5,331	5,331	3,474	3,474	4,115	4,115	734	734	5,780	5,780	5,354	51,106

*Deepwater species include speckled hind, Warsaw grouper, snowy grouper, blueline tilefish, yellowedge grouper, misty grouper, queen snapper, and silk snapper.
**Fishing year for black sea bass starts in June.

3.4 Average Fish Landed

Table A.2 presents the 2005-2008 average fish landed per angler target trip by fishing mode. These numbers were derived by assigning all landed fish to target trips, that is, total landed fish divided by total target trips by fishing mode. In modes where landed fish far exceeded the number of target trips, the averages would be relatively high. Conversely, where the number of target trips far exceeded the number of fish landed, the averages would be relatively low. To some extent, this method of assigning all landed fish to target trips would mitigate the potential overestimation/underestimation of changes in CS due to overestimation/underestimation of target trips.

Table A.2. Average fish landed per angler target trip, by mode, 2005-2008.

	Deepwater Species	Golden Tilefish	Snowy Grouper	Black Sea Bass
Chtr.	18	13	46	18
Head.	2	0	2	7
Priv.	13	9	20	9

3.5 Consumer Surplus and Net Operating Revenues

Estimates of recreational CS and for-hire NOR were derived by the SEFSC 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 (Dumas et al. 2009). These values are expressed in 2009 dollars.

4.0 Results

Estimates of the expected short-term reductions in consumer surplus and net operating revenues are presented in the four tables below. Only some alternatives are presented because the

economic effects of the other alternatives cannot be quantified with available information. However, some qualitative discussions are presented to gauge the relative magnitude of the economic effects of those other alternatives.

Shown in Table A.3 are the economic effects of Alternative 3 for the ACL/AM for speckled hind, Warsaw grouper, and other co-occurring deepwater species. Alternative 2 would have smaller economic effects than Alternative 3, because it would not affect fishing for other co-occurring deepwater species. Alternative 4 would have smaller economic effects than Alternative 3, because it would affect fishing for other co-occurring deepwater species only beyond a depth of 240 feet. Alternative 5 would have smaller economic effects than either Alternative 3 or Alternative 4 as it would affect fishing for other co-occurring deepwater species beyond a depth of 300 feet.

Table A.3. Economic effects of Alternative 3 for deepwater species, in 2009 dollars.

	Charterboats	Headboats	Private/Rental	Total
CS	$3,961,980	$159,520	$1,683,400	$5,804,900
NOR	$37,088	$65,484		$102,572
Total	$3,999,068	$225,004	$1,683,400	$5,907,472

Table A.4 presents the economic effects of the ACL/AM for golden tilefish, giving consideration to the commercial/recreational allocation of 96/4 and 97/3. A 50/50 commercial/recreational allocation was not used because of the difficulty in estimating the number of additional recreational trips that may occur due to a significant increase in recreational allocation. There is also the added issue of whether recreational trips could increase given the relatively restrictive bag limit on golden tilefish. Alternative 4 would result in smaller economic effects than Alternative 3 as the fishery would remain open year round, although at very restrictive bag limit of 1 fish per vessel per day once the ACL specified in Alternative 3 is met. It may also be noted that the AM for Alternative 2 would apply only in the fishing season following the year the ACL is met.

Table A.4. Economic effects of Alternatives 2, 3, and 5 for golden tilefish, in 2009 dollars.

	Charterboats	**Private/Rental**	**Total**
	*Alternative 2: ACL of 9,796 lbs ww; closure starts in July**		
CS	$55,670	$132,922	$188,592
NOR	$7,008		$7,008
Total	$62,678	$132,922	$195,600
	*Alternative 2: ACL of 13,062 lbs ww; closure starts in August**		
CS	$55,670	$132,922	$188,592
NOR	$7,008		$7,008
Total	$62,678	$132,922	$195,600
	Alternative 3: single ACL of 326,554 lbs ww; closure starts in October		
CS	$27,835	$66,461	$94,296
NOR	$3,504		$3,504
Total	$31,339	$66,461	$97,800
	Alternative 5: single ACL of 321,003 lbs ww; closure starts in September		
CS	$55,670	$132,922	$188,592

NOR	$7,008		$7,008
Total	$62,678	$132,922	$195,600

*The AM for Alternative 2 involves a reduction in fishing season the following year and not an immediate fishery closure.

The economic effects of the alternatives for snowy grouper are presented in Table A.5. In determining the economic effects of Alternative 2, it was assumed that the AM of 1 snowy grouper per vessel per day would effectively constrain the fishery to its ACL, which is about 62 percent of the 2005-2008 average recreational landings of snowy grouper. It is worth noting that the AM under Alternative 2 would apply only in the fishing season following the year the ACL is met. For Alternative 4, it was assumed that once the daily bag limit of 1 fish per vessel became effective (determined to be in September), it would have the same proportional effect on recreational trips as in Alternative 2. That is, 38 percent of the September through December recreational trips would be affected by bag limit.

Table A.5. Economic effects of Alternatives 2, 3, and 4 for snowy grouper, in 2009 dollars.

	Charterboats	Headboats	Private/Rental	Total
	*Alternative 2**			
CS	$143,962	$4,800	$49,920	$198,682
NOR	$4,992	$2,040		$7,032
Total	$148,954	$6,840	$49,920	$205,714
	Alternative 3			
CS	$224,480	$5,600	$48,240	$278,320
NOR	$7,808	$2,380		$10,188
Total	$232,288	$7,980	$48,240	$288,508
	Alternative 4			
CS	$143,667	$2,458	$46,310	$192,435
NOR	$4,997	$1,044		$6,042
Total	$148,664	$3,502	$46,310	$198,477

*The AM for Alternative 2 involves a reduction in fishing season the following year and not an immediate fishery closure.

The ACL/AM for gag, black grouper, red grouper, and vermilion snapper were determined to have no effects on the recreational sector, since the various ACL options were based on expected landings from the implementation of previous amendments for these species. Although the ACL for black sea bass was established in a previous amendment, the AM affecting this species would be part of Amendment 17B. This AM would result in economic effects presented in Table A.6. The tabulated economic effects, however, are deemed to be overestimates of the true economic effects for a variety of reasons. For one, recreational landings of black sea bass have been trending downwards most likely due to the restrictive regulations implemented in 2006. Landings averaged over 2005-2008 would not effectively capture the noted downward trend in landings. Overestimation could also be due to the method used in estimating the target effort for headboats. In the absence of species-specific headboat angler trips, total angler trips were adjusted using the ratio of black sea bass landings to total snapper grouper landings of headboats to arrive at estimates of headboat angler trips for black sea bass. Moreover, there is the issue of effort shifting which was not taken into account in the estimating the economic effects of the

proposed regulation affecting black sea bass.

Table A.6. Economic effects of ACL/AM for black sea bass (Alternative 5b), in 2009 dollars.

	Charterboats	Headboats	Private/Rental	Total
CS	$2,286,705	$5,507,964	$13,393,573	$21,188,241
NOR	$203,456	$656,717		$860,173
Total	$2,490,161	$6,164,681	$13,393,573	$22,048,414

The alternatives for updating the framework procedure for specification of total allowable catch were determined to have no short-run economic effects.

5.0 Discussion and Caveats

The following provides some discussion and caveats on the model and assumptions, in addition to those already noted in the preceding section. These are not listed in any implied order of importance.

a. MRFSS target trips – there are several potential measures of effort and thus of trips potentially affected by this amendment. Effort may be measured, generally in ascending magnitude, as target trips, harvest trips, catch trips, and directed trips. Target trips are those trips for which the angler stated a specific primary or secondary target species. Harvest trips are those trips for which the recreational catch was comprised of Types A or B1 fish. Type A refers to fish that were caught, landed whole, and available for identification and enumeration by the interviewers. Type B1 refers to fish that were caught and filleted, released dead, given away, or disposed of in some way other than being landed or released alive. Catch trips are those trips which caught the species and for which the recreational catch was comprised of Types A, B1, and B2 fish. Type B2 refers to fish caught and released alive. Directed trips are a combination of two or more of the other trips noted above but are generally a combination of target and catch trips. The use of target trips in estimating economic effects is premised on the contention that these trips are closely related to recreational angler expectations and thereby carries more information generally embodied in angler demand functions (demand studies, and the estimated values they produce, generally are based on target trips). The other types of trip, particularly the directed trips, may also be relevant for economic analysis since they embody both intent and the fact that anglers caught the species of interest. The use of target trips may not fully capture the economic effects of this amendment. However, the use of other types of trips (i.e., non-target trips) would probably result in lower estimates of the value per trip or per fish as someone less interested in catching a particular species would be expected to value that species less.

b. Headboat target trips – unlike MRFSS, the headboat survey does not collect target intent information. Target trips (TTR) were derived using equation (3). Using the

ratio of landings of a species or species group to total landings of snapper grouper as an adjustment factor to derive the target trips for the species or species group may tend to inflate target trip estimates. A highly sought after species may not be as abundant as the less sought after species, yet the derived target trips would be less for the much sought after species because landings for this species would likely be low. In addition, total headboat angler trips are relatively large numbers so that even a small ratio would come up with relatively large number of target trips. In addition, overestimation of affected target trips would also result if anglers who normally catch or expect to catch a regulated species chose some other species to target.

c. Average fish landed – considering the various types of trips discussed above, there is no one-to-one correspondence between landed fish and target trips. Some species of fish are landed without being targeted and some target trips do not catch the targeted species. Under the methodology of assigning economic values to target trips only and of putting an economic value to each fish landed, the derivation of average fish per angler target trip resulted in very low numbers in some cases and very high numbers in others. To some extent, this approach would compensate for over- and under-estimation of target trips in calculating the changes in CS due to the various alternatives. But since the methodology was consistently applied across all alternatives, the ranking of alternatives would not be affected.

d. Consumer surplus (CS) – a value of $80 (2009 dollars) per fish, per angler, per trip was used for this amendment. This value is for a snapper grouper trip and is derived from a study conducted in North Carolina (Dumas et al. 2009). 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 chosen value 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. It should be noted that the use of a constant value of consumer surplus across all areas and fishing modes does 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 fishery for a species is closed, or certain areas are closed to fishing for the species. However, because the value and methodology was used consistently across all alternatives, the ability to rank alternatives should not be affected.

e. Net operating revenue (NOR) – The values of $128 and $68, respectively, for charter and headboat NOR 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 (Dumas et al. 2009). 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. However, it is noted that the use of these values does not take into account differences in charter and headboat operations by area.

f. Economic effects – the economic effects of the various alternatives were estimated under the assumption that the affected trips would be cancelled. This assumption would rule out the possibility that anglers may opt to target other species in the affected areas or snapper grouper species in areas that remain open. This assumption, however, should not alter the ranking of alternatives or the distribution of economic effects by mode, unless the likelihood of these behaviors differs by alternative.

g. Period of analysis – although the proposed alternatives would establish management measures that would remain in effect for a number of years 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 viable business operations.

h. Effects of recent and pending amendments – several amendments have been recently implemented, are in the process of being implemented, or are being currently considered. The effects of these 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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