UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

MAY 25 2012

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE:	Amendment 24 to the Snapper-Grouper Fishery Management Plan of the South Atlantic Region (Amendment 24) (RIN 0648-BA52)
LOCATION:	Exclusive economic zone (EEZ) off the Southeast coast
SUMMARY:	The South Atlantic Fishery Management Council (Council) approved Amendment 24 during their December 5-9, 2011, Council meeting. The Council submitted the document to National Marine Fisheries Service (NOAA Fisheries Service) for agency review as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) on December 14, 2011.

The South Atlantic red grouper stock was assessed in 2008 through the Southeast Data, Assessment, and Review Process. The assessment determined red grouper to be overfished and undergoing overfishing. The Council is required by the Magnuson-Stevens Act to implement a rebuilding plan within two years after notification of an overfished stock. NOAA Fisheries Service notified the Council of the stock status on June 9, 2010. The primary purpose of Amendment 24 is to implement the rebuilding plan. The Council is also revising management benchmarks, annual catch limits (ACL), and accountability measures (AM) for red grouper.

Amendment 24 will eliminate the commercial and recreational aggregate ACLs/AMs for black grouper, gag, and red grouper. The aggregate ACLs/AMs would be replaced by individual red grouper ACLs/AMs. The gag ACLs, implemented through Amendment 16 to the FMP, will remain. The Comprehensive ACL Amendment specified the ACLs for black grouper. The red grouper ACLs are based on the acceptable biological catch (ABC) derived from the Council's Scientific and Statistical Committee's ABC control rule. Proposed in-season AMs will close each sector (commercial and recreational) when the sector-ACL is projected to be met. If a sector-ACL is exceeded, the Regional Administrator will publish a notice to reduce the sector-ACLs in the following season by the amount of the overage. The ACLs for the commercial and recreational sectors will be established through the Council's proposed allocations (44 percent commercial/56 percent recreational).

RESPONSIBLE
OFFICIAL: Roy E. Crabtree, Ph.D.
Regional Administrator
National Marine Fisheries Service, National Oceanic and Atmospheric Administration (NOAA)
Southeast Regional Office
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The environmental review process led us to conclude that this action will not have a significant impact on the environment. Therefore, an environmental impact statement was not prepared. A copy of the finding of no significant impact (FONSI), including the environmental assessment (EA), is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI we will consider any comments submitted that would assist us in preparing future NEPA documents. Please submit any written comments to the Responsible Official named above.

Sincerely,

for

Patricia A. Montanio
NEPA Coordinator

Enclosure

Amendment 24

to the Snapper Grouper Fishery Management Plan
of the South Atlantic Region

Red Grouper Rebuilding Plan

Environmental Assessment **Initial Regulatory Flexibility Act Analysis** **Regulatory Impact Review**

Social Impact Assessment/Fishery Impact Statement

December 2011

Definitions, Abbreviations, and Acronyms Used in the FMP

ABC	acceptable biological catch
ACL	annual catch limits
AM	accountability measures
ACT	annual catch target
B	a measure of stock biomass in either weight or other appropriate unit
B_{MSY}	the stock biomass expected to exist under equilibrium conditions when fishing at F_{MSY}
B_{OY}	the stock biomass expected to exist under equilibrium conditions when fishing at F_{OY}
B_{CURR}	The current stock biomass
CPUE	catch per unit effort
DEIS	draft environmental impact statement
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
F	a measure of the instantaneous rate of fishing mortality
$F_{30\%SPR}$	fishing mortality that will produce a static SPR = 30%
F_{CURR}	the current instantaneous rate of fishing mortality
F_{MSY}	the rate of fishing mortality expected to achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}
F_{OY}	the rate of fishing mortality expected to achieve OY under equilibrium conditions and a corresponding biomass of B_{OY}
FEIS	final environmental impact statement
FMP	fishery management plan
FMU	fishery management unit
M	natural mortality rate
MARMAP	Marine Resources Monitoring Assessment and Prediction Program
MFMT	maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistics Survey
MRIP	Marine Recreational Information Program
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	overfishing limit
OY	optimum yield
RIR	regulatory impact review
SAMFC	South Atlantic Fishery Management Council
SEDAR	Southeast Data Assessment and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SIA	social impact assessment
SPR	spawning potential ratio
SSC	Scientific and Statistical Committee

Amendment 24

to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region with Environmental Assessment, Initial Regulatory Flexibility Act Analysis, Regulatory Impact Review, and Social Impact Assessment/Fishery Impact Statement

Proposed actions:	For red grouper, specify the following: MSY; MSST; rebuilding plan (including ACLs, ACTs, AMs, and OY); and allocations.
Lead agency:	FMP Amendment – South Atlantic Fishery Management Council EA - NOAA Fisheries Service
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NOI published:	Jan. 12, 2011
Scoping meetings held:	Jan. 24, 2011-Feb. 3, 2011
Public Hearings held:	Aug. 22-25, 2011; Nov. 14-17, 2011; Dec. 6, 2011

Abstract

The most recent assessment for the red grouper in the South Atlantic indicates that the stock is experiencing overfishing and is overfished (SEDAR 19 2010). When a stock is undergoing overfishing, fishery managers must implement management measures to end overfishing. In cases where stocks are overfished, the Councils and NOAA Fisheries Service must implement rebuilding plans. NOAA Fisheries Service notified the South Atlantic Fishery Management Council (South Atlantic Council) of the status of the red grouper stock on June 9, 2010. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires the implementation of measures within two years of notification. Therefore, a rebuilding plan for red grouper in the South Atlantic must be in place by June 2012 to end overfishing and rebuild the stock. Besides establishing a rebuilding plan, the South Atlantic Council is proposing the implementation or revision of the following items through this amendment:

(1) maximum sustainable yield
(2) minimum stock size threshold
(3) rebuilding schedule
(4) rebuilding strategy and acceptable biological catch
(5) allocations
(6) annual catch limits and optimum yield
(7) annual catch targets
(8) accountability measures

A reauthorization of the Magnuson-Stevens Act in 2007 introduced new tools that, when implemented, would end and prevent overfishing in order to achieve the optimum yield from a fishery. The requirements are referred to as annual catch limits (ACLs) and accountability measures (AMs). An ACL is the level of annual catch of a stock that, if met or exceeded, triggers some corrective action. AMs are management controls to prevent ACLs from being exceeded and to correct overages of ACLs if they occur.

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SUMMARY

of

AMENDMENT 24

to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region

The Southeast Data, Assessment, and Review (SEDAR) stock assessment of the red grouper stock in the South Atlantic was completed in 2010 with data through 2008. The assessment showed red grouper are overfished (population biomass or pounds in the water is too low) and undergoing overfishing (rate of removal or numbers of fish removed from the water is too high).

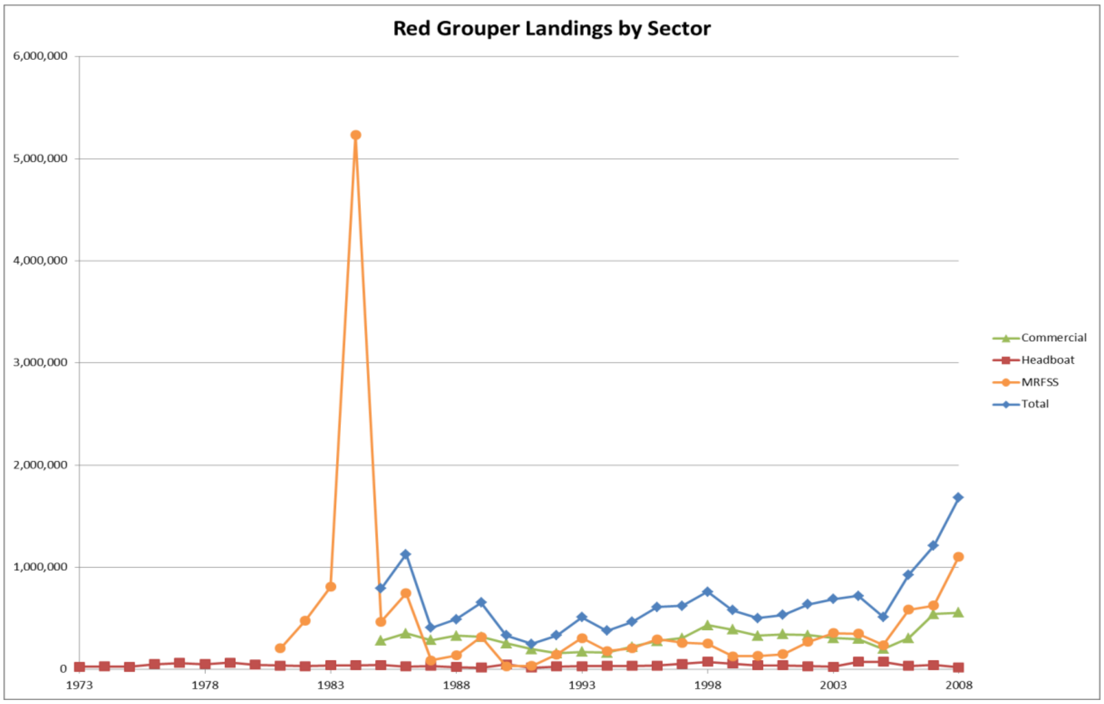
The South Atlantic Fishery Management Council (South Atlantic Council) and National Marine Fisheries Service (NOAA Fisheries Service) are required by law to implement a rebuilding plan. The primary purpose of Amendment 24 to the Fishery Management Plan for the Snapper Grouper Fishery (Amendment 24) is to implement the rebuilding plan to end overfishing and rebuild the stock of red grouper. However, the South Atlantic Council is also required to specify management benchmarks (called maximum sustainable yield and minimum stock size threshold).

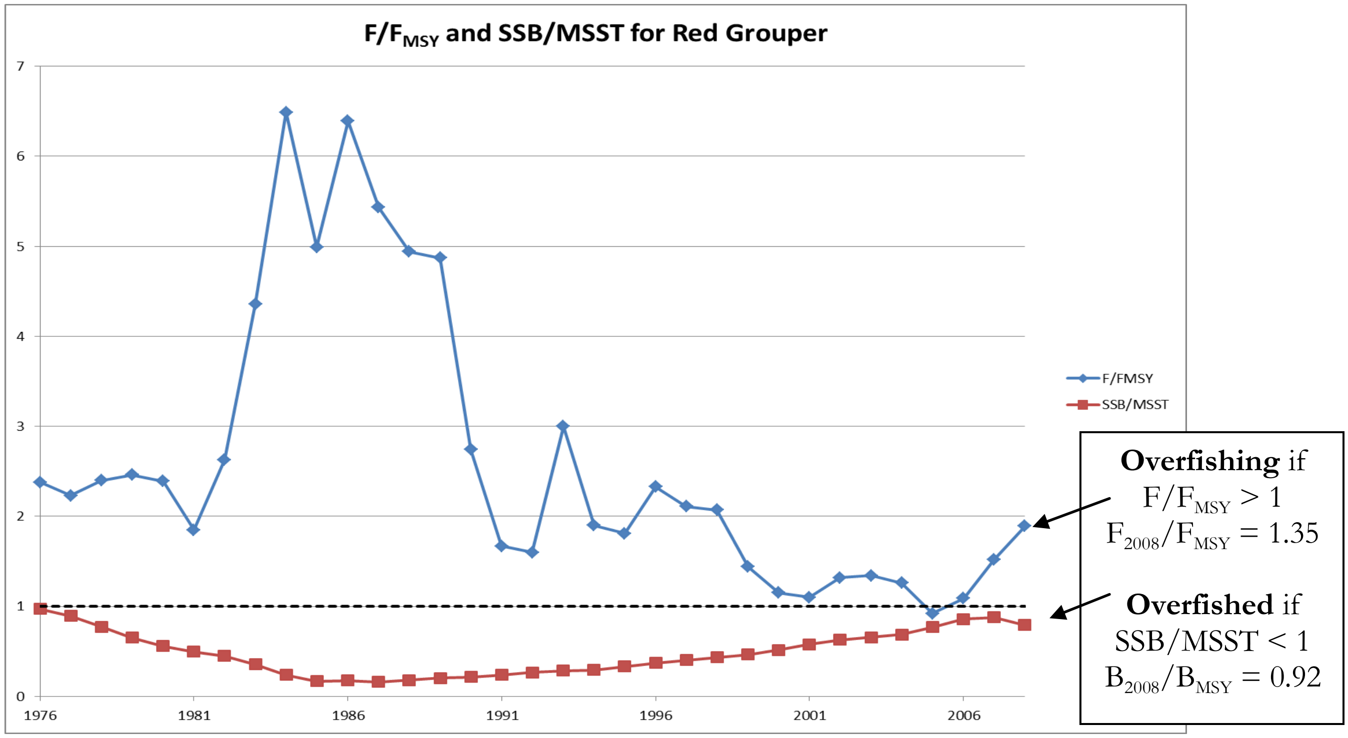
On July 29, 2009, the South Atlantic Council's Amendment 16 to the Snapper Grouper Fishery Management Plan that included a four-month spawning season closure for gag and shallow water groupers (including red grouper) was implemented by NOAA Fisheries Service. Based on 2010 red grouper catch data, current management measures are sufficient to limit recreational landings below the recreational ACL proposed in this amendment; however, the commercial ACL could be exceeded before the end of the year once implemented in 2012.

This document is intended to serve as a SUMMARY for all the actions and alternatives in Amendment 24. It also provides background information and includes a summary of the expected biological, social, and economic effects from the management measures.

Why is the South Atlantic Council taking Action?

The stock assessment of red grouper in the South Atlantic Council's area was completed in 2010 using data through 2008. The assessment showed red grouper to be **overfished** (the number of red grouper in the water is too low) and **undergoing overfishing** (red grouper are being removed from the population too quickly) (see figures below). The South Atlantic Council and National Marine Fisheries Service (NOAA Fisheries Service) are required by law to implement a rebuilding plan to end overfishing and rebuild the spawning stock of red grouper.




F/FMSY and SSB/MSST for Red Grouper
F/FMSY
SSB/MSST
Overfishing if
F/FMSY > 1
F2008/FMSY = 1.35
Overfished if
SSB/MSST < 1
B2008/BMSY = 0.92
0
1
2
3
4
5
6
7
1976
1981
1986
1991
1996
2001
2006

What Are the Proposed Actions?

There are 10 actions in Amendment 24. Each *action* has a range of *alternatives*, including a "no action alternative" and a "preferred alternative".

Indicates the Council's preferred alternative(s)

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Annual Catch Target for the Commercial Sector
8. Annual Catch Target for the Recreational Sector
9. Accountability Measures for the Commercial Sector
10. Accountability Measures for the Recreational Sector

What Are the Alternatives?

1. Maximum Sustainable Yield

Maximum Sustainable Yield: The largest long-term average catch that can be taken continuously (sustained) from a stock or stock complex under average environmental conditions.

Proposed Actions in Amendment 24

1. **Maximum Sustainable Yield**
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. Recreational ACT
9. Commercial AMs
10. Recreational AMs

Alternatives	Equation	F_{MSY}	MSY Values (lbs whole weight)
Alternative 1 (No Action)	Do not change the current definition of MSY for red grouper. Currently, MSY equals the yield produced by F_{MSY}. $F_{30\%SPR}$ is used as the F_{MSY} proxy.	$F_{30\%SPR}=0.189$[1]	not specified
Alternative 2 (Preferred)	**MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy. MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.**	**0.221**[2]	**1,110,000**[3]

[1]Estimate from the Beaufort Assessment Model (BAM)
[2,3]SEDAR 19 (2010) addendum

Impacts

Biological: **Preferred Alternative 2** would have beneficial effects on the red grouper stock as it provides a reference point to monitor its long-term performance.

Economic: **Preferred Alternative 2**, which is recommended in the most recent SEDAR and by the SSC, has a better scientific basis. Hence, it provides a more solid ground for management actions that have economic implications.

Social: **Preferred Alternative 2** will likely have few negative social effects if the threshold is above the mean landings and not substantially reduced by other management actions.

2. Minimum Stock Size Threshold (MSST)

Minimum Stock Size Threshold (MSST): The biomass level below which a stock would be considered overfished.

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. **Minimum Stock Size Threshold**
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. Recreational ACT
9. Commercial AMs
10. Recreational AMs

Alternatives	MSST Equation	M equals	MSST Values (lbs whole weight)
Alternative 1 (No Action)	Do not change the current definition of MSST for red grouper. MSST equals SSB_{MSY} ((1-M) or 0.5, whichever is greater).	0.14[1]	4,914,053
Alternative 2	MSST equals 50% of SSB_{MSY}	n/a	2,857,162
Alternative 3 (Preferred)	**MSST equals 75% of SSB_{MSY}**	**n/a**	**4,285,742**
Alternative 4	MSST equals 85% of SSB_{MSY}	n/a	4,857,175
Alternative 5	MSST at which rebuilding to the MSY level would be expected to occur within 10 years at the MFMT level.[2]		

[1]Source: Determination from SEDAR 19 (2010).
[2]At the December 2010 meeting, the South Atlantic Council requested the Southeast Fisheries Science Center (SEFSC) provide an estimate of the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years when fishing mortality is at the minimum fishing mortality threshold (MFMT) level and that this be added as an alternative. This analysis is contained in **Appendix D**.

<u>Impacts</u>

<u>Biological</u>: Taking no action could result in the red grouper stock's biomass fluctuating frequently between an overfished and rebuilt status because the current MSST is set too close to SSBmsy (the stock biomass expected to exist under equilibrium conditions when fishing at F_{MSY}). **Alternatives 2-4** would establish a larger buffer between what is considered to be an overfished and rebuilt condition. The benefits of **Preferred Alternative 3** are intermediate between **Alternatives 2** and **4**.

<u>Economic</u>: Like MSY, MSST does not alter the current harvest or use of the resource, and thus would have no direct economic effects on fishery participants and associated industries or communities. However, a low MSST level would be associated with lower probability of enacting rebuilding actions that would alter the economic environment. The economic effects of the **Preferred Alternative 3** fall in between those of taking no action (**Alternative 1**) and setting the MSST at 50% of the SSB_{MSY} (**Alternative 2**).

<u>Social</u>: **Preferred Alternative 3** is expected to result in greater short-term social impacts than **Alternative 2** from closures and other regulations that limit harvest due to MSST being reached, but less long-term social impacts than **Alternative 4**.

3. Rebuilding Schedule

Proposed Actions in Amendment 24

Alternatives	Definition
Alternative 1 (No Action)	Do not implement a rebuilding plan for red grouper. There currently is not a rebuilding plan for red grouper. Snapper Grouper Amendment 4 (regulations effective January 1992) implemented a 15-year rebuilding plan beginning in 1991, which expired in 2006.
Alternative 2	Define a rebuilding schedule as the shortest possible period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 3 years with the rebuilding time period ending in 2013. 2011 is Year 1.
Alternative 3	Define a rebuilding schedule intermediate between the shortest possible and maximum recommended period to rebuild. This would equal 7 years with the rebuilding time period ending in 2017. 2011 is Year 1.
Alternative 4	Define a rebuilding schedule of 8 years with the rebuilding time period ending in 2018. 2011 is Year 1.
Alternative 5 (Preferred)	**Define a rebuilding schedule as the maximum period allowed to rebuild (T_{MAX}). This would equal 10 years with the rebuilding time period ending in 2020. 2011 is Year 1.**

Impacts

Biological: **Preferred Alternative 5** would take the longest time period to rebuild the red grouper stock. A longer rebuilding schedule would, in general: 1) offer lower beneficial impacts to the biological environment, 2) allow the stock to be harvested at higher rates as it rebuilds, and 3) increase the risk that environmental or other factors could prevent the stock from recovering.

Economic: **Preferred Alternative 5** would provide the least restrictive management measures over the rebuilding timeframe. The degree of short-term adverse economic consequences would vary according to the restrictiveness of management measures. It can be expected that future benefits would accrue soonest under **Alternative 1 (No Action)** and latest under the preferred alternative.

Social: Generally, the shorter the rebuilding schedule, the more severe the necessary harvest restrictions and the greater the short-term adverse effects associated with business failure, job or living dislocations, and overall adjustments for the social environment. **Preferred Alternative 5** would be expected to allow the greatest flexibility to recover red grouper and minimize the adverse social and economic effects on associated fisheries.

4. Rebuilding Strategy and ABC

The South Atlantic Council is proposing the implementation of a rebuilding plan for red grouper as the stock is overfished. The Council is considering a range of rebuilding strategy alternatives that define the maximum fishing mortality rate throughout the rebuilding timeframe. The table below summarizes the alternatives.

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. **Rebuilding Strategy and Acceptable Biological Catch**
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. Recreational ACT
9. Commercial AMs
10. Recreational AMs

Alternatives	Rebuilding strategy (F_{OY} Equal To) Scenario	F rate	ABC (lbs whole weight) *Landings & Discards*	ABC (lbs whole weight) *Landings (Preferred)*
Alternative 1 (No Action)	$F_{45\%SPR}$	0.1055	399,000 (2011) 468,000 (2012) 537,000 (2013) 602,000 (2014)	374,000 (2011) 442,000 (2012) 511,000 (2013) 575,000 (2014)
Alternative 2	$F_{REBUILD}$ (10 years)	0.181	665,000 (2011) 737,000 (2012) 806,000 (2013) 866,000 (2014)	622,000 (2011) 693,000 (2012) 762,000 (2013) 822,000 (2014)
Alternative 3 (Preferred)	**75%F_{MSY}**	**0.166**	613,000 (2011) 687,000 (2012) 759,000 (2013) 821,000 (2014)	**573,000 (2011) 647,000 (2012) 718,000 (2013) 780,000 (2014)**
Alternative 4	65%F_{MSY}	0.144	535,000 (2011) 610,000 (2012) 683,000 (2013) 749,000 (2014)	501,000 (2011) 575,000 (2012) 648,000 (2013) 713,000 (2014)
Alternative 5	$F_{REBUILD}$ (7 years)	0.157	583,000 (2011) 657,000 (2012) 730,000 (2013) 794,000 (2014)	545,000 (2011) 619,000 (2012) 691,000 (2013) 755,000 (2014)
Alternative 6	$F_{REBUILD}$ (8 years)	0.168	620,000 (2011) 695,000 (2012) 765,000 (2013) 828,000 (2014)	580,000 (2011) 654,000 (2012) 724,000 (2013) 787,000 (2014)

Alternative 1 (No Action). Do not specify a rebuilding strategy for red grouper.

Alternative 2. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in T_{MAX} (ten years for red grouper). Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2017 and 70% chance of rebuilding to SSB_{MSY} by 2020.

Alternative 3 (Preferred). Define a rebuilding strategy for red grouper that sets ABC equal to the yield at 75%F_{MSY}. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2016 and 81% chance of rebuilding to SSB_{MSY} by 2020.

Alternative 4. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at 65%F_{MSY}. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2016 and 92% chance of rebuilding to SSB_{MSY} by 2020.

Alternative 5. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in 7 years. Under this strategy, the fishery would have at least a 48% chance of rebuilding to SSB_{MSY} by 2015 and 70% chance of rebuilding to SSB_{MSY} by 2017.

Alternative 6. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in 8 years. Under this strategy, the fishery would have at least a 54% chance of rebuilding to SSB_{MSY} by 2016 and 70% chance of rebuilding to SSB_{MSY} by 2018.

A comparison of rebuilding strategy alternatives in terms of probability of stock recovery.

	Alternatives					
	1 (No Action)	**2** $F_{REBUILD}$ (10 years)	**3** **75%F_{MSY} (Preferred)**	**4** 65%F_{MSY}	**5** $F_{REBUILD}$ (7 years)	**6** $F_{REBUILD}$ (8 years)
Probability of rebuilding to SSB_{MSY} in <u>10 years</u> (2020)	n/a	70%	**81%**	92%	n/a	n/a
Probability of rebuilding to SSB_{MSY} in <u>7 years</u> (2017)	n/a	54%	**64%**	78%	70%	n/a
Probability of rebuilding to SSB_{MSY} in <u>8 years</u> (2018)	n/a	61%	**72%**	85%	n/a	70%
Year in which 50% probability of rebuilding to SSB_{MSY} would be reached	2014[1]	2017	**2016**	2016	2015[2]	2016[3]

[1]Based upon a $F_{30\%SPR}$ proxy for F_{MSY}
[2]A 48% probability of rebuilding
[2]A 54% probability of rebuilding
NOTE: Alternatives 2-4 are based on a 70% probability of rebuilding success in 10 years. Alternative 5 is based on a 70% probability of rebuilding success in 7 years.
Alternative 6 is based on a 70% probability of rebuilding success in 8 years.

Impacts

Biological: This action determines the target level of fishing mortality during the rebuilding time frame. The second greatest biological benefit would be provided by **Preferred Alternative 3**, which would specify an ABC equal to the yield 75%F_{MSY}. A large sustainable biomass associated with the preferred fishing mortality rate would be beneficial for the stock.

Economic: **Preferred Alternative 3** would provide the third highest economic benefits (after **Alternatives 2 and 6**). From a regional perspective, **Alternative 2** is economically superior in that it makes all constituents better off without making anybody worse off.

Social: Although a more conservative fishing mortality rate (F) would likely result in a higher probability of rebuilding over a shorter period of time, the strategy proposed under **Preferred Alternative 3** provides more long-term social benefits than **Alternatives 2 or 6**.

5. Allocations

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. **Allocations**
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. Recreational ACT
9. Commercial AMs
10. Recreational AMs

Alternative 1 (No Action). Do not establish a sector allocation of the red grouper annual catch limit (ACL).

Alternative 2. Specify allocations for the commercial and recreational sectors based on criteria as outlined in one of the following options: **(using SEDAR 19 data; Table S-1)**

Subalternative 2a. Commercial = 52% and recreational = 48% (Established by using average landings from 1986-2008).

Subalternative 2b. Commercial = 54% and recreational = 46% (Established by using average landings from 1986-1998).

Subalternative 2c. Commercial = 49% and recreational = 51% (Established by using average landings from 1999-2008).

Subalternative 2d. Commercial = 41% and recreational = 59% (Established by using average landings from 2006-2008).

Subalternative 2e (Preferred). Commercial = 44% and recreational = 56% (Established by using 50% of average landings from 1986-2008 + 50% of average landings from 2006-2008).

Impacts

Biological: The biological effects of the different allocation alternatives would be similar if landings in both sectors could be closely monitored. Further, the biological effects of options that allocate more of the ABC to the commercial sector could have a more beneficial biological effect because there is less chance a commercial ACL would be exceeded than a recreational ACL. Commercial data can often be more closely monitored as they are based on dealer reports, whereas much of the recreational data (except headboat data) are based on survey information.

Economic: In terms of the commercial sector, **Subalternative 2b** would result in the largest positive effects for all states combined. **Subalternatives 2a-2c** would have negative impacts on Georgia/Northeast Florida and positive for all other states. **Subalternative 2d** would result in negative effects for all states. **Preferred Subalternative 2e** would not result in any changes to business activity. In terms of the recreational fishery, the alternatives may be ranked in descending order as follows: **2d**, **2e (Preferred)**, **2c**, **2a**, and **2b**. This ranking is mainly driven by the size of the recreational allocation.

Social: **Preferred Subalternative 2e** would result in more social benefits for the commercial sector than **Subalternative 2d**, and more social benefits for the recreational sector than **Subalternatives 2a, 2b** and **2c.**

Table S-1. Red grouper catches by recreational and commercial sectors and the percent distribution of the catch between commercial and recreational sector (pounds whole weight).

Year	Recreational	% Rec	Commercial	%Com	Total
1986	775,164	69%	353,202	31%	1,128,366
1987	122,558	30%	285,679	70%	408,237
1988	160,621	33%	329,624	67%	490,245
1989	335,050	51%	319,067	49%	654,117
1990	78,198	23%	255,077	77%	333,275
1991	50,803	20%	198,562	80%	249,365
1992	176,044	53%	156,617	47%	332,661
1993	337,910	66%	171,300	34%	509,210
1994	216,995	57%	162,735	43%	379,730
1995	241,106	52%	222,171	48%	463,277
1996	333,076	55%	276,945	45%	610,021
1997	316,706	51%	305,940	49%	622,646
1998	327,083	43%	433,301	57%	760,384
1999	187,357	32%	391,232	68%	578,589
2000	172,432	34%	329,150	66%	501,582
2001	188,190	35%	344,748	65%	532,938
2002	300,258	47%	336,392	53%	636,650
2003	383,175	56%	305,646	44%	688,821
2004	423,043	59%	297,475	41%	720,518
2005	314,667	61%	199,761	39%	514,428
2006	619,598	67%	307,212	33%	926,810
2007	667,750	55%	541,960	45%	1,209,710
2008	1,125,328	67%	556,286	33%	1,681,614

Source: SEDAR 19 stock assessment

Landings data from the Red Grouper SEDAR Stock Assessment were used to determine allocations (www.sefsc.noaa.gov/sedar/).

Here's how the Council determined red grouper allocations using catch data from the SEDAR stock assessment.

South Atlantic Council's Preferred Allocation Formula for each sector:
Sector apportionment = (50% * (average of long catch range (lbs) 1986-2008 + (50% * average of recent catch trend (lbs) 2006-2008. The commercial and recreational allocations specified would remain in effect until modified.

$$\text{Com Sector \%} = \frac{(50\% \text{ x Average Com 1986-2008}) + (50\% \text{ x Average Com 2006-2008})}{(50\% \text{ x Avg Com 1986-2008} + 50\% \text{ x Avg Com 2006-2008}) + (50\% \text{ x Avg Rec 1986-2008} + 50\% \text{ x Avg Rec 2006-2008})}$$

$$\text{Rec Sector \%} = \frac{(50\% \text{ x Average Rec 1986-2008}) + (50\% \text{ x Average Rec 2006-2008})}{(50\% \text{ x Avg Rec 1986-2008} + 50\% \text{ x Avg Rec 2006-2008}) + (50\% \text{ x Avg Com 1986-2008} + 50\% \text{ x Avg Com 2006-2008})}$$

6. Annual Catch Limits and Optimum Yield

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. **Annual Catch Limits and Optimum Yield**
7. Commercial ACT
8. Recreational ACT
9. Commercial AMs
10. Recreational AMs

Alternative 1 (No Action). Do not specify an individual ACL for red grouper. An individual ACL is currently not in place for red grouper. Retain aggregate recreational and commercial ACLs for black grouper, red grouper, and gag. The commercial sector ACL for gag, black grouper, and red grouper is 662,403 lbs gw (781,636 lbs ww) and 648,663 lbs gw (765,422 lbs ww) for the recreational sector. The total group ACL is 1,311,066 lbs gw (1,547,058 lbs ww). These values are equivalent to the expected catch resulting from the implementation of management measures for red grouper in Amendment 16 and specified in Amendment 17B.

Alternative 2 (Preferred). ACL = OY = ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 3. ACL = OY = 90% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 4. ACL = OY = 80% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 5 (Preferred). Eliminate the commercial sector aggregate ACL of 662,403 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of all shallow water groupers once the commercial aggregate ACL is projected to be met.

Alternative 6 (Preferred). Eliminate the recreational sector aggregate ACL of 648,663 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of black grouper, gag, and red grouper once the ACL is projected to be met if any one of the three species is listed as overfished. Eliminate the post-season AM that specifies a reduction in a subsequent year's ACL by the amount of an overage if landings exceed the aggregate ACL. Eliminate the regulation that states that the recreational landings are evaluated relative to the ACL as follows: For 2010, only 2010 recreational landings will be compared to the ACL; in 2011, the average of 2010 and 2011 recreational landings will be compared to the ACL; and in 2012 and subsequent fishing years, the most recent 3-year running average recreational landings will be compared to the ACL.

Table S-2. The ACL values (lbs whole weight) for red grouper in **Preferred Alternative 2** (ACL=ABC). ACL values are based on preferred allocation alternative (44% commercial/56% recreational).

Alt 2 (Preferred) ACL=ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	693,000	647,000	575,000	619,000	654,000
	2013	762,000	718,000	648,000	691,000	724,000
	2014	822,000	780,000	713,000	755,000	787,000
landings & discards	2012	737,000	687,000	610,000	657,000	695,000
	2013	806,000	759,000	683,000	730,000	765,000
	2014	866,000	821,000	749,000	794,000	828,000
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	304,920	284,680	253,000	272,360	287,760
	2013	335,280	315,920	285,120	304,040	318,560
	2014	361,680	343,200	313,720	332,200	346,280
landings & discards	2012	324,280	302,280	268,400	289,080	305,800
	2013	354,640	333,960	300,520	321,200	336,600
	2014	381,040	361,240	329,560	349,360	364,320
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	388,080	362,320	322,000	346,640	366,240
	2013	426,720	402,080	362,880	386,960	405,440
	2014	460,320	436,800	399,280	422,800	440,720
landings & discards	2012	412,720	384,720	341,600	367,920	389,200
	2013	451,360	425,040	382,480	408,800	428,400
	2014	484,960	459,760	419,440	444,640	463,680

Table S-3. The ACL values (lbs whole weight) for red grouper in **Alternative 3** (ACL=90%ABC). ACL values are based on preferred allocation alternative (44% commercial/56% recreational).

Alt. 3 ACL=90%ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	623,700	582,300	517,500	557,100	588,600
	2013	685,800	646,200	583,200	621,900	651,600
	2014	739,800	702,000	641,700	679,500	708,300
landings & discards	2012	663,300	618,300	549,000	591,300	625,500
	2013	725,400	683,100	614,700	657,000	688,500
	2014	779,400	738,900	674,100	714,600	745,200
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	274,428	256,212	227,700	245,124	258,984
	2013	301,752	284,328	256,608	273,636	286,704
	2014	325,512	308,880	282,348	298,980	311,652
landings & discards	2012	291,852	272,052	241,560	260,172	275,220
	2013	319,176	300,564	270,468	289,080	302,940
	2014	342,936	325,116	296,604	314,424	327,888
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	349,272	326,088	289,800	311,976	329,616
	2013	384,048	361,872	326,592	348,264	364,896
	2014	414,288	393,120	359,352	380,520	396,648
landings & discards	2012	371,448	346,248	307,440	331,128	350,280
	2013	406,224	382,536	344,232	367,920	385,560
	2014	436,464	413,784	377,496	400,176	417,312

Table S-4. The ACL values (lbs whole weight) for red grouper in **Alternative 4** (ACL=80%ABC). ACL values are based on preferred allocation alternative (44% commercial/56% recreational).

Alt. 4 ACL=80%ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	554,400	517,600	460,000	495,200	523,200
	2013	609,600	574,400	518,400	552,800	579,200
	2014	657,600	624,000	570,400	604,000	629,600
landings & discards	2012	589,600	549,600	488,000	525,600	556,000
	2013	644,800	607,200	546,400	584,000	612,000
	2014	692,800	656,800	599,200	635,200	662,400
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	243,936	227,744	202,400	217,888	230,208
	2013	268,224	252,736	228,096	243,232	254,848
	2014	289,344	274,560	250,976	265,760	277,024
landings & discards	2012	259,424	241,824	214,720	231,264	244,640
	2013	283,712	267,168	240,416	256,960	269,280
	2014	304,832	288,992	263,648	279,488	291,456
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	310,464	289,856	257,600	277,312	292,992
	2013	341,376	321,664	290,304	309,568	324,352
	2014	368,256	349,440	319,424	338,240	352,576
landings & discards	2012	330,176	307,776	273,280	294,336	311,360
	2013	361,088	340,032	305,984	327,040	342,720
	2014	387,968	367,808	335,552	355,712	370,944

PROPOSED 2012 ACL VALUES

Red Grouper ACL = 647,000 pounds whole weight
Commercial Sector ACL (44%) = 284,680 pounds whole weight
Recreational Sector ACL (56%) = 362,320 pounds whole weight

Impacts

Biological: **Alternatives 3** and **4** would have a greater positive biological effect than **Preferred Alternative 2** because they would create a buffer between the ACL and ABC thus providing greater assurance overfishing would not occur. **Preferred Alternatives 5** and **6** would eliminate the aggregate commercial and recreational ACLs and accountability measures (AMs) currently in place for red grouper, black grouper, and gag. An ACL for black grouper is being established through the Comprehensive ACL Amendment (under review) and a gag ACL is already in place.

Economic: **Preferred Alternative 2** would provide the largest ACL, and would also result in the largest positive economic impacts. It should be noted, however, that South Carolina would experience reductions in business activity under any of the alternatives. Under **Preferred Alternative 2**, all states except South Carolina would experience positive impacts on business activity. Removal of the aggregate quota for red, gag, and black (**Preferred Alternatives 5** and **6**) is not expected to have any economic effects based on the analysis.

Social: **Preferred Alternative 2** would result in fewer short-term social impacts than alternatives that set the ACL at a percentage of the ABC. Any social effects from **Alternatives 5** and **6 (Preferreds)** would be expected to result from a species-specific limit that could impact fishermen by limiting harvest of red grouper.

7. Specify a Commercial Sector Annual Catch Target

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. **Commercial ACT**
8. Recreational ACT
9. Commercial AMs
10. Recreational AMs

Alternative 1 (No Action) (Preferred). Do not specify a commercial ACT for red grouper. Currently, there is no commercial ACT for red grouper (The proposed commercial ACL would equal 284,680 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 2. The commercial ACT equals 90% of the commercial ACL (The proposed commercial ACT would equal 256,212 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 3. The commercial ACT equals 80% of the commercial ACL (The proposed commercial ACT would equal 227,744 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

NOTE: The ACT values would not increase if the total ACL is exceeded, as discussed in **Action 6**.

Impacts

Biological: **Alternatives 2** and **3** are designed to hedge against an ACL overage by providing a buffer between the ACT and ACL, and therefore account for management uncertainty. Establishing an ACT that is 90% or 80% of the commercial ACL would also reduce the probability that post-season AMs, meant to correct for an ACL overage, would be needed.

Economic: **Preferred Alternative 1 (No Action)** would not set a commercial ACT and therefore no economic impacts are expected relative to the status quo.

Social: There is an increasing possibility of negative short-term social effects going from **Alternative 1 (No Action) (Preferred)** to **Alternative 3.**

8. Specify a Recreational Sector Annual Catch Target

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. **Recreational ACT**
9. Commercial AMs
10. Recreational AMs

Alternative 1 (No Action). Do not specify a recreational ACT for red grouper. Currently, there is no recreational ACT for red grouper (The proposed recreational ACL would equal 362,320 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 2. The recreational ACT equals 85% of the recreational ACL (The proposed recreational ACT would equal 307,972 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 3. The recreational ACT equals 75% of the recreational ACL (The proposed recreational ACT would equal 271,740 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 4 (Preferred). The recreational ACT equals the recreational ACL*(1-PSE) or ACL*0.5, whichever is greater (The proposed recreational ACT would equal 271,740 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Note: The ACT values would not increase if the total ACL was exceeded as discussed in **Action 6**.

Alternative 4 (Preferred). The recreational ACT equals the recreational ACL*(1-PSE) or ACL*0.5, whichever is greater

Table S-5. Proportional Standard Error (PSE) values for red grouper 2004-2008 including 3-year and 5-year averages.
Note: Council using average value rounded to the nearest whole number.

PSE Values (weight)	
2004	24.7
2005	22.7
2006	26.0
2007	27.1
2008	25.6
3 Yr Avg	26.2
5 Yr Avg	25.2
Council using PSE=25%	

Source: MRFSS

What is PSE?
PSE stands for Proportional Standard Error and is a measure of precision. The smaller the PSE, the better the estimate of recreational landings.

Table S-6. Red grouper recreational ACTs. Values are in lbs whole weight.

Year	Preferred Recreational Sector ACL	Recreational Sector ACT		
		Alt 2; ACT=85%(ACL)	Alt 3; ACT=75%(ACL)	Alt 4 (Preferred); ACT equals sector ACL*(1-PSE) or ACL*0.5, whichever is greater
2012	362,320	307,972	271,740	**271,740**
2013	402,080	341,768	301,560	**301,560**
2014+	436,800	371,280	327,600	**327,600**

Impacts

Biological: **Preferred Alternative 4** would have the greatest biological benefit of the alternatives. The lower the value of the PSE, the more reliable the landings data. If the South Atlantic Council chose to limit harvest to the ACT, establishing this level below the recreational ACL would also reduce or eliminate the need to close or implement post-season AMs that are meant to correct for an ACL overage.

Economic: **Alternative 2** would result in larger positive economic effects than **Alternative 3**. **Preferred Alternative 4** would have exactly the same economic effects as **Alternative 3**.

Social: **Alternatives 2-4** impose various buffers as percentages of the ACL. It would be expected that short-term negative social effects would accrue as the buffer increases from **Alternative 2** to **Preferred**

Why an ACT for the recreational sector?

An ACT can be considered a "soft target" because the South Atlantic Council's goal is to have recreational landings fluctuate around the ACT level. The South Atlantic Council uses the ACT to determine whether a change in management is needed. If the current or expected recreational catch is above the ACT, the South Atlantic Council can use bag/size limits and seasons to reduce the recreational catch. If catches are below the ACT, no change in management measures is necessary.

The goal is to have the estimate of landings from MRFSS/MRIP fluctuate around the ACT without exceeding the ACL. Using PSE, which is a measure of the variability of the estimate of the recreational catch, provides the best approach to keep catches below the ACL as long as the necessary management measures are specified to limit the recreational catch. To ensure catches do not exceed the ACL, the South Atlantic Council is specifying Accountability Measures (AMs) to close the recreational fishery when NOAA Fisheries Service projects the recreational catch will be met. This requires in-season availability of the headboat and MRFSS/MRIP data and a method to project the expected catches. Delays in either of these data sources could result in the ACL being exceeded.

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. Recreational ACT
9. **Commercial AMs**
10. Recreational AMs

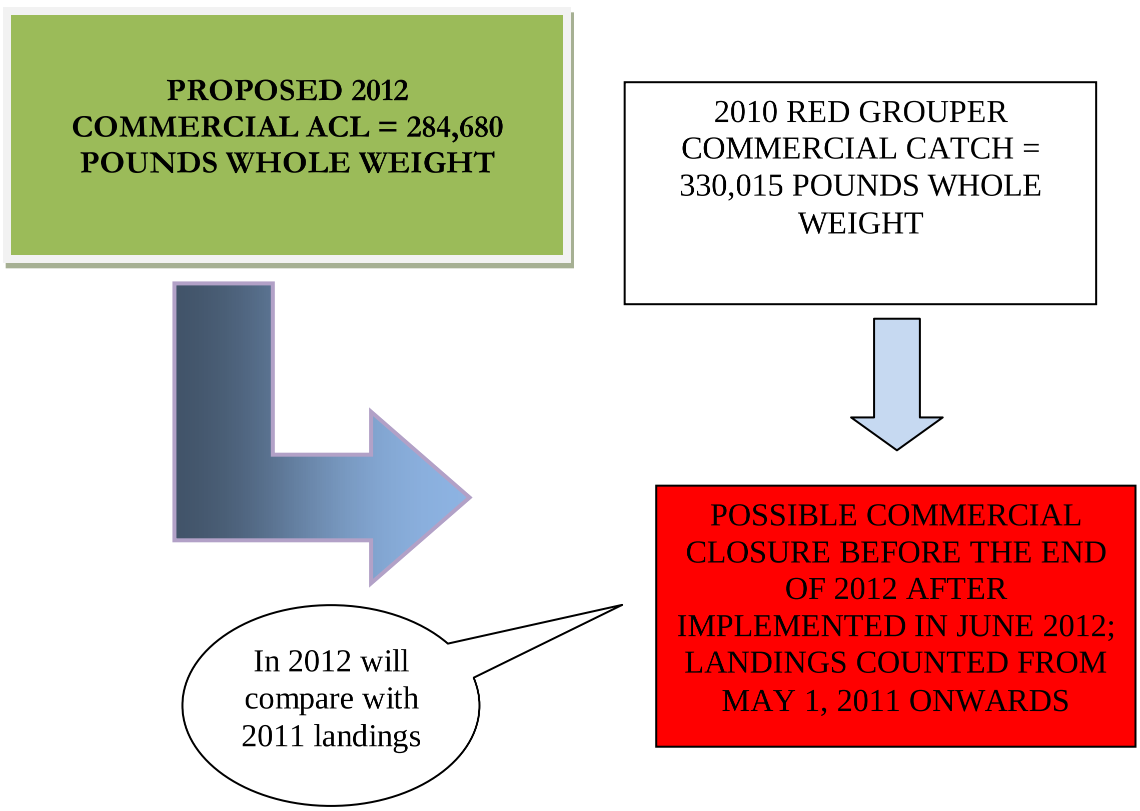
9. Specify Commercial Accountability Measures for Red Grouper

Alternative 1 (No Action). Do not specify new commercial AMs for red grouper. There currently are commercial AMs for a black grouper, gag, and red grouper complex.

Alternative 2 (Preferred). If the commercial ACL is met or is projected to be met, all subsequent purchase and sale of red grouper is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 3 (Preferred). If the commercial ACL is exceeded, the Regional Administrator shall publish a notice to reduce the commercial ACL in the following season by the amount of the overage.

NOTE: Paybacks are not required when new projections are adopted that incorporate ACL overruns and the ACLs are adjusted in accordance with those projections.



Impacts

Biological: **Preferred Alternative 3** would complement **Preferred Alternative 2** because it would correct for an ACL overage post-season, if such an event were to occur, by reducing the commercial ACL in the following season by the amount of the overage. This may result in a shortened season, however, if the reduced ACL is met earlier in the year. A shortened season could in turn result in increased regulatory discards if no level of harvest is permitted after the ACL is reached. However, **Preferred Alternative 2** would still allow fishermen to retain bag limit quantities of red grouper, which may reduce the number of regulatory discards that would otherwise result from a shortened season.

Economic: **Preferred Alternative 2** would provide greater short-term economic benefits to the commercial sector compared to **Preferred Alternative 3** but less than **Alternative 1 (No Action).** **Preferred Alternative 3** would also provide the greatest long-term economic benefits to the commercial sector compared to **Alternatives 1 (No Action)** and **Alternative 2 (Preferred)**.

Social: The combination of **Preferred Alternatives 2** and **3** should provide sufficient protection with some beneficial social effects. While payback does incur short-term negative social impacts, the long-term benefits of stock protection should contribute to the overall benefits as the red grouper stock would remain at sustainable levels.

CURRENT COMMERCIAL REGULATIONS

- 20 inch total length minimum size limit (effective 1/1/92)
- Vessels with longline gear can only possess deepwater species (no red grouper) (effective 2/24/99)
- Aggregate ACL of 662,403 lbs gutted weight for black grouper, gag, and red grouper (effective 1/31/11)
- Once the aggregate ACL is projected to be met, all possession of shallow water groupers is prohibited (effective 1/31/11)
- January through April annual closure of all shallow water groupers (effective 7/29/09)

Table S-7. Red grouper commercial landings by month during the open season for 2010. Proposed commercial ACL = 284,680 lbs whole weight

	Reported Monthly 2010 Landings (lbs whole weight)	Cumulative 2010 Landings (lbs whole weight)
January	0	0
February	0	0
March	0	0
April	0	0
May	85,057	85,057
June	55,486	140,543
July	35,893	176,436
August	32,205	208,641
September	24,857	233,498
October	41,625	275,123
November	31,272	306,395
December	23,620	330,015
Total	330,015	

10. Specify Recreational Accountability Measures (AMs) for Red Grouper

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Commercial ACT
8. Recreational ACT
9. Commercial AMs
10. **Recreational AMs**

Alternative 1 (No Action). Do not specify new, or modify existing, recreational AMs for red grouper. There currently are recreational AMs for a black grouper, gag, and red grouper complex.

Alternative 2. Specify the recreational AM trigger.

Subalternative 2a. Do not specify a recreational AM trigger.

Subalternative 2b (Preferred). If the current year recreational landings exceed the recreational ACL in a given year.

Subalternative 2c. If the mean recreational landings for the past three years exceed the recreational ACL.

Subalternative 2d. If the modified mean recreational landings exceed the recreational ACL. The modified mean is the most recent 5 years of available recreational landings data with highest and lowest landings estimates from consideration removed.

Subalternative 2e. If the lower bound of the 90% confidence interval estimate of the MRFSS landings' population mean plus headboat landings is greater than the recreational ACL.

Alternative 3. Specify the recreational in-season AM.

Subalternative 3a. Do not specify a recreational in-season AM.

Subalternative 3b (Preferred). The Regional Administrator shall publish a notice to close the recreational sector when the recreational ACL is projected to be met.

Alternative 4. Specify the recreational post-season AM.

Subalternative 4a. Do not specify a recreational post-season AM.

Subalternative 4b. For recreational post-season accountability measures, compare the recreational ACL with recreational landings over a range of years. For 2011, use only 2011 landings. For 2012, use the mean landings of 2011 and 2012. For 2013 and beyond, use the most recent three-year running mean.

Subalternative 4c. Monitor following year. If the recreational ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator would take action as necessary.

Subalternative 4d. Monitor following year and shorten season as necessary. If the recreational ACL is exceeded, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the recreational fishing season as necessary.

Subalternative 4e. Monitor following year and reduce bag limit as necessary. If the recreational ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator will publish a notice to reduce the recreational bag limit as necessary.

Subalternative 4f. Shorten following season. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the length of the following recreational fishing year by the amount necessary to ensure landings do not exceed the recreational ACL for the following fishing season.

Subalternative 4g (Preferred). Payback. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the recreational ACL in the following season by the amount of the overage.

NOTE: Paybacks are not required when new projections are adopted that incorporate ACL overruns and the ACLs are adjusted in accordance with those projections.

CURRENT RECREATIONAL REGULATIONS

- 20 inch total length minimum size limit (effective 1/1/92)
- Aggregate grouper bag limit of 3 per person per day (effective 7/29/09)
- Aggregate ACL of 648,663 lbs gw for black grouper, gag, and red grouper (effective 1/31/11)
- Once the ACL is projected to be met, possession of black grouper, gag, and red grouper is prohibited if any one of the three species is listed as overfished (effective 1/31/11)
- If the aggregate ACL exceeded, the subsequent year's ACL is reduced by the amount of the overage (effective 1/31/11)
- Recreational landings are evaluated relative to the ACL as follows: For 2010, only 2010 recreational landings will be compared to the ACL; in 2011, the average of 2010 and 2011 recreational landings will be compared to the ACL; and in 2012 and subsequent fishing years, the most recent 3-year running average recreational landings will be compared to the ACL (effective 1/31/11)
- January through April annual closure of all shallow water groupers (effective 7/29/09)

PROPOSED 2012 RECREATIONAL ACL = 362,320 POUNDS WHOLE WEIGHT

RECREATIONAL ACT

Rec ACT = Rec ACL *(1-PSE)
= 362,320*(1-0.25)
= 271,740 pounds whole weight

2010 RED GROUPER RECREATIONAL CATCH = 98,419 POUNDS WHOLE WEIGHT

NO RECREATIONAL CLOSURE IS EXPECTED BEFORE THE END OF 2012 AFTER IMPLEMENTED IN JUNE 2012; LANDINGS COUNTED FROM MAY 1, 2011 ONWARDS BUT EXPECTED TO BE BELOW PROPOSED ACL & ACT. NO CHANGE TO RECREATIONAL MANAGEMENT MEASURES REQUIRED BASED ON 2010 RECREATIONAL CATCHES.

In 2012 will compare with 2011 landings

Impacts

Biological: Together **Preferred Subalternatives 2b, 3b,** and **4g** define the South Atlantic Council's approach to ensure that landings do not surpass the recreational ACL and any overages, should they occur, are accounted for. The approach would benefit the red grouper stock in that it would ensure that overfishing does not occur and the stock is rebuilt.

Economic: **Subalternatives 2c** and **2d** would likely provide less adverse short-term economic effects than the other subalternatives under **Alternative 2** since they are less likely to trigger the AM. Between the two subalternatives under **Alternative 3**, **Subalternative 3a** would benefit the recreational sector more in the short-term since no further restrictions would be imposed. However, it would result in worse long-term economic conditions since lack of an AM could result in further overfishing of the stock that, in turn, would require more restrictive regulations. **Subalternative 4d** may yield larger adverse economic impacts than **Subalternative 4e** because it would eliminate fishing opportunities during part of the fishing year rather than reduce the fishing experience for part of the year. It is likely that **Subalternatives 4f** and **4g (Preferred)** would result in the same fishing season length, although some other measures, like bag limit reduction, may be employed to lengthen the season thus benefiting the economic environment.

Social: The long-term social effects of this action would be positive as long as the restrictions on recreational harvest through the preferred subalternatives help to meet the rebuilding goals.

Chapter 1.
Introduction

1.1 What Actions Are Being Proposed?

Fishery managers are proposing changes to regulations through Amendment 24 to the Fishery Management Plan (FMP) for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 24). Several actions are being proposed, the most noteworthy being a rebuilding plan for the red grouper stock in the South Atlantic.

1.2 Who is Proposing the Actions?

The South Atlantic Fishery Management Council (South Atlantic Council) is proposing the actions. The South Atlantic Council develops the regulations and submits them to the National Marine Fisheries Service (NOAA Fisheries Service) who ultimately approves, disapproves, or partially approves the actions in the amendment on behalf of the Secretary of Commerce. NOAA Fisheries Service is an agency in the National Oceanic and Atmospheric Administration.

South Atlantic Fishery Management Council

- Responsible for conservation and management of fish stocks
- Consists of 13 voting members who are appointed by the Secretary of Commerce and 4 non-voting members
- Management area is from 3 to 200 miles off the coasts of North Carolina, South Carolina, Georgia, and east Florida through Key West
- Develops management plans and recommends actions to NOAA Fisheries Service for implementation

1.3 Where is the Project Located?

Management of the federal snapper grouper fishery located off the South Atlantic in the 3-200 nautical miles U.S. Exclusive Economic Zone (EEZ) is conducted under the FMP for the Snapper Grouper Fishery of the South Atlantic Region (SAFMC 1983) (**Figure 1-1**).

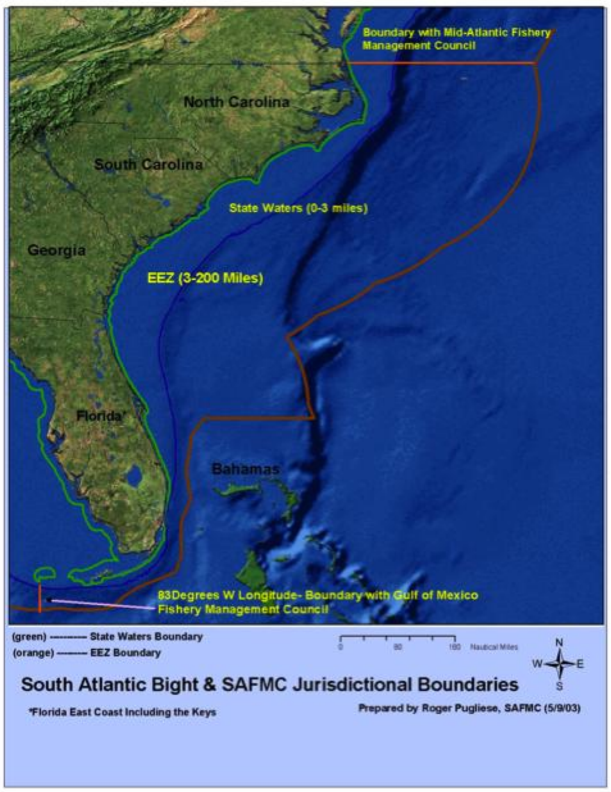


Figure 1-1. Jurisdictional boundaries of the South Atlantic Fishery Management Council.

1.4 Why is the Council Considering Action?

The most recent assessment for the red grouper stock in the South Atlantic, completed in 2010 with date through 2008, indicates that the stock is experiencing overfishing and is overfished (SEDAR 19). As directed by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the South Atlantic Council and NOAA Fisheries Service must implement a rebuilding plan, through an FMP amendment or proposed regulations, which ends overfishing immediately and provides for rebuilding the red grouper stock. The intent of a rebuilding plan is to increase biomass of overfished stocks to a sustainable level within a specified period of time. A plan should achieve conservation goals while minimizing, to the extent practicable, adverse socioeconomic impacts.

Purpose for Action

Specify annual mortality limits in a rebuilding plan that ultimately provides a blueprint to increase red grouper biomass to sustainable levels within a specified time period.

Need for Action

To end overfishing and rebuild the stock while minimizing, to the extent practicable, adverse social and economic effects.

1.5 What are Problems with An Overfished Stock Undergoing Overfishing?

The red grouper stock in the South Atlantic is undergoing overfishing **(Figure 1-2)** and is overfished **(Figure 1-3)**.

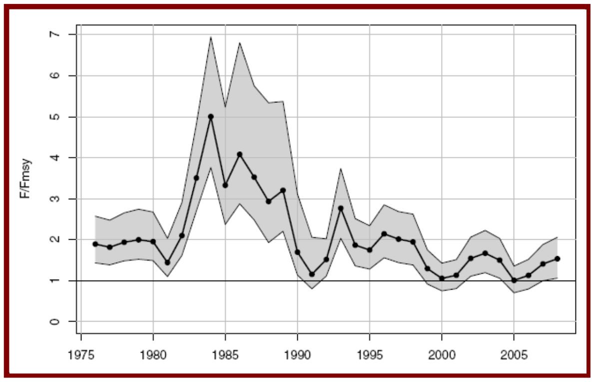


Figure 1-2. The overfishing ratio for red grouper over time. The stock is undergoing overfishing when the F/F_{MSY} is greater than one.

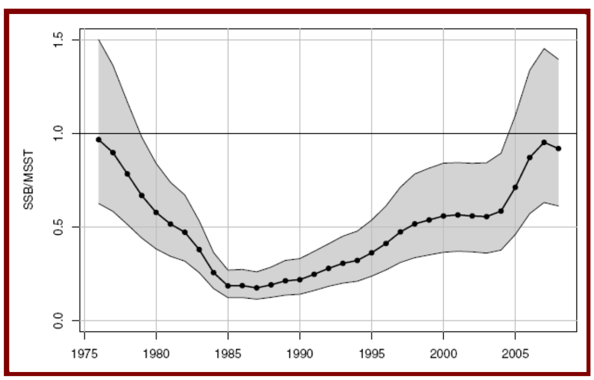


Figure 1-3. The overfished ratio for red grouper over time. The stock is overfished when the SSB/MSST is less than one.

Overfishing results when fishing pressure is beyond a pre-determined fishing mortality limit. Overfishing may lead to an overfished condition. A stock is overfished when the biomass is below an identified minimum stock size threshold (MSST). Due to low biomass levels, an overfished stock is more vulnerable to environmental variables and cannot produce the maximum sustainable yield (MSY). Further problems associated with overfishing and overfished stocks may include reduced population stability; lower or more unpredictable yields, and difficulty sustaining viable commercial fishing and charterboat operations; reduced availability to recreational anglers; higher costs to consumers; economic losses to related businesses (e.g., marinas, tackle shops, restaurants); and possibly, shifts in ecosystem dynamics.

1.6 How Long Does the South Atlantic Council and NOAA Fisheries Service Have to Implement Measures?

NOAA Fisheries Service notified the South Atlantic Council of the overfished stock status on June 9, 2010. The Magnuson-Stevens Act specifies that measures must be implemented within two years of notification; that is, by June 9, 2012.

1.7 What Are the Other Actions in the Amendment?

Besides establishing a rebuilding plan, the South Atlantic Council is proposing implementation or revision of the following items through this amendment:

(1) annual catch limits (ACLs)
(2) annual catch targets (ACTs)
(3) accountability measures (AMs)
(4) allocations
(5) maximum sustainable yield (MSY)
(6) optimum yield (OY)
(7) minimum stock size threshold (MSST)
(8) overfishing definition

1.8 What Are Annual Catch Limits and Accountability Measures and Why are They Required?

A reauthorization of the Magnuson-Stevens Act in 2007 required implementation of new tools that, when implemented, would end and prevent overfishing in order to achieve the optimum yield from a fishery. The tools are annual catch limits (ACLs) and accountability measures (AMs). An ACL is the level of annual catch of a stock that, if met or exceeded, triggers some corrective action. The AMs are management controls to prevent ACLs from being exceeded and to correct overages of ACLs if they occur. Two examples of AMs include an in-season closure if catch approaches the ACL and reducing the ACL by an overage that occurred the previous fishing year. The Environmental Assessment (EA) contained within Amendment 24 includes alternatives that would establish ACLs and AMs for red grouper in the South Atlantic region.

Definitions

Annual Catch Limits
The level of annual catch (pounds or numbers) that triggers accountability measures to ensure that overfishing is not occurring.

Annual Catch Targets
The level of annual catch (pounds or numbers) that is the management target of the fishery, and accounts for management uncertainty in controlling the actual catch at or below the ACL.

Accountability Measures
Management controls to prevent ACLs, including sector ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur.

Allocations
A division of the overall ACL among sectors (e.g, recreational and commercial) to create sector ACLs.

Maximum Sustainable Yield
Largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.

Optimum Yield
The amount of catch that will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems.

Minimum Stock Size Threshold
Another status determination criteria. If current stock size is below MSST, the stock is overfished.

The South Atlantic Council and NOAA Fisheries Service also intend to divide the red grouper ACL into sector ACLs based upon allocation decisions **(Figure 1-4)**. A “sector” means a distinct user group to which separate management strategies and separate catch quotas apply. Commercial and recreational are the two sectors being proposed for red grouper. The South Atlantic Council and NOAA Fisheries Service believe ACLs and sector AMs are important components of red grouper management as each sector differs in scientific and management uncertainty. The South Atlantic Council and NOAA Fisheries Service will evaluate a range of options in the EA, including those that base allocation decisions on historical landings.

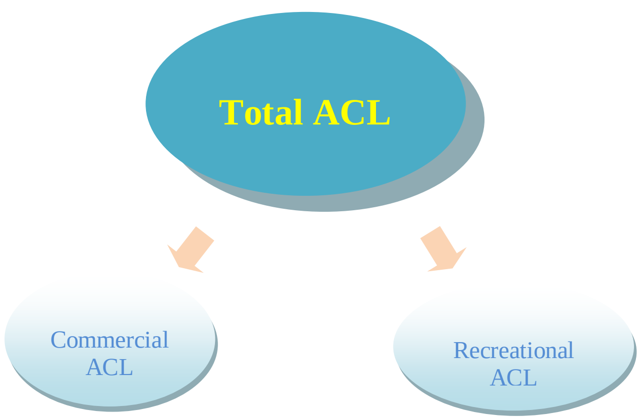


Figure 1-4. The division of total ACLs into commercial and recreational sector ACLs.

1.9 How Does the South Atlantic Council Determine the Annual Catch Limits?

Annual Catch Limits (ACLs) are derived from the overfishing limit (OFL) and the Acceptable Biological Catch (ABC) **(Figure 1-5)**. The South Atlantic Council’s Scientific and Statistical Committee (SSC) determines the OFL and ABC (based on the South Atlantic Council/SSC’s ABC control rule). The OFL is an estimate of the catch level above which overfishing is occurring and comes from a stock assessment. The ABC is defined as the level of a stock or stock complex’s annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty, and should be specified based on the South Atlantic Council/SSC’s ABC control rule. Using the ABC as a start, the South Atlantic Council is proposing a total ACL for the red grouper stock in the South Atlantic. The total ACL is then divided into sector ACLs using allocation decisions.

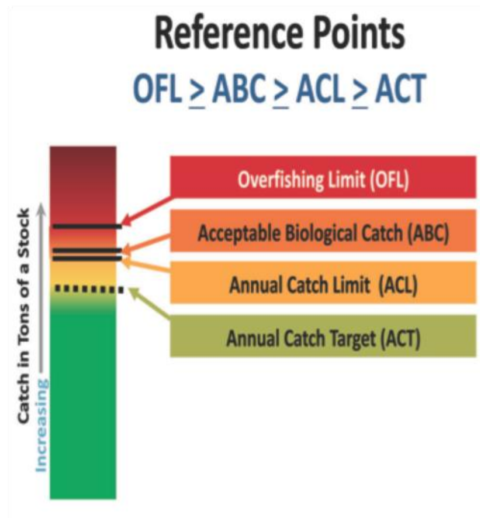


Figure 1-5. The relationship of the reference points to each other.

The SSC recommended an OFL equal to the yield at the fishing mortality rate when fishing at the maximum sustainable yield level (referred to as the F_{MSY}). Since the stock is overfished, the ABC was determined by applying the ABC Control Rule for rebuilding stocks. Under this control rule, the probability of rebuilding success equals 100% minus the risk of overfishing (also referred to as the P*). The acceptable risk of overfishing for red grouper, as determined by the control rule, is 30%; thus, the acceptable probability of rebuilding success is at least 70% within the SSC’s recommended rebuilding timeframe of 10 years. The probability rate determines the ABC throughout the rebuilding timeframe.

1.10 How is the Council Modifying the Overfishing Definition for Red Grouper?

The 2009 National Standard 1 Guidelines provide a definition of overfishing that allows overfishing to be determined in two ways, by a fishing mortality rate or by a level of catch:

§ 600.310 (e)(2)(i)(B)

"Overfishing (to overfish) occurs whenever a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce maximum sustainable yield (MSY) on a continuing basis."

The National Standard 1 Guidelines provide more detail about these two methods, and require that FMPs describe which method will be used to determine an overfishing status:

§ 600.310 (e)(2)(ii)(A)

Status Determination Criteria to determine overfishing status. Each fishery management plan (FMP) must describe which of the following two methods will be used for each stock or stock complex to determine an overfishing status.

(1) Fishing mortality rate exceeds maximum fishing mortality threshold (MFMT). Exceeding the MFMT for a period of 1 year or more constitutes overfishing. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

(2) Catch exceeds the overfishing limit (OFL). Should the annual catch exceed the annual OFL for 1 year or more, the stock or stock complex is considered subject to overfishing.

SSC Recommendations for Red Grouper for 2011

OFL
Yield at F_{MSY}

ABC
Projected yield stream with a 70% rebuilding success

Maximum Overfishing Risk (P*)
30%

Minimum Probability of Rebuilding Success
70%

The OFL is defined as an annual level of catch that corresponds directly to the MFMT, and is the best estimate of the catch level above which overfishing is occurring. As the red grouper stock rebuilds, the SSC has indicated OFL would be equal to the yield at F_{MSY} (F = 0.221).

Each of the two methods for determining overfishing has its benefits and drawbacks.

MFMT Method- Overfishing occurring if fishing mortality exceeds the MFMT

Currently, the MFMT method is being used to determine if the red grouper stock is undergoing overfishing. This method is a more direct way of comparing the fishing rate to the maximum allowed rate of fishing, and it is less sensitive to recent fluctuations in recruitment than the OFL method. The estimates of fishing mortality are based on the maximum annual fishing mortality at any age. However, fishing mortality rates cannot be directly measured. They must be calculated as part of a stock assessment or assessment update, thus fishing mortality rates are only available for years when assessments are conducted.

The current fishing mortality reported in a SEDAR assessment actually has a lag of one or more years. The most recent data used in assessments are usually the year prior to the year in which the analysis is conducted, and sometimes two years prior. The current fishing mortality rate for red grouper in SEDAR 19 (2010) is from 2008 as 2008 is the last year of data used in the assessment. Therefore, use of the "current fishing mortality" rate from a SEDAR stock assessment may not reflect the true status of the stock in years following a stock assessment, particularly if actions are taken to constrain effort and harvest.

OFL Method– Overfishing occurring if annual landings exceed the OFL

The OFL method is based on catch levels that are more easily understood by constituents than fishing mortality. Unlike fishing mortality rates, a determination can be made on an annual basis as soon as catch totals are available. However, the use of the OFL method might not be appropriate for stocks with highly variable recruitment that cannot be predicted and therefore incorporated into the forecast of stock condition on which the OFL is based.

Overfishing Definition for Red Grouper

Each of the two methods for determining overfishing has its benefits and drawbacks with MFMT being a better estimate of overfishing status in a year in which a stock is assessed and OFL a better estimate of overfishing status in years when a current estimate of fishing mortality is not available. Therefore, the South Atlantic Council proposes the use of both the MFMT and OFL as a metric to determine the overfishing status of red grouper.

For red grouper, overfishing will be determined on an annual basis by the MFMT and OFL method. The estimate of F_{MSY} (MFMT) for red grouper from SEDAR 19 is 0.221, while the corresponding OFL values increase as the stock rebuilds (Table 1-1). If either the MFMT (during an assessment year) or the OFL method (during a non-assessment year) is exceeded, the stock will be considered to be undergoing overfishing. Two examples are below:

Example 1. As a stock assessment is not conducted in 2013, the South Atlantic Council does not receive an updated estimate of F_{MSY} (MFMT). The OFL for 2013 is 88,000 pounds whole weight and provides the basis for the overfishing definition. Total landings in 2013 are 86,000 pounds whole weight and below the OFL (88,000 pounds whole weight). Overfishing in 2013 is not occurring.

Example 2. A SEDAR assessment is completed in 2013 and changes the F_{MSY} value to 0.205. The current estimate of the fishing mortality, termed $F_{CURRENT}$, is 0.233. Landings in 2013 are 78,000 pounds whole weight, below OFL. Even though landings are below OFL, $F_{CURRENT}$ is greater than MFMT. Overfishing in 2013 is occurring.

Table 1-1. Red grouper estimates of F_{MSY} and OFL from SEDAR 19.

Year	OFL (yield at F_{MSY} in lbs whole weight)	Fishing Mortality Rate at F_{MSY} (MFMT)
2012	808,000	0.221
2013	865,000	0.221
2014	914,000	0.221
2015	953,000	0.221
2016	986,000	0.221
2017	1,012,000	0.221
2018	1,033,000	0.221
2019	1,049,000	0.221
2020	1,062,000	0.221

Chapter 2. Proposed Actions

This section contains the proposed actions being considered to meet the purpose and need. Each action contains a range of alternatives, including the no action (the current regulations). Alternatives the South Atlantic Fishery Management Council (South Atlantic Council) considered but eliminated from detailed study during the development of this amendment are described in **Appendix A**.

Proposed Actions in Amendment 24

1. Maximum Sustainable Yield
2. Minimum Stock Size Threshold
3. Rebuilding Schedule
4. Rebuilding Strategy and Acceptable Biological Catch
5. Allocations
6. Annual Catch Limits and Optimum Yield
7. Annual Catch Target for the Commercial Sector
8. Annual Catch Target for the Recreational Sector
9. Accountability Measures for the Commercial Sector
10. Accountability Measures for the Recreational Sector

2.1 Action 1. Re-define Maximum Sustainable Yield (MSY)

2.1.1 Alternatives

The South Atlantic Council is proposing a change to the definition for the maximum sustainable yield (MSY) for the red grouper stock in the South Atlantic (**Table 2-1**). The MSY is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.

Table 2-1. MSY alternatives for red grouper.

Alternatives	Equation	F_{MSY}	MSY Values (lbs whole weight)
Alternative 1 (No Action)	Do not change the current definition of MSY for red grouper. Currently, MSY equals the yield produced by F_{MSY}. $F_{30\%SPR}$ is used as the F_{MSY} proxy.	$F_{30\%SPR}$=0.189[1]	not specified
Alternative 2 (Preferred)	**MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy. MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.**	**0.221[2]**	**1,110,000[3]**

[1]Estimate from the Beaufort Assessment Model (BAM)
[2,3]SEDAR 19 (2010)

What Does This Table Mean?

The current definition of the MSY is the level of yield produced by F_{MSY} when the stock is rebuilt (at equilibrium) where $F_{30\%SPR}$ is used as a proxy (substitute) for F_{MSY}. SEDAR 19 (2010) specifies the value for $F_{30\%SPR}$ equal to 0.189; however, the poundage for MSY has not been specified. The South Atlantic Council would like to modify the definition of MSY in order to remove the reference to a specific value ($F_{30\%SPR}$). By not specifying the value for the F_{MSY} proxy, the MSY level may be modified with each new assessment without having to go through the amendment process.

- Current MSY = yield produced by F_{MSY} where $F_{30\%SPR}$ is the F_{MSY} proxy (substitute)
- Proposed change to definition
- Assessment indicates that F_{MSY} = 0.221

The F_{MSY} value from the recent assessment is 0.221. This level is important, as it establishes the overfishing level (also called the OFL). The SSC's recommendation for the OFL is the level of yield when fishing at the $F_{MSY.}$

2.1.2 Comparison of Alternatives

In **Alternative 1 (No Action)**, F_{MSY} is estimated from the $F_{30\%SPR}$ proxy; however, MSY is not specified. MSY is a function of certain characteristics of the current fish population, such as its age and size structure. **Alternative 2 (Preferred)** offers the best estimate of the true F_{MSY} and the only estimate of MSY. As **Preferred Alternative 2** provides a better estimate of MSY, it affords greater probability for long-term protection of the stock and consequently higher probability for the long-term viability of both commercial and recreational fisheries.

Specifying MSY, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, MSY may be considered to have indirect effects on fishery participants. **Alternative 2 (Preferred)**, which is recommended in the most recent Southeast Data, Assessment and Review (SEDAR) assessment and by the South Atlantic Council's Scientific and Statistical Committee (SSC), has a better scientific basis. Hence, it provides a more solid ground for management actions that have economic implications. **Alternative 1 (No Action)** would likely have few social impacts as it uses the present value for F_{MSY}. **Alternative 2 (Preferred),** which uses the MSY proxy recommended by the SSC, will likely have few negative social effects if the threshold is above the mean landings and not substantially reduced by other management action.

The potential administrative effects of the alternatives under **Action 1** differ in terms of the implied restrictions required to constrain the fishery to its benchmarks. Defining a MSY proxy establishes a harvest goal for the fishery, for which management measures will be implemented. Those management measures would directly impact the administrative environment according to the level of conservativeness associated with the chosen MSY and subsequent restrictions placed on the fishery to constrain harvest levels. **Alternative 2 (Preferred)** would implement an MSY equation that would allow for periodic adjustments of F_{MSY} and MSY values based on new assessments without the need for a plan amendment. This would reduce the administrative burden from current levels and is the least administratively burdensome between the MSY proxy alternatives considered under this action.

A summary of the effects of the alternatives under **Action 1** is provided in **Table 2-2.**

Table 2-2. Summary of effects under **Action 1**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action). MSY=yield of F_{MSY}	-	-
Alternative 2 (Preferred). MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.	+	+

2.2 Action 2. Re-define Minimum Stock Size Threshold (MSST)

2.2.1 Alternatives

The South Atlantic Council is proposing a change to the current definition of MSST (**Table 2-3**).

Table 2-3. MSST alternatives.

Alternatives	MSST Equation	M equals	MSST Values (lbs whole weight)
Alternative 1 (No Action)	Do not change the current definition of MSST for red grouper. MSST equals SSB_{MSY} ((1-M) or 0.5, whichever is greater).	0.14[1]	4,914,053[1]
Alternative 2	MSST equals 50% of SSB_{MSY}	n/a	2,857,162
Alternative 3 (Preferred)	**MSST equals 75% of SSB_{MSY}**	**n/a**	**4,285,742**
Alternative 4	MSST equals 85% of SSB_{MSY}	n/a	4,857,175
Alternative 5	MSST at which rebuilding to the MSY level would be expected to occur within 10 years at the MFMT level.[2]		

[1]Source: Determination from SEDAR 19 (2010).
[2]At the December 2010 meeting, the South Atlantic Council requested the Southeast Fisheries Science Center (SEFSC) provide an estimate of the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years when fishing mortality is at the minimum fishing mortality threshold (MFMT) level and that this be added as an alternative. This analysis is contained in **Appendix D**.

2.2.2 Comparison of Alternatives

Alternatives 2 through **4** would establish a larger buffer than **Alternative 1 (No Action)** between what is considered to be an overfished and rebuilt condition. **Alternative 2** would allow stock biomass to decrease to as little as 50% of the MSY level before an overfished determination was made. As **Alternative 2** would allow for the greatest decrease in biomass before an overfishing determination is made, it would have the least amount of biological benefit among **Alternatives 1 (No Action)-4**. The biological effect of **Alternative 3 (Preferred)** would be intermediate between **Alternatives 2** and **4**. The impacts of **Alternative 4** would be similar to **Alternative 1 (No Action)** as the difference in the MSST value between the two alternatives is 56,878 lbs. The biological impacts of **Alternative 5** have not been estimated as the Southeast Fisheries Science Center (SEFSC) stated that the computation of MSST as recommended by **Alternative 5** would need to be completed through projection methods usually done during the stock assessment process. The computation of MSST through projection methods raises several practical and technical issues as documented in **Appendix D**.

Alternative 2 would appear to be best from an economics standpoint, because it is unlikely to trigger restrictive rebuilding actions in the short term. One possible downside of this alternative is that once the stock is considered overfished, the required rebuilding actions could be very restrictive and potentially remain for quite some time. **Alternative 1 (No Action)** lies on the opposite end because it has the highest probability of triggering restrictive rebuilding actions. The economic implications of the other alternatives may be characterized as falling between those of **Alternatives 1 (No Action)** and **2**.

Because the current MSST would cause red grouper to fluctuate between an overfished and rebuilt condition (constantly triggering rebuilding plans), **Alternative 1 (No Action)** is the most administratively burdensome of the MSST alternatives under consideration. The larger the buffer between MSST and SSB_{MSY}, the lower the probability that red grouper would be considered overfished and require a rebuilding plan. Therefore, **Alternative 2** would be considered the least administratively burdensome since under **Alternative 2** red grouper would be least likely to be considered overfished and least likely to require a rebuilding plan. The potential administrative impacts of **Alternatives 3 (Preferred)** and **4** increase as the buffer between MSST and SSB_{MSY} decreases. As the distance between the value of MSST and SSB_{MSY} gets smaller, the probability red grouper would be considered overfished and require a rebuilding plan increases. **Alternative 5**, depending upon the SEFSC estimate, may or may not be more or less administratively burdensome than **Alternatives 3 (Preferred)** and **4**. **Alternative 5** is unlikely to result in greater administrative impacts than **Alternative 1 (No Action)**, or a reduced administrative burden compared to **Alternative 2**, which is the lowest value at which MSST may be set.

A summary of the effects of the alternatives under **Action 2** is provided in **Table 2-4**.

Table 2-4. Summary of effects under **Action 2**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action)	+	-
Alternative 2. MSST equals 50% of SSB_{MSY}	--	+
Alternative 3 (Preferred). MSST equals 75% of SSB_{MSY}	-	The economic implications of the other alternatives may be characterized as falling between those of **Alternatives 1 (No Action) and 2**.
Alternative 4. MSST equals 85% of SSB_{MSY}	+	
Alternative 5. MSST at which rebuilding to the MSY level would be expected to occur within 10 years at the MFMT level	Not estimated	

2.3 Action 3. Establish a Rebuilding Schedule

2.3.1 Alternatives

Table 2-5. Rebuilding schedule alternatives for red grouper.

Alternatives	Definition
Alternative 1 (No Action)	Do not implement a rebuilding plan for red grouper. There currently is not a rebuilding plan for red grouper. Snapper Grouper Amendment 4 (regulations effective January 1992) implemented a 15-year rebuilding plan beginning in 1991, which expired in 2006.
Alternative 2	Define a rebuilding schedule as the shortest possible period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal 3 years with the rebuilding time period ending in 2013. 2011 is Year 1.
Alternative 3	Define a rebuilding schedule intermediate between the shortest possible and maximum recommended period to rebuild. This would equal 7 years with the rebuilding time period ending in 2017. 2011 is Year 1.
Alternative 4	Define a rebuilding schedule of 8 years with the rebuilding time period ending in 2018. 2011 is Year 1.
Alternative 5 (Preferred)	**Define a rebuilding schedule as the maximum period allowed to rebuild (T_{MAX}). This would equal 10 years with the rebuilding time period ending in 2020. 2011 is Year 1.**

What Does This Table Mean?

- Rebuilding plan required
- Rebuilding schedule specifies the maximum number of years to rebuild
- Alternatives range from 3 to 10 years

A rebuilding plan is required when a stock has been declared to be in an overfished state. A stock is overfished when the biomass is below an identified minimum stock size threshold. Red grouper is overfished as determined by the most recent stock assessment (SEDAR 19, 2010). The South Atlantic Council must specify a rebuilding plan.

One component of the rebuilding plan is a determination of the number of years it will take to rebuild the stock. The Magnuson-Stevens Act mandates the maximum amount of time to rebuild a stock as 10 years. If the stock cannot be rebuilt in 10 years then the maximum allowable rebuilding time is 10 years plus one generation. The South Atlantic Council is considering a range of 3 to 10 years to rebuild red grouper.

2.3.2 Comparison of Alternatives

Alternatives 2, 3, 4, and **5 (Preferred)** would establish schedules that would achieve rebuilding within time periods allowed by the Magnuson-Stevens Act, and therefore, **Alternatives 2, 3, 4,** and **5 (Preferred)** would be expected to benefit the ecological environment by restoring a crucial component of the South Atlantic ecosystem. **Alternative 2** would have the greatest biological benefits, as it would rebuild the stock in the shortest amount of time. **Alternative 5** (**Preferred**) would result in the least biological benefits of all the action alternatives.

Alternative 1 (No Action) would not be a viable alternative because the most recent stock assessment determined red grouper to be overfished, thereby requiring a rebuilding plan. **Alternative 2** would provide the shortest rebuilding period of 3 years and very likely the most restrictive management measures over the rebuilding timeframe. **Alternative 5 (Preferred)** would provide the longest rebuilding period and hence the least restrictive management measures over the rebuilding timeframe. The restrictiveness of management measures for **Alternative 3** (7 years) and **Alternative 4** (8 years) would fall between that of **Alternatives 2** and **5**. The degree of short-term adverse economic consequences would directly vary with the restrictiveness of management measures implied under the various alternatives. It can be expected that future benefits would accrue soonest under **Alternative 2** and latest under **Alternative 5**.

Alternatives 2-5 (Preferred) specify rebuilding schedules of different length. Faster recovery conceptually allows faster receipt of the benefits of a recovered resource -- a long-term positive effect on fishermen and fishing communities -- but it is less likely that the resource could recover under the shortest schedule (**Alternative 2**) and the restrictions would likely be more severe, increasing immediate social impacts on fishermen. Regardless of duration, severe restrictions on red grouper harvest could result in loss of jobs in commercial and for-hire fleets, and after even just a few years, the commercial and for-hire sectors may not recover. Under the intermediate rebuilding schedules in **Alternatives 3** and **4**, recovery of the red grouper stock is realistic and likely would not require reduced harvest to meet the rebuilding strategy, resulting in less short-term social impacts than **Alternative 2. Alternative 5 (Preferred)** would allow the longest possible rebuilding timeframe and would be expected to allow the greatest flexibility to recover red grouper and minimize the adverse social and economic effects on associated fisheries.

Of all the rebuilding schedule alternatives that specify a timeframe, **Alternative 2** would be most likely to impact the administrative environment in the form of developing, implementing, and monitoring more restrictive harvest regulations for red grouper. **Alternative 5 (Preferred)** would incur the lowest impact on the administrative environment since measures to limit harvest of red grouper and other shallow water groupers already in place are considered sufficient to end overfishing. **Alternatives 3** and **4** would result in administrative impacts in-between those of **Alternative 2** and **Alternative 5 (Preferred)**.

A summary of the effects of the alternatives under **Action 3** is provided in **Table 2-6.**

Table 2-6. Summary of effects under **Action 3**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action)	-	
Alternative 2	++++	Most restrictive
Alternative 3	+++	The restrictiveness of management measures for **Alternative 3** (7 years) and **Alternative 4** (8 years) would fall between that of **Alternatives 1 (No Action) and 5**.
Alternative 4	++	
Alternative 5 (Preferred)	+	Least restrictive

2.4 Action 4. Establish a Rebuilding Strategy and Acceptable Biological Catch (ABC)

2.4.1 Alternatives

The South Atlantic Council is proposing the implementation of a rebuilding plan for red grouper as the stock is overfished. The South Atlantic Council is considering a range of rebuilding strategy alternatives that define the maximum fishing mortality rate throughout the rebuilding timeframe. **Tables 2-7 and 2-8** present a summary of the alternatives that follow.

Table 2-7. A summary of the rebuilding strategy alternatives for red grouper.

Alternatives	Rebuilding strategy (F_{OY} Equal To) Scenario	F rate	ABC (lbs whole weight) *Landings and Discards*	ABC (lbs whole weight) *Landings*
Alternative 1 (No Action)	$F_{45\%SPR}$	0.1055	399,000 (2011) 468,000 (2012) 537,000 (2013) 602,000 (2014)	374,000 (2011) 442,000 (2012) 511,000 (2013) 575,000 (2014)
Alternative 2	$F_{REBUILD}$ (10 years)	0.181	665,000 (2011) 737,000 (2012) 806,000 (2013) 866,000 (2014)	622,000 (2011) 693,000 (2012) 762,000 (2013) 822,000 (2014)
Alternative 3 (Preferred)	**75%F_{MSY}**	**0.166**	**613,000 (2011)** **687,000 (2012)** **759,000 (2013)** **821,000 (2014)**	**573,000 (2011)** **647,000 (2012)** **718,000 (2013)** **780,000 (2014)**
Alternative 4	65%F_{MSY}	0.144	535,000 (2011) 610,000 (2012) 683,000 (2013) 749,000 (2014)	501,000 (2011) 575,000 (2012) 648,000 (2013) 713,000 (2014)
Alternative 5	$F_{REBUILD}$ (7 years)	0.157	583,000 (2011) 657,000 (2012) 730,000 (2013) 794,000 (2014)	545,000 (2011) 619,000 (2012) 691,000 (2013) 755,000 (2014)
Alternative 6	$F_{REBUILD}$ (8 years)	0.168	620,000 (2011) 695,000 (2012) 765,000 (2013) 828,000 (2014)	580,000 (2011) 654,000 (2012) 724,000 (2013) 787,000 (2014)

Table 2-8. A comparison of rebuilding strategy alternatives for red grouper in terms of probability of stock recovery.

	Alternatives					
	1 (No Action)	**2** $F_{REBUILD}$ (10 years)	**3** 75%F_{MSY} (Preferred)	**4** 65%F_{MSY}	**5** $F_{REBUILD}$ (7 years)	**6** $F_{REBUILD}$ (8 years)
Probability of rebuilding to SSB_{MSY} in 10 years (2020)	n/a	70%	81%	92%	n/a	n/a
Probability of rebuilding to SSB_{MSY} in 7 years (2017)	n/a	54%	64%	78%	70%	n/a
Probability of rebuilding to SSB_{MSY} in 8 years (2018)	n/a	61%	72%	85%	n/a	70%
Year in which 50% probability of rebuilding to SSB_{MSY} would be reached	2014[1]	2017	2016	2016	2015[2]	2016[3]

[1]Based upon a $F_{30\%SPR}$ proxy for F_{MSY}
[2]A 48% probability of rebuilding
[2]A 54% probability of rebuilding
NOTE: Alternatives 2-4 are based on a 70% probability of rebuilding success in 10 years. Alternative 5 is based on a 70% probability of rebuilding success in 7 years.
Alternative 6 is based on a 70% probability of rebuilding success in 8 years.

Alternatives

Alternative 1 (No Action). Do not specify a rebuilding strategy for red grouper.

Alternative 2. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in T_{MAX} (ten years for red grouper). Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2017 and 70% chance of rebuilding to SSB_{MSY} by 2020.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 665,000 lbs whole weight (2011), 737,000 lbs whole weight (2012), 806,000 lbs whole weight (2013), and 866,000 lbs whole weight (2014).
- The-Acceptable Biological Catch values without dead discards would be 622,000 lbs whole weight (2011), 693,000 lbs whole weight (2012), 762,000 lbs whole weight (2013), and 822,000 lbs whole weight (2014).

Table 2-9. Projection results if the fishing mortality rate is fixed at F = Rebuild with a 70% probability of rebuilding success in 10 years.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.181	0.01	622,000	43,000	665,000
2012	0.181	0.06	693,000	44,000	737,000
2013	0.181	0.15	762,000	44,000	806,000
2014	0.181	0.26	822,000	44,000	866,000
2015	0.181	0.36	873,000	45,000	918,000
2016	0.181	0.46	915,000	45,000	960,000
2017	0.181	0.54	951,000	45,000	996,000
2018	0.181	0.61	980,000	45,000	1,025,000
2019	0.181	0.66	1,004,000	46,000	1,050,000
2020	0.181	0.7	1,023,000	46,000	1,069,000

Where Does a 70% Probability of Rebuilding Success Come From?

The SSC is recommending a P* of .30. A P* is the risk that overfishing is occurring. The probability of rebuilding success = 100 – P*. So in the case of red grouper, the SSC is recommending that the South Atlantic Council choose a rebuilding plan that would be expected to have a 70% chance or better of rebuilding to the target within the specified rebuilding timeframe.

Alternative 3 (Preferred). Define a rebuilding strategy for red grouper that sets ABC equal to the yield at 75%F_{MSY}. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2016 and 81% chance of rebuilding to SSB_{MSY} by 2020.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values without dead discards would be 573,000 lbs whole weight (2011), 647,000 lbs whole weight (2012), 718,000 lbs whole weight (2013), and 780,000 lbs whole weight (2014).

Table 2-10. Projection results if the fishing mortality rate is fixed at F = 75%F_{MSY}.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.166	0.01	573,000	40,000	613,000
2012	0.166	0.07	647,000	40,000	687,000
2013	0.166	0.18	718,000	41,000	759,000
2014	0.166	0.31	780,000	41,000	821,000
2015	0.166	0.44	834,000	41,000	875,000
2016	0.166	0.55	880,000	42,000	922,000
2017	0.166	0.64	919,000	42,000	961,000
2018	0.166	0.72	951,000	42,000	993,000
2019	0.166	0.77	977,000	42,000	1,019,000
2020	0.166	0.81	999,000	42,000	1,041,000

Alternative 4. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at 65%F_{MSY}. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2016 and 92% chance of rebuilding to SSB_{MSY} by 2020.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 535,000 lbs whole weight (2011), 610,000 lbs whole weight (2012), 683,000 lbs whole weight (2013), and 749,000 (2014).
- The Acceptable Biological Catch values without dead discards would be 501,000 lbs whole weight (2011), 575,000 lbs whole weight (2012), and 648,000 lbs whole weight (2013), and 713,000 lbs whole weight (2014).

Table 2-11. Projection results if the fishing mortality rate is fixed at F = 65%$F_{MSY.}$

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,00	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.144	0.01	501,000	34,000	535,000
2012	0.144	0.08	575,000	35,000	610,000
2013	0.144	0.23	648,000	35,000	683,000
2014	0.144	0.4	713,000	36,000	749,000
2015	0.144	0.56	770,000	36,000	806,000
2016	0.144	0.69	820,000	36,000	856,000
2017	0.144	0.78	863,000	37,000	900,000
2018	0.144	0.85	898,000	37,000	935,000
2019	0.144	0.89	928,000	37,000	965,000
2020	0.144	0.92	953,000	37,000	990,000

Alternative 5. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in 7 years. Under this strategy, the fishery would have at least a 48% chance of rebuilding to SSB_{MSY} by 2015 and 70% chance of rebuilding to SSB_{MSY} by 2017.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 583,000 lbs whole weight (2011), 657,000 lbs whole weight (2012), 730,000 lbs whole weight (2013), and 794,000 lbs whole weight (2014).
- The Acceptable Biological Catch values without dead discards would be 545,000 lbs whole weight (2011), 619,000 lbs whole weight (2012), 691,000 lbs whole weight (2013), and 755,000 lbs whole weight (2014).

Table 2-12. Projection results if the fishing mortality rate is fixed at F = Rebuild with a 70% probability of rebuilding success in 7 years.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.157	0.01	545,000	38,000	583,000
2012	0.157	0.07	619,000	38,000	657,000
2013	0.157	0.20	691,000	39,000	730,000
2014	0.157	0.34	755,000	39,000	794,000
2015	0.157	0.48	810,000	39,000	849,000
2016	0.157	0.60	858,000	40,000	898,000
2017	0.157	0.7	898,000	40,000	938,000

Alternative 6. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in 8 years. Under this strategy, the fishery would have at least a 54% chance of rebuilding to SSB_{MSY} by 2016 and 70% chance of rebuilding to SSB_{MSY} by 2018.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 620,000 lbs whole weight (2011), 695,000 lbs whole weight (2012), 765,000 lbs whole weight (2013), and 828,000 lbs whole weight (2014).
- The Acceptable Biological Catch values without dead discards would be 580,000 lbs whole weight (2011), 654,000 lbs whole weight (2012), 724,000 lbs whole weight (2013), and 787,000 lbs whole weight (2014).

Table 2-13. Projection results if the fishing mortality rate is fixed at F = Rebuild with a 70% probability of rebuilding success in 8 years.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.168	0.01	580,000	40,000	620,000
2012	0.168	0.07	654,000	41,000	695,000
2013	0.168	0.17	724,000	41,000	765,000
2014	0.168	0.3	787,000	41,000	828,000
2015	0.168	0.42	840,000	42,000	882,000
2016	0.168	0.54	886,000	42,000	928,000
2017	0.168	0.63	924,000	42,000	966,000
2018	0.168	0.70	956,000	42,000	998,000

What Do These Tables Mean?

A rebuilding strategy is the second component to a rebuilding plan (the rebuilding schedule is the first). The strategy defines the target fishing mortality rate (F rate) during the rebuilding timeframe. A lower fishing mortality rate means that less of the stock is removed due to fishing activities. A lower F rate means a lower OY and lower ACL; however, the probability of rebuilding is higher.

2.4.2 Comparison of Alternatives

There are negative consequences with retaining **Alternative 1 (No Action)**. Although the rebuilding strategy is specified ($F_{45\%SPR}$), the ABC, ACL, and OY levels are not explicitly stated. The specification of targets and limits are a crucial component of any management program involving natural resources. Without the designation of these components, regulations may not be sufficient to prevent overfishing.

ABC, ACL, and OY values at equilibrium in the alternatives are distinguished from each other by the level of risk (and associated tradeoffs) each would assume. The more conservative the estimates, the larger the sustainable biomass when the stock is rebuilt.

Alternatives 2-6 would have positive biological effects on the stock in that a biological benchmark, an Acceptable Biological Catch level, would be established for management. The alternatives may be ranked by the allowable, maximum fishing mortality rate of each rebuilding strategy. Beginning with the least amount of expected beneficial biological effects, the ranking of alternatives is as follows: **Alternative 2** (F rate = 0.181), **Alternative 6** (F rate = 0.168), **Alternative 3 (Preferred)** (F rate = 0.166), **Alternative 5** (F rate = 0.157), and **Alternative 4** (F rate = 0.144). The effects of **Alternatives 3** and **6** would be expected to be similar as difference in the allowable fishing mortality rate is only 0.002.

Alternative 2 is economically superior to the other rebuilding strategy alternatives presented in **Action 4**. Under **Alternative 2**, commercial fishermen who land their catch in North Carolina are expected to benefit the most relative to fishermen in other states. Only commercial fishermen in Georgia and northeast Florida are expected to lose a relatively small amount of Net Operating Revenue (NOR) (not more than $40,000). This reinforces that **Alternative 2** is not only globally (i.e., industry-wide) superior from an economic perspective but also regionally superior. The predicted benefits of **Alternative 2** to the commercial sector are greater than those of all the other alternatives as well. This is strong evidence, from an economic perspective, of the superiority of **Alternative 2** relative to the other alternatives. **Preferred Alternative 3** ranks third behind **Alternatives 2** and **6**. Finally, commercial fishermen in Georgia and Florida are predicted to only receive relatively minor benefits from the proposed rebuilding plans. The most generated by these fishermen would be $32,000 by central south Florida boats under **Alternative 2**.

Most of the benefits from the rebuilding strategy alternatives will accrue to the vertical line fishers, especially those who utilize hook-and-line and bandit gears. Assuming a discount rate of 7%, **Alternative 2** creates the most benefits totaling $1,516,000 to the vertical line sector and $21,000 to the diving sector over a period of ten years **(Table 4-13)**. The rankings of the other alternatives are the same as the previous analyses above. **Alternatives 3** and **6** are the next best alternatives, followed by **Alternative 5**. **Alternative 4** accrues the least benefits.

All the rebuilding strategies would result in consumer surplus (CS) increases to recreational anglers, mainly because the baseline recreational landings are lower than the ACL implied in any of the rebuilding alternatives. Over four years or ten years, the alternatives may be ranked in descending order as follows: **Alternative 2**, **Alternative 6**, **Alternative 3 (Preferred)**, **Alternative 5**, and **Alternative 4**. **Preferred Alternative 3** would result in CS increases ranging from $0.84 million to $3.86 million over four years, or from $3.07 million to $14.1 million over ten years.

The rebuilding strategy decision will result in the establishment of the ABC for red grouper, which will be used by the Council to select the ACL for the species, a number that can be set at the same level, but not higher, than the ABC. **Alternative 1 (No Action)** includes the lowest F rate and the lowest resulting ABC, while **Alternative 2** includes the highest F rate and associated ABC. **Alternatives 3-6** include a range between the F rates in the first two alternatives. **Alternative 3 (Preferred)** includes an F rate and ABC between the highest and lowest F rates, and would be expected to have fewer short-term social impacts than **Alternatives 1 (No Action)** and **2.** Although a more conservative F rate would likely result in a higher probability of rebuilding over a shorter period of time, the probability of rebuilding using the strategy in **Alternative 3 (Preferred)** will provide more long-term social benefits than **Alternative 2** or **Alternative 6.**

A summary of the effects of alternatives under **Action 4** is provided in **Table 2-14**.

Table 2-14. Summary of effects under **Action 4**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action)	-	
Alternative 2. ABC equal to the yield at $F_{REBUILD}$	+	**Alternative 2** is economically superior to the other rebuilding strategy alternatives presented in **Action 4**. **Alternatives 6 and 3 (Preferred)** provide the second and third highest economic benefits, respectively.
Alternative 3 (Preferred). ABC equal to the yield at $75\%F_{MSY}$	++	
Alternative 4. ABC equal to the yield at $65\%F_{MSY}$	++++	
Alternative 5. ABC equal to the yield at $F_{REBUILD}$ (7 years).	+++	
Alternative 6. ABC equal to the yield at $F_{REBUILD}$ (8 years).	++	

2.5 Action 5. Specify Sector Allocations

2.5.1 Alternatives

The South Atlantic Council and NOAA Fisheries Service also intend to divide the red grouper ACL into sector-ACLs based upon allocation decisions. A “sector” means a distinct user group to which separate management strategies and separate catch quotas apply. Examples of sectors include commercial and recreational; the recreational sector may also be divided into for-hire and private recreational groups. The South Atlantic Council and NOAA Fisheries Service have determined sector-ACLs and sector-AMs are important components of red grouper management as each sector differs in scientific and management uncertainty. A range of options will be evaluated in the environmental assessment, including those that base allocation decisions on historical landings.

Alternative 1 (No Action). Do not establish a sector allocation of the red grouper annual catch limit (ACL).

Alternative 2 (Preferred). Specify allocations for the commercial and recreational sectors based on criteria outlined in one of the following options:

> **Subalternative 2a**. Commercial = 52% and recreational = 48% (Established by using average landings from 1986-2008).
> **Subalternative 2b**. Commercial = 54% and recreational = 46% (Established by using average landings from 1986-1998).
> **Subalternative 2c**. Commercial = 49% and recreational = 51% (Established by using average landings from 1999-2008).
> **Subalternative 2d**. Commercial = 41% and recreational = 59% (Established by using average landings from 2006-2008).
> **Subalternative 2e (Preferred)**. Commercial = 44% and recreational = 56% (Established by using 50% of average landings from 1986-2008 + 50% of average landings from 2006-2008).

2.5.2 Comparison of Alternatives

Alternative 2, including the associated subalternatives, would have positive effects on the red grouper stock as allocation decisions allow managers to separate the stock ACL into sector-ACLs. As such, the specification of allocations is an often a necessary component of the fishery management system that specifies catch limits and accountability measures. The biological effects of the different allocation alternatives would be similar if landings in various sectors could be closely monitored. Further, the biological effects of options that allocate more of the ABC to the commercial sector could have a greater biological effect because there is a less of a chance that a commercial ACL would be exceeded than a recreational ACL. Commercial data can often be more closely monitored as they are based on dealer reports, whereas much of the recreational data (except headboat data) are based on survey information.

The magnitude of effects of the allocation alternatives on business activity would fairly correspond to the proportion of ACL allocated to the commercial sector for all states combined. In terms of the commercial sector**, Subalternative 2b**, which would assign the largest allocation to the commercial sector, would result in the largest positive effects for all states combined. A slightly different scenario is depicted when state-by-state effects are considered. **Subalternatives 2a, 2b, and 2c** would have negative impacts on Georgia/Northeast Florida and positive for all other states. **Subalternative 2d** would result in negative effects for all states. **Preferred Subalternative 2e** would not result in any changes to business activity because the allocation ratio under this subalternative is the same as the distribution of landings between the commercial and recreational sectors during the time period of the analysis (2005-2009).

In terms of the recreational fishery, the alternatives may be ranked in descending order as follows: **Subalternative 2d**, **Subalternative 2e (Preferred)**, **Subalternative 2c**, **Subalternative 2a**, and **Subalternative 2b**. This ranking is mainly driven by the size of the recreational allocation, with the highest allocation under **Subalternative 2d** and the lowest under **Subalternative 2b**.

Preferred Subalternative 2e would result in CS increases ranging from $0.84 million to $3.86 million over four years, or from $3.07 million to $14.1 million over ten years (**Table 4-15**). Note that these are the same figures mentioned in the discussion of the preferred alternative for a rebuilding strategy (**Action 4**), because these estimates are based on the same suite of preferred alternatives.

Alternative 2 presents five subalternatives of allocation between the commercial and recreational sectors based on different qualifying periods to reflect long-term harvest trends versus more recent harvest. In general, it would be expected that there might be negative social effects to whichever sector receives less than their current allocation and those effects would correspond to the amount of reduction. The subalternatives in this action use average landings to calculate options for sector allocations, and in general the more older years that are used in the qualifying period, the higher the percentage for the commercial sector, and using more recent years would allocate a higher percentage to the recreational sector. The allocations that would result from **Subalternatives 2a** and **2b** would benefit the commercial sector more than the recreational sector, since the commercial allocation would be slightly greater.

Because more recently the recreational catch has increased to more than the commercial catch (**Table 2-15**), the likelihood of an early closure would increase for the recreational sector and would be expected to impact recreational fishing opportunities and affiliated businesses, such as for-hire captains and crew, bait and tackle shops, and associated tourism. Although the allocations that would result from the formula under **Subalternative 2c** are close to an equal division (49% commercial, 51% recreational), this would likely still have more negative social impacts on the recreational sector, since in more recent years the recreational landings have been higher than the commercial landings. **Subalternative 2d** reflects more recent distribution between the commercial and recreational sector, which would benefit the recreational sector by allowing continued fishing opportunities. However, the allocation scenario could impact the commercial sector by limiting growth, or a return to historic levels. With restrictions and closures in other fisheries, the commercial sector may increase harvest of red grouper; the smaller allocation could prevent this harvest and impact fishermen and affiliated businesses, such as fish houses and restaurants. For example, in Murrells Inlet, SC, red grouper are nearly as important to the community as gag grouper or vermilion snapper. Should new management measures limit harvest of those two species, the commercial fishermen in the community may shift effort to red grouper, but ultimately be limited by the commercial ACL. **Subalternative 2e (Preferred)** has a similar allocation (44% commercial, 56% recreational) and would result in more social benefits for the commercial sector than **Subalternative 2d**, and more social benefits for the recreational sector than **Subalternatives 2a, 2b** and **2c**.

With regards to administrative impacts, **Alternative 2 (Preferred)** and its subalternatives would not necessarily result in additional administrative burden beyond the status quo since commercial and recreational landings are already tracked separately through MRFSS/MRIP, headboat logbooks, dealer reports, and commercial vessel logbooks. **Subalternatives 2a-2e (Preferred)** would likely result in the same administrative impact, varying only by the percentage of allocation given to each sector.

Data used to specify sector allocations is shown in **Table 2-15**.

Table 2-15. Recreational and commercial red grouper catches and the percent distribution of the catch between commercial and recreational sectors (pounds whole weight).

Year	Recreational	% Rec	Commercial	%Com	Total
1986	775,164	65%	416,778	35%	1,191,942
1987	122,558	27%	337,101	73%	459,659
1988	160,621	29%	388,956	71%	549,577
1989	335,050	47%	376,499	53%	711,549
1990	78,198	21%	300,991	79%	379,189
1991	50,803	18%	234,303	82%	285,106
1992	176,044	49%	184,808	51%	360,852
1993	337,910	63%	202,134	37%	540,044
1994	216,995	53%	192,027	47%	409,022
1995	241,106	48%	262,162	52%	503,268
1996	333,076	50%	326,795	50%	659,871
1997	316,706	47%	361,009	53%	677,715
1998	327,083	39%	511,295	61%	838,378
1999	187,357	29%	461,654	71%	649,011
2000	172,432	31%	388,397	69%	560,829
2001	188,190	32%	406,803	68%	594,993
2002	300,258	43%	396,943	57%	697,201
2003	383,175	52%	360,662	48%	743,837
2004	423,043	55%	351,021	45%	774,064
2005	314,667	57%	235,718	43%	550,385
2006	619,598	63%	362,510	37%	982,108
2007	667,750	51%	639,513	49%	1,307,263
2008	1,125,328	63%	656,417	37%	1,781,745

Source: SEDAR 19 stock assessment

A summary of the effects of the alternatives under **Action 5** is provided in **Table 2-16**.

Table 2-16. Summary of effects under **Action 5**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action)	-	See text below for explanation as socio-economic effects vary by state and sector
Subalternative 2a. Commercial = 52% and recreational = 48%	++	
Subalternative 2b. Commercial = 54% and recreational = 46%	++	
Subalternative 2c. Commercial = 49% and recreational = 51%	++	
Subalternative 2d. Commercial = 41% and recreational = 59%	++	
Subalternative 2e (Preferred). Commercial = 44% and recreational = 56%	++	

2.6 Action 6. Specify Annual Catch Limits (ACL) and Optimum Yield (OY)

2.6.1 Alternatives

Alternative 1 (No Action). Do not specify an individual ACL for red grouper. An individual ACL is currently not in place for red grouper. Retain aggregate recreational and commercial ACLs for black grouper, red grouper, and gag. The commercial sector ACL for gag, black grouper, and red grouper is 662,403 lbs gw (781,636 lbs ww) and 648,663 lbs gw (765,422 lbs ww) for the recreational sector. The total group ACL is 1,311,066 lbs gw (1,547,058 lbs ww). These values are equivalent to the expected catch resulting from the implementation of management measures for red grouper in Amendment 16 and specified in Amendment 17B.

Alternative 2 (Preferred). ACL = OY = ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 3. ACL = OY = 90% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 4. ACL = OY = 80% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 5 (Preferred). Eliminate the commercial sector aggregate ACL of 662,403 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of all shallow water groupers once the commercial aggregate ACL is projected to be met.

Alternative 6 (Preferred). Eliminate the recreational sector aggregate ACL of 648,663 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of black grouper, gag, and red grouper once the ACL is projected to be met if any one of the three species is listed as overfished. Eliminate the post-season AM that specifies a reduction in a subsequent year's ACL by the amount of an overage if landings exceed the aggregate ACL. Eliminate the regulation that states that the recreational landings are evaluated relative to the ACL as follows: For 2010, only 2010 recreational landings will be compared to the ACL; in 2011, the average of 2010 and 2011 recreational landings will be compared to the ACL; and in 2012 and subsequent fishing years, the most recent 3-year running average recreational landings will be compared to the ACL.

ACL values based on the preferred allocation alternative (44% commercial/56% recreational) for **Alternatives 2 (Preferred)-4** under this action are shown in **Tables 2-17** through **2-19**.

Table 2-17. The ACL values (lbs whole weight) for red grouper in **Preferred Alternative 2** (ACL=ABC). ACL values are based on preferred allocation alternative under **Action 5** (44% commercial/56% recreational). The Council's proposed values are shown in gray.

Alt 2 (Preferred) ACL=ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	693,000	647,000	575,000	619,000	654,000
	2013	762,000	718,000	648,000	691,000	724,000
	2014	822,000	780,000	713,000	755,000	787,000
landings & discards	2012	737,000	687,000	610,000	657,000	695,000
	2013	806,000	759,000	683,000	730,000	765,000
	2014	866,000	821,000	749,000	794,000	828,000
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	304,920	284,680	253,000	272,360	287,760
	2013	335,280	315,920	285,120	304,040	318,560
	2014	361,680	343,200	313,720	332,200	346,280
landings & discards	2012	324,280	302,280	268,400	289,080	305,800
	2013	354,640	333,960	300,520	321,200	336,600
	2014	381,040	361,240	329,560	349,360	364,320
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	388,080	362,320	322,000	346,640	366,240
	2013	426,720	402,080	362,880	386,960	405,440
	2014	460,320	436,800	399,280	422,800	440,720
landings & discards	2012	412,720	384,720	341,600	367,920	389,200
	2013	451,360	425,040	382,480	408,800	428,400
	2014	484,960	459,760	419,440	444,640	463,680

Table 2-18. The ACL values (lbs whole weight) for red grouper in **Alternative 3** (ACL=90%ABC). ACL values are based on preferred allocation alternative under **Action 5** (44% commercial/56% recreational).

Alt. 3 ACL=90%ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	623,700	582,300	517,500	557,100	588,600
	2013	685,800	646,200	583,200	621,900	651,600
	2014	739,800	702,000	641,700	679,500	708,300
landings & discards	2012	663,300	618,300	549,000	591,300	625,500
	2013	725,400	683,100	614,700	657,000	688,500
	2014	779,400	738,900	674,100	714,600	745,200
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	274,428	256,212	227,700	245,124	258,984
	2013	301,752	284,328	256,608	273,636	286,704
	2014	325,512	308,880	282,348	298,980	311,652
landings & discards	2012	291,852	272,052	241,560	260,172	275,220
	2013	319,176	300,564	270,468	289,080	302,940
	2014	342,936	325,116	296,604	314,424	327,888
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	349,272	326,088	289,800	311,976	329,616
	2013	384,048	361,872	326,592	348,264	364,896
	2014	414,288	393,120	359,352	380,520	396,648
landings & discards	2012	371,448	346,248	307,440	331,128	350,280
	2013	406,224	382,536	344,232	367,920	385,560
	2014	436,464	413,784	377,496	400,176	417,312

Table 2-19. The ACL values (lbs whole weight) for red grouper in **Alternative 4** (ACL=80%ABC). ACL values are based on preferred allocation alternative under **Action 5** (44% commercial/56% recreational).

Alt. 4 ACL=80%ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	554,400	517,600	460,000	495,200	523,200
	2013	609,600	574,400	518,400	552,800	579,200
	2014	657,600	624,000	570,400	604,000	629,600
landings & discards	2012	589,600	549,600	488,000	525,600	556,000
	2013	644,800	607,200	546,400	584,000	612,000
	2014	692,800	656,800	599,200	635,200	662,400
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	243,936	227,744	202,400	217,888	230,208
	2013	268,224	252,736	228,096	243,232	254,848
	2014	289,344	274,560	250,976	265,760	277,024
landings & discards	2012	259,424	241,824	214,720	231,264	244,640
	2013	283,712	267,168	240,416	256,960	269,280
	2014	304,832	288,992	263,648	279,488	291,456
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	310,464	289,856	257,600	277,312	292,992
	2013	341,376	321,664	290,304	309,568	324,352
	2014	368,256	349,440	319,424	338,240	352,576
landings & discards	2012	330,176	307,776	273,280	294,336	311,360
	2013	361,088	340,032	305,984	327,040	342,720
	2014	387,968	367,808	335,552	355,712	370,944

2.6.2 Comparison of Alternatives

Alternative 1 (No Action) could have adverse effects on the red grouper stock as an ACL aids in the avoidance of overfishing conditions. However, the adverse biological effects would be mitigated by the fact a three species aggregate is in place. **Alternative 2 (Preferred)** would set the ACL equal to the ABC. The National Standard 1 guidelines indicate the ACL may typically be set very close to the ABC. **Alternatives 3** and **4** would have a greater positive biological effect than **Alternative 2 (Preferred)** because they would create a buffer between the ACL and ABC, with **Alternative 4** setting the most conservative ACL at 80% of the ABC. **Alternative 4** would have the greatest positive effect. Creating a buffer between the ACL and ABC would provide greater assurance overfishing would not occur. Setting a buffer between the ACL and ABC would be appropriate in situations where there is uncertainty in whether or not management measures are constraining fishing mortality to target levels. Annual catch targets, which are not required, can also be set below the ACLs to account for management uncertainty and provide greater assurance overfishing does not occur.

Alternatives 5 and **6 (Preferreds)** would eliminate the aggregate commercial and recreational ACLs and accountability measures (AMs) currently in place for red grouper, black grouper, and gag. The ACL for red grouper would be based on **Alternative 2 (Preferred)** in this action. **Actions 9** and **10** of this amendment would specify commercial and recreational AMs for red grouper, respectively.

The removal of the three species aggregate ACL and AM could biologically affect the stock adversely as the ACL and AM offer an additional method to prohibit harvest. However, this action would implement red grouper individual ACLs/AMs. Gag ACLs/AMs are in place, and the Comprehensive ACL Amendment (under review) proposes the implementation of black grouper ACLs/AMs. All three ACLs are based upon the Scientific and Statistical Committee's catch recommendation that in turn is based upon SEDAR stock assessments. These ACLs are based on the best scientific information where the three species aggregate ACL used catch history for black grouper and red grouper to determine the aggregate ACL.

The magnitude of effects of the ACL/OY alternatives on business activity would directly correlate with the level of ACL. **Preferred Alternative 2** would provide the largest ACL, and would also result in the largest positive impacts on business activity for all states combined. It should be noted, though, that South Carolina would experience reductions in business activity under any of the alternatives. Under **Preferred Alternative 2,** all states except South Carolina would experience positive impacts on business activity. Under **Alternatives 3** and **4**, only Georgia/Northeast Florida would experience increases in business activity. **Preferred Alternative 5** would have the same impacts on business activity as **Preferred Alternative 2 (Table 4-24)**. The impacts of these two preferred alternatives on business activity should not be added, because one alternative practically assumed the other. In particular, **Preferred Alternative 2** was evaluated by eliminating the aggregate quota for black grouper, red grouper, and gag and closing the fishery during the first four months of the year, resulting in the commercial aggregate ACL not being reached

The estimated economic effects of the various ACL/OY alternatives on the recreational sector would directly correlate with the level of ACL as a percent of ABC. That is, the closer the ACL would be to ABC, the higher the consequent effects on the recreational sector. Thus, the ranking of alternatives is rather straightforward, with **Alternative 2 (Preferred)** being first and **Alternative 4**, last. Under **Alternative 2 (Preferred)**, CS (consumer surplus) increases to the recreational sector would range from $0.84 million to $3.86 million over four years, or from $3.07 million to $14.1 million over ten years (**Table 4-25**). Again, these results are the same as those of the preferred alternatives for **Actions 4** and **5**.

As noted earlier, the estimates of economic effects were generated assuming the recreational sector aggregate ACL for black grouper, gag, and red grouper would not be reached in any year during the rebuilding period. In this sense, the economic effects of **Alternative 6 (Preferred)** would be the same as those for **Alternative 2 (Preferred)**. Without **Alternative 6 (Preferred)**, the economic effects of the various alternatives would be lower than shown in **Table 4-25**, particularly for higher ACLs, such as those under **Alternatives 2 (Preferred)** and **3**.

In regard to the ACL, in general the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue, assuming long-term recovery and rebuilding goals are met. Adhering to stock recovery and rebuilding goals is assumed to result in net long-term positive social and economic benefits. **Alternative 1 (No Action)** would retain the aggregate ACL for gag, black and red grouper, and likely would not allow red grouper to be rebuilt, foregoing long-term social benefits associated with rebuilding the stock. **Alternative 2 (Preferred)** sets the ACL equal to the ABC, the highest possible ACL, and would result in fewer short-term social impacts than under **Alternatives 3** and **4**, which each set the ACL at a percentage of the ABC. **Alternative 5 (Preferred)** and **Alternative 6 (Preferred)** eliminate the previously established aggregate ACL and AMs for gag, black and red grouper, and any social effects would be expected to result from a species-specific limit that could impact fishermen by limiting harvest of red grouper.

A summary of the effects of the alternatives under **Action 6** is provided in **Table 2-20**.

Table 2-20. Summary of effects under **Action 6**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action)	-	$90.65 in millions of 2009 dollars.
Alternative 2 (Preferred). ACL = OY = ABC	+	(+/-) Greatest beneficial effects
Alternative 3. ACL = OY = 90% of the ABC	++	(+/-) Effects vary by state
Alternative 4. ACL = OY = 80% of the ABC	+++	(+/-) Effects vary by state
Alternative 5 (Preferred). Eliminate the commercial sector aggregate ACL of 662,403 lbs gw for black grouper, gag, and red grouper and associated AMs.	Potentially -	(+/-)
Alternative 6 (Preferred). Eliminate the recreational sector aggregate ACL of 648,663 lbs gw for black grouper, gag, and red grouper and associated AMs.	Potentially -	(+/-) Same as **Alternative 2 (Preferred)**

2.7 Action 7. Specify a Commercial Sector Annual Catch Target (ACT)

2.7.1 Alternatives

Alternative 1 (No Action) (Preferred). Do not specify a commercial ACT for red grouper. Currently, there is no commercial ACT for red grouper (The proposed commercial ACL would equal 284,680 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 2. The commercial ACT equals 90% of the commercial ACL (The proposed commercial ACT would equal 256,212 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 3. The commercial ACT equals 80% of the commercial ACL (The proposed commercial ACT would equal 227,744 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Note: The ACT values would not increase if the total ACL was exceeded as discussed in **Action 6**.

Table 2-21. Red grouper commercial ACTs.
Values are in lbs whole weight.

		Commercial Sector ACT		
Year	**Preferred Commercial Sector ACL**	**Alt 1 (No Action)**	**Alt 2 ACT=90%(ACL)**	**Alt 3 ACT= 80%(ACL)**
2012	284,680	n/a	256,212	227,744
2013	315,920	n/a	284,328	252,736
2014+	343,200	n/a	308,880	274,560

2.7.2 Comparison of Alternatives

Alternative 1 (No Action) (Preferred) would not set a commercial sector ACT. **Alternatives 2** and **3**, which would establish ACTs at reduced harvest levels (90% and 80% of the ACL, respectively) are designed to hedge against an ACL overage by providing a buffer between the ACT and ACL, and therefore account for management uncertainty. Establishing an ACT that is 90% or 80% of the commercial ACL would also reduce the probability that post-season AMs, meant to correct for an ACL overage, would be needed.

Assuming a discount rate of 3%, **Alternative 2** (ACT = 90% of the ACL), would result in a loss of $570,000 over the ten-year period. **Alternative 3** (ACL = 80% of the ABC) would result in losses totaling $1,160,000 over a ten-year period **(Table 4-27)**. Assuming a discount rate of 7%, **Alternative 2** would result in a loss of $460,000 over the ten year period whereas **Alternative 3** is expected to result in losses totaling $940,000 over the same period **(Table 4-27)**.

For the commercial sector, **Alternative 1 (No Action) (Preferred)** would not impose a buffer through the ACT and is less restrictive than **Alternatives 2** or **3**. With **Alternatives 2** and **3,** a buffer could be imposed which would reduce the harvest threshold further from the ACL. Therefore there is an increasing possibility of negative short-term social effects going from **Alternative 1 (No Action) (Preferred)** to **Alternative 3**. Some of those effects are similar to other thresholds being met and may involve switching to other species or discontinuing fishing altogether. Although these are common responses to closures, it is not known how fishermen may respond if closures are anticipated for several different species or groups. There could be a domino effect as one closure forces them to switch to another species which closes as thresholds are met with the added fishing pressure.

A summary of the effects of the alternatives under **Action 7** is provided in **Table 2-22**.

Table 2-22. Summary of effects under **Action 7**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action) (Preferred)	n/a	+
Alternative 2. Commercial ACT equals 90% of the commercial ACL	+	+
Alternative 3. Commercial ACT equals 80% of the commercial ACL	++	-

2.8 Action 8. Specify a Recreational Sector Annual Catch Target (ACT)

2.8.1 Alternatives

Alternative 1 (No Action). Do not specify a recreational ACT for red grouper. Currently, there is no recreational ACT for red grouper (The proposed recreational ACL would equal 362,320 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 2. The recreational ACT equals 85% of the recreational ACL (The proposed recreational ACT would equal 307,972 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 3. The recreational ACT equals 75% of the recreational ACL (The proposed recreational ACT would equal 271,740 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 4 (Preferred). The recreational ACT equals the recreational ACL*(1-PSE) or ACL*0.5, whichever is greater (The proposed recreational ACT would equal 271,740 pounds ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Note: The ACT values would not increase if the total ACL was exceeded as discussed in **Action 6**.

Table 2-23. Red grouper recreational ACTs.
Average PSE during 2004-2008 equals 25 (**Table 2-24**). Values are in lbs whole weight.

Year	Preferred Recreational Sector ACL	Recreational Sector ACT		
		Alt 2; ACT=85%(ACL)	Alt 3; ACT=75%(ACL)	Alt 4 (Preferred); ACT equals sector ACL*(1-PSE) or ACL*0.5, whichever is greater
2012	362,320	307,972	271,740	**271,740**
2013	402,080	341,768	301,560	**301,560**
2014+	436,800	371,280	327,600	**327,600**

Table 2-24. Proportional Standard Error (PSE) values for red grouper 2004-2008 including 3-year and 5-year averages.

PSE Values (weight)	
2004	24.7
2005	22.7
2006	26.0
2007	27.1
2008	25.6
3 Yr Avg	26.2
5 Yr Avg	25.2
Council using PSE=25%	

Source: MRFSS

2.8.2 Comparison of Alternatives

Alternative 1 (No Action) would not specify a recreational ACT for red grouper. **Alternatives 2 and 3** would establish reduced harvest levels (85% and 75% of the ACL, respectively) designed to hedge against an ACL overage and therefore, provide a buffer between the ACT and ACL and account for management uncertainty.

Alternative 4 (Preferred) would have the greatest biological benefit of the alternatives by adjusting the ACL by 50% or one minus the Proportional Standard Error (PSE) from the recreational fishery, whichever is greater (**Table 2-23**). The lower the value of the PSE, the more reliable the landings data. If the South Atlantic Council chose to limit harvest to the ACT, establishing this level below the recreational ACL would also reduce or eliminate the need to close or implement post-season AMs that are meant to correct for an ACL overage. ACTs may be considered “soft targets” (do not trigger action). In this sense, the ACT would serve as a “performance standard”. If the South Atlantic Council and its SSC determined that the management measures in place are not constraining catch to a target level such as the ACT, adjustments could be made through a future regulatory amendment.

Under the assumption that ACL is equal to ABC, **Alternative 2** would provide an ACT equal to 85% of ACL. This alternative would result in larger positive economic effects ($0.33 million to $1.53 million over four years) than the alternative setting the ACL equal to 75% of ACL (-$0.03 million to -$0.01 million) (**Table 4-31**). For the current analysis, a PSE of 0.25 was used, so that **Subalternative 4 (Preferred)** would have exactly the same economic effects as **Subalternative 3**.

The general effects on the social environment of an ACT for the recreational sector would be similar to the effects described in **Section 4.7.3**. **Alternative 1 (No Action)** would not implement a recreational ACT and there would be no additional social impact on the recreational sector. The variations in **Alternatives 2-4 (Preferred)** impose a buffer, as a certain percentage of the ACL, and it would be expected that short-term negative social effects would accrue as the buffer increases. The ACTs under **Alternative 3** and **Alternative 4 (Preferred)** are identical and would result in the same social effects, primarily by limiting recreational fishing opportunities. The short-term social impacts on recreational fishermen would be less under **Alternative 2** as this alternative proposes a higher ACT.

Because the ACT alternatives do not trigger any corrective or preventative action, no additional in-season monitoring is required regardless of where the ACT level is set. Therefore, there is no difference in the potential administrative impacts associated with **Alternatives 2-4 (Preferred)**.

A summary of the effects of alternatives under **Action 8** is provided in **Table 2-25**.

Table 2-25. Summary of effects under **Action 8**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action).	No effect	No effect
Alternative 2. Recreational ACT equals 90% of the commercial ACL	+	++
Alternative 3. Recreational ACT equals 80% of the commercial ACL	+	+
Alternative 4 (Preferred). Recreational ACT equals the recreational ACL*(1-PSE) or ACL*0.5, whichever is greater	++	+

2.9 Action 9. Specify Commercial Accountability Measures (AMs)

2.9.1 Alternatives

Alternative 1 (No Action). Do not specify new commercial AMs for red grouper. There currently are commercial AMs for a black grouper, gag, and red grouper complex.

Table 2-26. Current commercial regulations for red grouper.

Current Commercial Regulations	
Aggregate ACL and in-season closures	Group commercial ACL for gag, black grouper and red grouper of 662,403 lbs gutted weight. After the commercial ACL is met, all purchase and sale of the following species is prohibited and harvest and/or possession is limited to the bag limit: gag; black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby; and coney.
Minimum size limit	20 inches total length
Seasonal closure	No fishing for and/or possession of the following species is allowed January through April: gag, black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby; and coney.

Alternative 2 (Preferred). If the commercial ACL is met or is projected to be met, all subsequent purchase and sale of red grouper is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 3 (Preferred). If the commercial ACL is exceeded, the Regional Administrator shall publish a notice to reduce the commercial ACL in the following season by the amount of the overage.

NOTE: Paybacks are not required when new projections are adopted that incorporate ACL overruns and the ACLs are adjusted in accordance with those projections.

2.9.2 Comparison of Alternatives

Alternative 2 (Preferred) would prevent the commercial sector from profiting from the harvest of red grouper in quantities exceeding the ACL, and thus provides a disincentive to target red grouper once the ACL has been reached.

Because the ACL for red grouper would be set equal to the ABC (**Action 6**), it is possible the fishing season could be shortened under **Alternative 2 (Preferred)** since the ACL could be projected to be met earlier in the season than under the status quo conditions. The biological benefits of a shortened fishing season for red grouper would depend on the exact reduction of the season length, and subsequent changes to fishing behavior. If a commercial fishing season is shortened due to triggering the **Alternative 2 (Preferred)** AM regulatory discards may not necessarily increase since fishermen would still be allowed to retain the bag limit.

Alternative 3 (Preferred) could complement **Alternative 2 (Preferred)** because it would correct for an ACL overage post-season if such an event were to occur. **Alternative 3 (Preferred)** would reduce the commercial sector ACL in the following season by the amount of the overage. The ACL can be reduced by the amount taken in excess the year before, and may shorten the season if the lower ACL is met earlier in the year. A shortened season may result in increased regulatory discards if no level of harvest is allowed after the ACL is reached. However, under **Alternative 2 (Preferred)**, fishermen would still be able to retain bag limit quantities of red grouper, which may reduce the number of regulatory discards that would otherwise result from a shortened season. Under this scenario **Alternative 3 (Preferred)** could be expected to provide a moderate biological benefit.

Alternative 1 (No Action) would economically benefit the commercial sector the most in the short-term but the least in the long-term since lack of an AM could result in further overfishing. **Alternative 2 (Preferred)** would provide greater short-term economic benefits to the commercial sector compared to **Alternative 3 (Preferred)** but less than **Alternative 1 (No Action)**. **Alternative 3 (Preferred)** would provide the greatest long-term economic benefits to the commercial sector compared to **Alternatives 1 (No Action)** and **Alternative 2 (Preferred)**.

The payback that is proposed in **Alternative 3** (**Preferred)** would further assist with rebuilding where the in-season closure in **Alternative 2** (**Preferred)** would not, on its own. However, when **Alternative 2 (Preferred)** and **3 (Preferred)** are combined, there is an in-season accountability measure that provides some protection from continued overages during the fishing season. So, with **Alternatives 2 (Preferred)** and **3 (Preferred)** combined, there should be sufficient protection with some beneficial social effects. While payback does incur short-term negative social impacts, the long-term benefits of stock protection should contribute to the overall benefits, as stock status should remain at sustainable levels.

A summary of the effects of alternatives under **Action 9** is provided in **Table 2-27**.

Table 2-27. Summary of effects under **Action 9**.

Alternatives	Biological Effects	Socioeconomic/Administrative Effects
Alternative 1 (No Action). Do not specify new, or modify existing, commercial AMs for red grouper.	-	+/- would economically benefit the most in the short-term but the least in the long-term
Alternative 2 (Preferred). Prohibit harvest when ACL projected to be met.	+	+/- greater short-term economic benefits to the commercial sector compared to **Alternative 3 (Preferred)** but less than **Alternative 1 (No Action)**.
Alternative 3 (Preferred). Reduce subsequent year's ACL if overage.	+	+/- greatest long-term economic benefit

2.10 Action 10. Specify Recreational Accountability Measures (AMs)

2.10.1 Alternatives

Alternative 1 (No Action). Do not specify new, or modify existing, recreational AMs for red grouper. There currently are recreational AMs for a black grouper, gag, and red grouper complex.

Table 2-28. Current recreational regulations for red grouper.

Current Recreational Regulations	
Bag limit	Included in three grouper aggregate bag limit per person per day. Exclude the captain and crew on for-hire vessels from possessing a bag limit for groupers
Minimum size limit	20 inches total length
Seasonal closure	No fishing for and/or possession of the following species is allowed January through April: black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby, and coney.
ACL/AM	Establish a recreational ACL for gag, black grouper, and red grouper of 648,663 lbs gutted weight. If at least one of the species (gag, red grouper, or black grouper) *is overfished* and the sector ACL is projected to be met, prohibit the recreational harvest and retention of black grouper, gag, and red grouper. If the ACL is exceeded, independent of stock status, the Regional Administrator shall publish a notice to reduce the sector ACL in the following year by the amount of the overage. For red grouper compare the recreational ACL with recreational landings over a range of years. For 2010, use only 2010 landings. For 2011, use the average landings of 2010 and 2011. For 2012 and beyond, use the most recent three-year running average.

Alternative 2. Specify the recreational AM trigger.

Subalternative 2a. Do not specify a recreational AM trigger.
Subalternative 2b (Preferred). If the current year recreational landings exceed the recreational ACL in a given year.
Subalternative 2c. If the mean recreational landings for the past three years exceed the recreational ACL.
Subalternative 2d. If the modified mean recreational landings exceeds the recreational ACL. The modified mean is the most recent 5 years of available recreational landings data with highest and lowest landings estimates from consideration removed.
Subalternative 2e. If the lower bound of the 90% confidence interval estimate of the MRFSS landings' population mean plus headboat landings is greater than the recreational ACL.

Alternative 3. Specify the recreational in-season AM.
Subalternative 3a. Do not specify a recreational in-season AM.
Subalternative 3b (Preferred). The Regional Administrator shall publish a notice to close the recreational sector when the recreational ACL is projected to be met.

Alternative 4. Specify the recreational post-season AM.
Subalternative 4a. Do not specify a recreational post-season AM.
Subalternative 4b. For recreational post-season accountability measures, compare the recreational ACL with recreational landings over a range of years. For 2011, use only 2011 landings. For 2012, use the mean landings of 2011 and 2012. For 2013 and beyond, use the most recent three-year running mean.
Subalternative 4c. Monitor following year. If the recreational ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator would take action as necessary.
Subalternative 4d. Monitor following year and shorten season as necessary. If the recreational ACL is exceeded, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the recreational fishing season as necessary.
Subalternative 4e. Monitor following year and reduce bag limit as necessary. If the recreational ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator will publish a notice to reduce the recreational bag limit as necessary.
Subalternative 4f. Shorten following season. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the length of the following recreational fishing year by the amount necessary to ensure landings do not exceed the recreational ACL for the following fishing season.
Subalternative 4g (Preferred). Payback. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the recreational ACL in the following season by the amount of the overage.

NOTE: Paybacks are not required when new projections are adopted that incorporate ACL overruns and the ACLs are adjusted in accordance with those projections.

2.10.2 Comparison of Alternatives

With the exception of **Subalternative 2a**, **Alternative 2** and its subalternatives would specify the AM trigger under different scenarios. Under **Subalternative 2b (Preferred)**, AMs would be triggered if the annual landings exceeded the ACL in a given year. **Subalternative 2c** would examine the trend in the past three years of landings data to determine if AMs would be triggered. **Subalternative 2d** is similar to **Subalternative 2c**, except that a review of the most recent 5-year time series of landings data would be conducted to determine which of the five years were associated with the highest and lowest harvest levels. After the years of highest and lowest landings were determined, those two years' landings would be removed from the time series leaving three years of landings to be averaged. **Subalternative 2e** would trigger AMs if the lower 90% confidence interval estimate of MRFSS landings' population mean plus headboat landings is greater than the ACL. The application of the 90% confidence interval could be considered a more conservative parameter to use when estimating overage amounts.

One of the benefits of employing the approaches in **Subalternatives 2c-2e** to triggering AMs is that it provides an opportunity for fishery managers to use a data set uninfluenced by anomalous highs and lows, which could be caused by statistical variability. Alternatively, it may be difficult to decide if such differences in recreational landings are due to statistical or sampling variances, or if they can be attributed to actual increased harvest. In the case of the latter, the modified mean approach (**Subalternative 2d**) may not be the most biologically advantageous compared to other alternatives since it would retain years of high and low landings. In cases where it cannot be determined whether one year's high landings are definitively caused by statistical variation, it may be difficult to justify removing that year's landings from the time series of data, especially if there is a strong year class known to have entered the fishery at that time or if regulations have been implemented that cause an extreme effort shift.

Since management uncertainty is already accounted for in the choice of an ACT (**Action 9**), and scientific uncertainty is accounted for in the choice of the South Atlantic Council SSC's ABC control rule (and the Council's corresponding ACL), the biological benefits would increase in order from **Subalternatives 2e** to **2b (Preferred)**.

Alternative 3 examines the need for an in-season AM. **Subalternative 3b (Preferred)** would allow the RA to publish a notice to close the recreational sector when the ACL is projected to be met.

With the exception of **Subalternative 4a**, which would not specify a post-season AM, **Alternative 4** and its subalternatives specify methodologies for specifying post-season AMs that would be taken if the ACL were exceeded. Under **Subalternative 4b**, ACLs would be compared with landings over a range of three years to determine the magnitude of the ACL overage for imposing post-season AMs. If the ACL were exceeded, **Subalternatives 4c-4e** would monitor the following year's landings for persistence in increased landings. Under **Subalternative 4c**, the RA would take action as necessary to ensure an ACL was not exceeded in a year subsequent to an ACL overage. Under **Subalternative 4f**, if the ACL were exceeded, the RA would publish a notice to reduce the length of the following fishing year by the amount necessary to ensure landings do not exceed the recreational sector ACL for the following fishing season. In contrast, under **Subalternative 4g (Preferred)**, there would be a payback provision for exceeding an

ACL, whereby, the RA would publish a notice to reduce the recreational sector ACL in the following season by the amount of the overage. This is consistent with the approach the South Atlantic Council has taken in previous amendments to address species that are overfished and/or experiencing overfishing.

Subalternatives 4d and **4f** would ensure that the amount of the previous year's ACL overage would be accounted for in the subsequent year's protection via a shortened season, and thus would be biologically beneficial. The monitoring component of **Subalternatives 4c-4e** would allow for any anomalies or data reporting irregularities to be taken into account before the AMs would be effective, hence possibly adding a socio-economic benefit to the biological benefit of any management measures such as reducing the length of the following fishing season (**Subalternative 4f)**.

Alternative 1 (No Action) would economically benefit the recreational sector the most in the short-term but the least in the long-term since lack of an AM could result in further overfishing. Under **Subalternatives 2c and 2d**, the AM would less likely be triggered than under **Subalternatives 2b (Preferred) and 2e** as a result of taking into account landings over a number of years. In this sense, **Subalternatives 2c and 2d** would likely provide less adverse short-term economic effects than the other subalternatives. **Subalternative 2d** would be particularly noteworthy because it would eliminate the highest and lowest landings. Under **Subalternative 2c**, one year of very high landings would have a strong influence in triggering the AM. Between the two subalternatives of **Alternative 3**, **Subalternative 3a** would economically benefit the recreational sector more in the short-term since no further restrictions would be imposed on the recreational sector. However, it would result in a worse long-term economic situation, since lack of an in-season AM could result in further overfishing of the stock that, in turn, would require more restrictive regulations. **Alternative 4** addresses the issue of implementing post-season AMs. **Subalternative 4a** would economically benefit the recreational sector most in the short-term since no further restrictions would be imposed on the recreational sector. However, it would result in the worst long-term economic situation, since lack of a post-season AM could result in moving further away from the rebuilding trajectory that, in turn, would require more restrictive regulations. The short-term economic effects of the other subalternatives would depend on the nature and extent of the restrictions imposed on the harvest of the species and/or on the opportunities to fish for the resource. **Subalternative 4a** has similar economic implications as the corresponding subalternatives of **Alternative 4**. Of the remaining subalternatives, **Subalternative 4c** would likely result in the least adverse economic effects on the recreational sector in the short term, although the actual effects would depend on the type of restrictions that would be imposed by the RA. **Subalternatives 4d** and **4e** would likely result in less adverse economic effects in the short term than **Subalternatives 4f** and **4g (Preferred)** to the extent that post-season AMs may not be imposed depending on how persistent the upward trend in landings would be.

Subalternative 4d may yield larger adverse economic impacts than **Subalternative 4e** because it would totally eliminate fishing opportunities during part of the fishing year rather than mainly reduce the fishing experience for part of the fishing year. There is a good possibility that **Subalternatives 4f** and **4g (Preferred)** would result in the same fishing season length, although some other measures, like bag limit reduction, may be employed under **Subalternative 4g (Preferred)** to effect a longer season that would provide more fishing opportunities. Whichever of these two subalternatives can provide for more fishing opportunities may be considered better than the other for economic reasons.

The 2010 recreational landings, which already accounted for newly implemented measures affecting the recreational red grouper sector, are far below the currently preferred ACL alternative (**Table 4-34**). Therefore, applications of AMs on the red grouper recreational sector would unlikely occur in the near future.

The general effects of closures and restrictions in the form of AMs are discussed in **Section 4.9.3**. **Alternative 1 (No Action)** does not implement any additional AMs for the recreational sector, and there would be no additional social impacts. There would likely be social benefits for this action, because proposed changes in **Action 6** would remove red grouper from the aggregate ACL.

Subalternatives in **Alternative 2** include options for establishing an AM trigger. It would be expected for short-term social impacts to be less significant under **Subalternatives 2a** and **2c-2e** because these are less likely to trigger the AM. **Subalternative 2b (Preferred)** is the most restrictive and would lead to social impacts from AMs, but would produce long-term social benefits as the stock rebuilds and overfishing is prevented.

Alternative 3 includes subalternatives for an in-season recreational AM. **Subalternative 3a** would have fewer short-term social impacts but fewer long-term social benefits than **Subalternative 3b (Preferred)** by not implementing an in-season closure. This type of AM could shorten the season, which would limit recreational opportunities. However, an in-season closure would produce long-term broad social benefits by preventing overfishing of the red grouper stock.

The subalternatives under **Alternative 4** include options for post-season recreational AMs. As discussed in **Section 4.9.3**, the more restrictive the AMs, the more impact on the recreational sector in the short-term. **Subalternative 4a** would not implement a post-season AM and would not produce any additional impacts on the recreational sector. However, a lack of post-season AM may cause long-term broad social impacts if there is a decline in the red grouper stock. **Subalternatives 4b-4g (Preferred)** present options to reduce harvest of red grouper if the ACL is exceeded, and each of these in some way would produce short-term impacts on recreational fishing opportunities through some management action, which could be shortened seasons, reduced bag limits, or other measures. The long-term social effects would be positive as long as the restrictions on recreational harvest through **Subalternatives 4b-4g (Preferred)** help to meet the rebuilding goals.

A summary of the effects of alternatives under **Action 10** are provided in **Table 2-29**.

Table 2-29. Summary of effects under **Action 10**.

Alternatives	Biological Effects	Socioeconomic/ Administrative Effects
Alternative 1 (No Action). Do not specify new, or modify existing, recreational AMs for red grouper. There currently are recreational AMs for a black grouper, gag, and red grouper complex.	-	+/-
Alternative 2a. Do not specify a recreational AM trigger.	-	+/-
Alternative 2b (Preferred). If the current year recreational landings exceed the recreational ACL in a given year.	+	+/-
Alternative 2c. If the mean recreational landings for the past three years exceed the recreational ACL.	+	+/- likely provide less adverse short-term economic effects than the other subalternatives.
Alternative 2d. If the modified mean recreational landings exceeds the recreational ACL.	+	+/- likely provide less adverse short-term economic effects than the other subalternatives.
Alternative 2e. If the lower bound of the 90% confidence interval estimate of the MRFSS landings' population mean plus headboat landings is greater than the recreational ACL.	++	+/-
Alternative 3a. Do not specify a recreational in-season AM.	-	+/-
Alternative 3b (Preferred). Prohibit harvest when ACL projected to be met.	+	+/-
Alternative 4a. Do not specify a recreational post-season AM.	-	+/-
Alternative 4b. For recreational post-season accountability measures, compare the recreational ACL with recreational landings over a range of years.	+	+/-
Alternative 4c. Monitor following year.	+	+/- least adverse economic effects in the short term
Alternative 4d. Monitor following year and shorten season as necessary.	+	+/- larger adverse economic impacts than **Subalternative 4e**
Alternative 4e. Monitor following year and reduce bag limit as necessary.	+	+/-
Alternative 4f. Shorten following season.	+	+/-
Alternative 4g (Preferred). Reduce subsequent year's ACL if overage.	+	+/-

Chapter 3. Affected Environment

This section describes the affected environment in the proposed project area. The affected environment is divided into four major components:

- **Habitat environment** (Section 3.1)

  Examples include coral reefs and sea grass beds

- **Biological end ecological environment** (Section 3.2)

  Examples include populations of red grouper, corals, turtles

- **Human environment** (Section 3.3)

  Examples include fishing communities and economic descriptions of the fisheries

- **Administrative environment** (Section 3.4)

  Examples include the fishery management process and enforcement activities

3.1 Habitat Environment

3.1.1 Inshore/Estuarine Habitat

Many deepwater snapper grouper species utilize both pelagic and benthic habitats during several stages of their life histories; larval stages of these species live in the water column and feed on plankton. Most juveniles and adults are demersal (bottom dwellers) and associate with hard structures on the continental shelf that have moderate to high relief (e.g., coral reef systems and artificial reef structures, rocky hard bottom substrates, ledges and caves, sloping soft bottom areas, and limestone outcroppings). Juvenile stages of some snapper grouper species also utilize inshore seagrass beds, mangrove estuaries, lagoons, oyster reefs, and embayment systems. In many species, various combinations of these habitats may be utilized during daytime feeding migrations or seasonal shifts in cross-shelf distributions. More detail on these habitat types is found in Volume II of the Fishery Ecosystem Plan (SAFMC 2009b).

3.1.2 Offshore Habitat

Predominant snapper grouper offshore fishing areas are located in live bottom and shelf-edge habitats, where water temperatures range from 11º to 27º C (52º to 81º F) due to the proximity of the Gulf Stream, with lower shelf habitat temperatures varying from 11º to 14º C (52º to 57º F). Water depths range from 16 to 27 meters (54 to 90 feet) or greater for live bottom habitats, 55 to 110 meters (180 to 360 feet) for the shelf-edge habitat, and from 110 to 183 meters (360 to 600 feet) for lower-shelf habitat areas.

The exact extent and distribution of productive snapper grouper habitat on the continental shelf north of Cape Canaveral is unknown. Current data suggest from 3 to 30% of the shelf is suitable habitat for these species. These live-bottom habitats may include low relief areas, supporting sparse to moderate growth of sessile (permanently attached) invertebrates, moderate relief reefs from 0.5 to 2 meters (1.6 to 6.6 feet), or high relief ridges at or near the shelf break consisting of outcrops of rock that are heavily encrusted with sessile invertebrates such as sponges and sea fan species. Live-bottom habitat is scattered irregularly over most of the shelf north of Cape Canaveral, Florida, but is most abundant offshore from northeastern Florida. South of Cape Canaveral, the continental shelf narrows from 56 to 16 kilometers (35 to 10 miles) wide, then narrows more off the southeast coast of Florida and the Florida Keys. The lack of a large shelf area, presence of extensive, rugged living fossil coral reefs, and dominance of a tropical Caribbean fauna are distinctive benthic characteristics of this area.

Rock outcroppings occur throughout the continental shelf from Cape Hatteras, North Carolina to Key West, Florida (MacIntyre and Milliman 1970; Miller and Richards 1979; Parker et al. 1983), which are principally composed of limestone and carbonate sandstone (Newton et al. 1971), and exhibit vertical relief ranging from less than 0.5 to over 10 meters (33 feet). Ledge systems formed by rock outcrops and piles of irregularly sized boulders are also common. Parker et al. (1983) estimated that 24% (9,443 km^2) of the area between the 27 and 101 meters (89 and 331 feet) depth contours from Cape Hatteras, North Carolina to Cape Canaveral, Florida is reef habitat. Although the bottom communities found in water depths between 100 and 300 meters (328 and 984 feet) from Cape Hatteras, North Carolina to Key West, Florida is relatively small compared to the whole shelf, this area, based upon landing information of fishers, constitutes prime reef fish habitat and probably significantly contributes to the total amount of reef habitat in this region.

Artificial reef structures are also utilized to attract fish and increase fish harvests; however, research on artificial reefs is limited and opinions differ as to whether or not these structures promote an increase of ecological biomass or merely concentrate fishes by attracting them from nearby, natural un-vegetated areas of little or no relief.

The distribution of coral and live hard bottom habitat as presented in the Southeast Marine Assessment and Prediction (SEAMAP) Bottom Mapping Project is a proxy for the distribution of the species within the snapper grouper complex. The method used to determine hard bottom habitat relied on the identification of reef obligate species including members of the snapper grouper complex. The Florida Fish and Wildlife Research Institute (FWRI), using the best available information on the distribution of hard bottom habitat in the south Atlantic region, prepared ArcView maps for the four-state project. These maps, which consolidate the known distribution of coral, hard/live bottom, and artificial reefs as hard bottom, are available on the South Atlantic Fishery Management Council's (South Atlantic Council) Internet Mapping System website: http://ocean.floridamarine.org/efh_coral/ims/viewer.htm.

Plots of the spatial distribution of offshore species were generated from the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP) data. The plots serve as point confirmation of the presence of each species within the scope of the sampling program. These plots, in combination with the hard bottom habitat distributions previously mentioned, can be employed as proxies for offshore snapper grouper complex distributions in the south Atlantic region. Maps of the distribution of snapper grouper species by gear type based on MARMAP data can also be generated through the Council's Internet Mapping System at the above web address.

3.1.3 Essential Fish Habitat

Essential fish habitat (EFH) is defined in the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S. C. 1802(10)). Specific categories of EFH identified in the South Atlantic Bight, which are utilized by federally managed fish and invertebrate species, include both estuarine/inshore and marine/offshore areas. Specifically, estuarine/inshore EFH includes: Estuarine emergent and mangrove wetlands, submerged aquatic vegetation, oyster reefs and shell banks, intertidal flats, palustrine emergent and forested systems, aquatic beds, and estuarine water column. Additionally, marine/offshore EFH includes: Live/hard bottom habitats, coral and coral reefs, artificial and manmade reefs, *Sargassum* species, and marine water column.

EFH utilized by snapper grouper species in this region includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 183 meters [600 feet (but to at least 2,000 feet for wreckfish)] where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical fish complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for survival of larvae and growth up to and including settlement. In addition, the Gulf Stream is also EFH because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine-dependent and near shore snapper grouper species, EFH includes areas inshore of the 30 meter (100-foot) contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom habitats. For maps of EFH for snapper grouper species, refer to the links provided in **Appendix F**.

3.1.3.1 Habitat Areas of Particular Concern

Areas which meet the criteria for Essential Fish Habitat-Habitat Areas of Particular Concern (EFH-HAPCs) for species in the snapper grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; near shore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). For maps of EFH-HAPCs for snapper grouper species refer to the links provided in **Appendix F**.

Areas that meet the criteria for EFH-HAPCs include habitats required during each life stage (including egg, larval, postlarval, juvenile, and adult stages).

In addition to protecting habitat from fishing related degradation though fishery management plan regulations, the South Atlantic Council, in cooperation with NOAA Fisheries Service, actively comments on non-fishing projects or policies that may impact essential fish habitat. With guidance from the Habitat Advisory Panel, the South Atlantic Council has developed and approved policies on: energy exploration, development, transportation and hydropower re-licensing; beach dredging and filling and large-scale coastal engineering; protection and enhancement of submerged aquatic vegetation; alterations to riverine, estuarine and near shore flows; offshore aquaculture; marine invasive species; and estuarine invasive species.

3.2 Biological and Ecological Environment

The reef environment in the South Atlantic management area affected by actions in this amendment is defined by two components (**Figure 3-1**). Each component will be described in detail in the following sections.

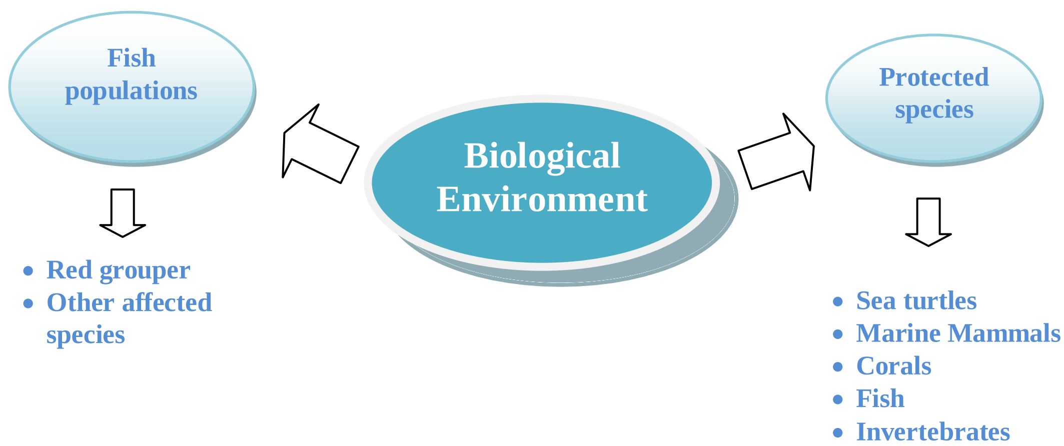


Figure 3-1. Two components of the biological environment described in this amendment.

3.2.1 Fish Populations

The waters off the South Atlantic coast are home to a diverse population of fish. The snapper grouper fishery management unit currently contains 73 species of fish, many of them neither "snappers" nor "groupers". These species live in depths from a few feet (typically as juveniles) to hundreds of feet. As far as north/south distribution, the more temperate species tend to live in the upper reaches of the South Atlantic management area (e.g., black sea bass, red grouper) while the tropical variety's core residence is in the waters off south Florida, Caribbean Islands, and northern South America (e.g., black grouper, mutton snapper).

These are reef-dwelling species that live amongst each other. These species rely on the reef environment for protection and food. There are several reef tracts that follow the southeastern coast. The fact that these fish populations congregate together dictates the nature of the fishery (multi-species) and further affects the type of management regulations proposed in this amendment.

Snapper grouper species commonly taken with red grouper could be affected by actions in this amendment. Snapper grouper species most likely to be affected by the proposed actions include many species that occupy the same habitat at the same time. Therefore, snapper grouper species are likely to be caught when regulated since they will be incidentally caught when fishermen target other co-occurring species.

3.2.1.1 Red Grouper, *Epinephelus morio*

Red Grouper Life History
An Overview

- Occurs from North Carolina to southeastern Brazil, including the eastern Gulf of Mexico and Bermuda
- Spawning occurs during February-June, with a peak in April
- Adult red grouper are sedentary fish that are usually found at depths of 5-300 meters (16-984 feet).
- Red grouper do not appear to form spawning aggregation or spawn at specific sites

Red grouper, *Epinephelus morio*, is primarily a continental species, mostly found in broad shelf areas (Jory and Iversen 1989). Red grouper is distributed in the Western Atlantic, from North Carolina to southeastern Brazil, including the eastern Gulf of Mexico and Bermuda, but can occasionally be found as far north as Massachusetts (Heemstra and Randall 1993). The red grouper is uncommon around coral reefs; it generally occurs over flat rock perforated with solution holes (Bullock and Smith 1991), and is commonly found in the caverns and crevices of limestone reef in the Gulf of Mexico (Moe 1969). It also occurs over rocky reef bottoms (Moe 1969).

Adult red grouper are sedentary fish that are usually found at depths of 5-300 meters (16-984 feet). Fishermen off North Carolina commonly catch red grouper at depths of 27-76 meters (88-249 feet) with an average of 34 meters (111 feet). Fishermen off southeastern Florida also catch red grouper in depths ranging from 27-76 with an average depth of 45 meters (148 feet) (Burgos 2001; McGovern et al., 2002). Moe (1969) reported that juveniles live in shallow water nearshore reefs until they are 40 centimeters (16 inches) and 5 years of age, when they become sexually mature and move offshore. Spawning occurs during February-June, with a peak in April (Burgos 2001). In the eastern Gulf of Mexico, ripe females are found December through June, with a peak during April and May (Moe 1969). Based on the presence of ripe adults (Moe 1996) and larval red grouper (Johnson and Keener 1984), spawning probably occurs offshore. Coleman et al. (1996) found groups of spawning red grouper at depths of 21-110 meters (70-360 feet). Red grouper do not appear to form spawning aggregations or spawn at specific sites (Coleman et al. 1996). They are reported to spawn in depths of 30-90 meters (98-295 feet) off the Southeast Atlantic coast (Burgos 2001; McGovern et al. 2002).

Red grouper are protogynous hermaphrodites, meaning they function as a female first and later transition to males. The proportion of males in the population increases with age. Off North Carolina, red grouper first become males at 50.9 centimeters (20.1 inches) TL and males dominate size classes greater than 70 centimeters (27.8 inches) TL. Most females transform to males between ages 7 and 14. Burgos (2001) reported that 50% of the females caught off North Carolina are undergoing sexual transition at age 8. Maximum age reported by Heemstra and Randall (1993) was 25 years. Burgos (2001) and McGovern et al. (2002) indicated that red grouper live for at least 20 years in the Southeast Atlantic and a maximum age of 26 years has been reported for red grouper in the Gulf of Mexico (L. Lombardi, NMFS Panama City, personal communication). Natural mortality rate is estimated to be 0.14 (SEDAR 19 2010). Maximum reported size is 125.0 centimeters (49.2 inches) TL (male) and 23.0 kilograms (51.1 lb). For fish collected off North Carolina during the late 1990s, age at 50% maturity of females is 2.4 years and size at 50% maturity is 48.7 centimeters (19.3 inches) TL. Off southeastern Florida, age at 50% maturity was 2.1 years and size at 50% maturity was 52.9 centimeters (21.0 inches) TL (Burgos 2001; McGovern et al. 2002). These fish eat a wide variety of fishes, octopuses, and crustaceans, including shrimp, lobsters, and stomatopods (Bullock and Smith 1991; Heemstra and Randall 1993).

3.2.1.2 Stock Status of Red Grouper

Stock assessments, through the analysis of biological and statistical information, provide an evaluation of stock health under the current management regime and potential future harvest conditions. More specifically, the assessments provide an estimation of maximum sustainable yield (MSY) and a determination of stock status (whether *overfishing* is occurring and whether the stock is *overfished*).

In 2002, a process was initiated called the SouthEast, Data, Assessment, and Review (SEDAR). SEDAR is a cooperative Fishery Management Council process initiated to improve the quality and reliability of fishery stock assessments in the South Atlantic, Gulf of Mexico, and US Caribbean. SEDAR is managed by the Caribbean, Gulf of Mexico, and South Atlantic Regional Fishery Management Councils in coordination with NOAA Fisheries and the Atlantic and Gulf States Marine Fisheries Commissions. SEDAR seeks improvements in the scientific quality of stock assessments, constituent and stakeholder participation in assessment development, transparency in the assessment process, and a rigorous and independent scientific review of completed stock assessments.

Following the assessment, the South Atlantic Council's Scientific and Statistical Committee (SSC) reviews the stock assessment information and advises the Council on whether the best available data were utilized and whether the outcome of the assessment is suitable for management purposes.

The following sections describe the results of the two most recent stock assessments for red grouper in the South Atlantic, in addition to the recommendations from the SSC.

<u>Trends Report</u>

Red grouper had not been formally assessed prior to SEDAR 19 (2010). The stock was examined in a trends report using catch-curve analysis and catch-per-unit-effort, with data through 1999 (Potts and Brennan 2001). That report examined several constant, natural mortality rates (M=0.15, 0.20, 0.25, and 0.30), but considered M=0.20 to be the base level. For M=0.20, the most recent static SPR value was estimated at 16%. Possible proxies for F_{MSY} were estimated at $F_{30\%}$SPR=0.28 and $F_{40\%}$SPR=0.17, whereas full F was estimated at F=0.56, which indicated that overfishing was occurring.

<u>SEDAR Assessment</u>

SEDAR 19 (2010) assessed black grouper in the South Atlantic and Gulf of Mexico and red grouper in the South Atlantic. The Data Workshop was held June 22-26, 2009 in Charleston, South Carolina, the Assessment Workshop was held October 5-9, 2009 in St. Petersburg, Florida and the Review Workshop was held January 25-29, 2010 in Savannah, Georgia.

The age model used in the assessment included data through 2008 from four fleets that caught South Atlantic red grouper: commercial lines (handline and longline), commercial other (pots, traps, trawl, diving, miscellaneous), recreational headboat, and general recreational. The model was fit to annual landings (in units of 1000 lbs whole weight for commercial fleets, 1000 fish for recreational fleets), annual discard mortalities (in units of 1000 fish for commercial lines and recreational fleets), annual length compositions of landings, annual age compositions of landings, annual length compositions of discards, three fishery-dependent indices of abundance (commercial handline, general recreational, and headboat), and one fishery-independent index of abundance (MARMAP chevron traps). Not all of these data sources were available for all fleets in all years. Annual discard mortalities, as fit by the model, were computed by multiplying total discards by the release mortality probability of 0.2.

Stock Status

Point estimates from the base model indicate that the South Atlantic stock of red grouper, *Epinephelus morio*, is currently overfished and is experiencing overfishing.

For red grouper the most recent estimate of the fishing mortality rate is from 2008 and was = 0.298 and F = 0.221 is the maximum fishing mortality threshold (MFMT). Comparing these two numbers:

- F_{2008}/MFMT = 0.298/0.221 = 1.35

This comparison is referred to as the **overfishing ratio**. If the ratio is greater than 1, then overfishing is occurring.

The red grouper stock in the Atlantic is overfished. For red grouper, the estimated level of spawning stock biomass in 2008 was 2,051,000 lbs whole weight. The minimum stock size threshold (MSST) = 2,229,000 lbs whole weight. Comparing these two numbers:

- SSB_{2008}/MSST = 2,051,000/2,229,000 = 0.92

If the ratio is less than 1, then the stock is **overfished**.

SSC Recommendation

The SSC recommends an Overfishing Limit (OFL) equal to the yield at F_{MSY} and an Acceptable Biological Catch (ABC) equal to the projected yield stream with a 70% chance of rebuilding success as specified in the SSC's ABC Control rule (being implemented through the Comprehensive ACL Amendment currently under review).

3.2.1.3 Other Species Affected

In addition to red grouper, snapper grouper species most likely to be affected by the proposed actions include many species that occupy the same habitat at the same time. Therefore, snapper grouper species are likely to be caught when regulated since they will be incidentally caught when fishermen target other co-occurring species. The following species are ones that are most likely to be affected. Amendment 17A (SAFMC 2010a), **Section 3.2.1**, describes their life history characteristics in detail.

gag
(*Mycteroperca microlepis*)
gray triggerfish
(*Balistes capriscus*)
greater amberjack
(*Seriola dumerili*)
red snapper
(*Lutjanus campechanus*)
scamp
(*Mycteroperca phenax*)
speckled hind
(*Epinephelus drummondhayi*)
vermilion snapper
(*Rhomboplites aurorubens*)

3.2.2 Protected Species

There are 31 different species of marine mammals that may occur in the EEZ of the South Atlantic region. All 31 species are protected under the Marine Mammal Protection Act (MMPA) and six are also listed as endangered under the ESA (i.e., sperm, sei, fin, blue, humpback, and North Atlantic right whales). In addition to those six marine mammals, five species of sea turtle (green, hawksbill, Kemp's ridley, leatherback, and loggerhead); the smalltooth sawfish; and two *Acropora* coral species (elkhorn [*Acropora palmata*] and staghorn [*A. cervicornis*]) are protected under the

ESA. Portions of designated critical habitat for North Atlantic right whales and *Acropora* corals also occur within the South Atlantic Council's jurisdiction. **Section 3.5** in the Comprehensive ACL Amendment (under review), describes the life history characteristics of these species and discusses the features essential for conservation found in each critical habitat area.

3.3 Human Environment

3.3.1 Economic Environment: Commercial Sector

Additional information on the commercial sector of the snapper grouper fishery is contained in previous or concurrent amendments [Amendment 13C (SAFMC 2006), Amendment 15A (SAFMC 2008a), Amendment 15B (SAFMC 2008b), Amendment 16 (SAFMC 2009a), Amendment 17A (SAFMC 2010a), Amendment 17B (SAFMC 2010b), Regulatory Amendment 9 (SAFMC 2011b), Regulatory Amendment 10 (SAFMC 2011a), and Comprehensive ACL Amendment for the South Atlantic Region (under review)] and is incorporated herein by reference.

The major sources of data summarized in this sub-section include the Federal Logbook System (FLS) and Accumulated Landings System (ALS), with price indices taken from the Bureau of Labor Statistics. Inflation adjusted revenues and prices are reported in 2009 constant dollars. Average prices are calculated from ALS data.

The three key snapper grouper species in this amendment are red grouper, black grouper, and gag, although the specification of reference points and Annual Catch Limit (ACL) pertains only to red grouper.

3.3.1.1 Gear and Fishing Behavior

The commercial snapper grouper fishery utilizes vertical lines, longlines, black sea bass pots/traps, spears, and powerheads (i.e., any device with an explosive charge, usually attached to a speargun, spear, pole, or stick, that fires a projectile upon contact). Vertical lines are used from the North Carolina/Virginia border to the Atlantic side of Key West, Florida. The majority of hook and line fishermen use either electric or hydraulic reels (bandit gear) and generally have 2-4 bandit reels per boat. Historically, the majority of the bandit fleet fished year round for snapper grouper with the only seasonal differences in catch associated with the regulatory spawning season closures in March and April for gag. Recently, Snapper Grouper Amendment 16 implemented a closed season from January through April for shallow water grouper, a commercial quota for vermilion snapper that could result in closures if the spring and/or fall sub-quotas are filled, and established a separate commercial ACL for gag. Snapper Grouper FMP Amendment 17B implemented a ban on possession of several deep-water species in depths of 240 feet. Amendment 17B also established an aggregate ACL for red grouper, black grouper, and gag, with a ban on the commercial possession of shallow water groupers when either the aggregate ACL or gag ACL is projected to be met. Most fluctuations in fishing effort during the open seasons in this fishery are a result of the weather. Trips can be limited during hurricane season and during the winter months from December through March.

Some fishermen stop bandit fishing to target king mackerel when they are running.

The Council allows the use of bottom longlines north of St. Lucie Inlet, Florida in depths greater than 50 fathoms. Bottom longline gear is used to target golden tilefish primarily. Longline boats are typically bigger than bandit boats, their trips are longer, and they cost more to operate because they operate farther offshore. A longline spool generally holds about 15 miles of cable. Longlines are fished from daylight to dark because sea lice eat the flesh of hooked fish at night. Historically, the fishery is operated year long with little or no seasonal fluctuation barring hurricane disruption. However, recent increases in participation have resulted in shorter seasons that close the fishery before summer.

Spears or powerheads are most commonly used off Florida and North Carolina; they are illegal for killing snapper grouper species in South Carolina and in Special Management Zones.

Black sea bass pots are used exclusively to target black sea bass. The pots have mesh size, material, and construction restrictions to facilitate bycatch reduction. All sea bass pots must have a valid identification tag attached and according to permit records maintained by NOAA Fisheries Service, more than 87% of tags in April 2003 were for vessels with homeports in North Carolina. Fishing practices vary by buoy practices, setting/pulling strategies, number of pots set, and length of set, with seasonal variations. The South Carolina pot fishery is mainly a winter fishery with short soak times (in some cases about an hour) and relatively few pots per boat. Most trips are day trips with pots being retrieved before heading to port. The North Carolina pot fishery also is primarily a winter fishery with some fishermen continuing to pot through the summer. North Carolina fishermen tend to use more pots than those in South Carolina. Although most North Carolina trips with sea bass pots last one day, more pots are left to soak for several days than in South Carolina. Many participants in the black sea bass fishery are active in other fisheries, including the recreational charter fishery during the summer months. Many snapper grouper permit holders maintain pots but are not active in the pot fishery.

3.3.1.2 Economic Activity

Estimates of the average annual economic activity (impacts) associated with the commercial harvest of all snapper grouper species and of the three key species in this amendment were derived using the model developed for and applied in NMFS (2009c) and are provided in **Table 3-1**. Business activity for the commercial sector is characterized in the form of full-time equivalent jobs, income impacts (wages, salaries, and self-employed income), and output (sales) impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting.

The estimates of economic activity include the direct effects (effects in the sector where an expenditure is actually made), indirect effects (effects in sectors providing goods and services to directly affected sectors), and induced effects (effects induced by the personal consumption expenditures of employees in the direct and indirectly affected sectors). Estimates are provided for the economic activity associated with the 2005-2009 average commercial dockside (dockside) revenues for all snapper grouper species and for each of the three key species in this amendment. All dollar values are in 2008 dollars in order to be consistent with the economic impact model. As a result, the estimates of average annual dockside revenues may be slightly different than those provided in previous tables depicting commercial revenues, which are in 2009 dollars. Row values should not be added, because the total for snapper grouper already includes red grouper, black grouper and gag.

With dockside revenues being the driving force for modeled economic activities, the results are as expected in terms of the magnitude of activities being directly correlated with the size of the dockside revenues. Among the three species, gag is estimated to result in the largest level of economic activities and black grouper, the smallest.

Table 3-1. Average annual economic activity associated with the harvest of all snapper grouper species, black grouper, gag, and red grouper (2005-2009). All dollar values are in 2008 dollars.

Species	Average Dockside Value (millions)	Total Jobs	Harvester Jobs	Output (Sales) Impacts (millions)	Income Impacts (millions)
All Snapper Grouper	$13.44	2,526	336	$176.91	$75.39
Black Grouper	$0.26	20	5	$1.03	$0.55
Gag	$2.13	400	53	$28.01	$11.94
Red Grouper	$1.18	221	29	$15.51	$6.61

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; economic activity results calculated using the model developed for NMFS (2009a).

3.3.1.3 Landings, Vessels, Dealers, Effort (Trips), Dockside Price, and Dockside Revenue

From 2005 to 2009 (**Table 3-2**), the average inflation-adjusted (2009 dollars) dockside (dockside) price received per gutted pound of snapper grouper landings increased from $2.60 in 2005 to $2.84 in 2007 before declining to $2.61 by 2009, averaging $2.70 over the five year period. From 2005 to 2009, the inflation-adjusted (2009 dollars) annual dockside (dockside) revenues received for snapper grouper landings increased from $12.1 million in 2005 to $15 million in 2007 before declining a bit to $14.8 million by 2009, averaging $13.8 million per year. The recession of 2007-2008 does not appear to have stopped steady growth in snapper grouper landings or in participating vessels, although it may have moderately reduced effort/trips for one year (2008) and likely contributed to lower dockside prices and revenues in 2008 and 2009.

Table 3-2. Snapper grouper landings, vessels, dealers, effort (trips by species), price, and revenue, 2005-2009.

	Year Landed					Average 2005-2009
	2005	2006	2007	2008	2009	
Pounds (Gutted)	5,453,614	5,217,993	5,636,077	6,101,203	6,472,263	5,776,230
Vessels[1]	865	856	897	912	929	892
Dealers	263	306	323	304	309	301
Effort (Trips)[2]	12,809	12,317	13,937	13,881	14,702	13,529
Hook & Line (Trips)[3]	12,207	11,749	13,226	13,390	14,116	12,938
Longline (Trips)[3]	117	143	248	199	257	193
Trap (Trips)[3]	601	755	612	555	747	654
Other (Trips)[3]	1,668	1,570	1,658	1,557	1,747	1,640
Dockside Price (2009 $) per Pound Gutted	$2.60	$2.75	$2.84	$2.70	$2.61	$2.70
Dockside Revenue (2009 $)	$12,125,282	$12,581,212	$15,008,354	$14,567,472	$14,803,406	$13,817,145

[1] May include double-counting of vessels that land snapper grouper in more than one state in a given year.
[2] A single trip using multiple gears is counted only once. A single trip using multiple gears counted in multiple categories, once for each gear.
Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; Bureau of Labor Statistics, price index.

3.3.1.4 Fishery Performance by State

The apparent trend in snapper grouper landings across the various areas is not uniform (**Table 3-3**). Snapper grouper landings in the east coast of Florida and Georgia fell from 2005 to 2006 but steadily rose thereafter. In the west coast of Florida, snapper grouper landings fell each year from 2005 through 2007 but rose in the subsequent years. North Carolina experienced an increase in snapper grouper landings from 2005 through 2008 but a decline in 2009. In South Carolina, snapper grouper landings rose from 2005 through 2007 but fell since then.

The change in the number of trips landing snapper grouper over the period 2005-2009 matched well with the change in landings for each state, except the east coast of Florida and Georgia (**Table 3-4**). For these two areas, the number of trips fluctuated from year to year whereas landings fell or rose for a consecutive number of years in other areas.

The 2005-2009 average price for snapper grouper was highest in South Carolina at $3.14 per pound and lowest in the east coast of Florida and Georgia at $2.39 per pound (**Table 3-5**). In terms of average dockside revenues from snapper grouper, North Carolina ranks first, followed by South Carolina. Note, however, that Florida has been split into the east and west coast for presentation of landings and dockside revenues to present some idea of west coast landings, some of which may possibly come from SA waters.

Table 3-3. Landings (gutted pounds) of snapper grouper by state and year, 2005-2009.

	Year Landed					Average 2005-2009
State Landed:	**2005**	**2006**	**2007**	**2008**	**2009**	
FL (east coast) and GA	1,282,145	1,133,110	1,491,152	1,606,513	1,998,482	1,502,280
FL (west coast)	1,402,262	1,117,701	1,000,608	1,148,555	1,424,174	1,218,660
NC	1,444,859	1,595,626	1,709,500	2,118,081	1,941,698	1,761,953
SC	1,324,348	1,371,556	1,434,817	1,228,053	1,107,909	1,293,337
Total All States	5,453,614	5,217,993	5,636,077	6,101,203	6,472,263	5,776,230

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-4. Number of trips landing snapper grouper by state, 2005-2009.

State Landed:	Year Landed					Average 2005-2009
	2005	**2006**	**2007**	**2008**	**2009**	
FL (east coast) and GA	4,309	4,066	5,347	5,195	5,957	4,975
FL (west coast)	5,397	4,815	4,830	4,886	4,885	4,963
NC	2,288	2,550	2,749	2,886	2,938	2,682
SC	814	886	1,011	914	922	909
Total All States	12,809	12,317	13,937	13,881	14,702	13,529

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-5. Average annual price and dockside revenues of snapper grouper by state, 2005-2009.

State Landed:		Year Landed 2005	2006	2007	2008	2009	Average 2005-2009
FL (east coast) and GA	Deflated Price (2009 $) per Pound Gutted	2.39	2.40	2.50	2.32	2.32	2.39
	Deflated Dockside Revenue (2009 $)	2,362,648	2,383,784	3,751,787	3,406,498	4,189,472	3,218,838
FL (west coast)	Deflated Price (2009 $) per Pound Gutted	2.49	2.65	2.78	2.56	2.43	2.58
	Deflated Dockside Revenue (2009 $)	2,988,509	2,704,610	2,422,232	2,627,941	3,208,701	2,790,399
NC	Deflated Price (2009 $) per Pound Gutted	2.66	2.75	2.95	2.87	2.83	2.81
	Deflated Dockside Revenue (2009 $)	3,320,179	3,786,195	4,559,345	4,988,849	4,324,496	4,195,813
SC	Deflated Price (2009 $) per Pound Gutted	3.08	3.29	3.23	3.13	2.98	3.14
	Deflated Dockside Revenue (2009 $)	3,453,946	3,706,623	4,274,990	3,544,184	3,080,737	3,612,096
Total All States	Deflated Price (2009 $) per Pound Gutted	2.60	2.75	2.84	2.70	2.61	2.70
	Deflated Dockside Revenue (2009 $)	12,125,282	12,581,211	15,008,354	14,567,472	14,803,406	13,817,145

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; Bureau of Labor Statistics, price index.

3.3.1.5 Fishery Performance by Gear

In the following tables, landings and revenues include those from the west coast of Florida.

Hook and line gear is by far the dominant gear type in the harvest of snapper grouper (**Table 3-6**). Traps and longline are the other important gear types in the snapper grouper fishery. It must be noted, however, that traps are mainly used in the harvest of black sea bass. Most of the trips landing snapper grouper have been accounted for by hook and line (**Table 3-7**). In addition, hook and line gear accounted for approximately 87% of the total dockside revenues from snapper grouper (**Table 3-8**).

Table 3-6. Average annual landings (gutted pounds) of snapper grouper by major gear type (2005-2009).

Gear Type:	Year Landed					Average 2005-2009
	2005	2006	2007	2008	2009	
Hook & Line	4,795,175	4,405,848	5,003,711	5,429,731	5,638,439	5,054,581
Longline	233,020	331,461	245,624	279,312	290,667	276,017
Trap	338,057	398,380	311,153	332,159	475,943	371,138
Other[1]	87,362	82,305	75,590	60,002	67,214	74,495
Total All Gears	5,453,614	5,217,994	5,636,078	6,101,204	6,472,263	5,776,230

[1]Powerheads are included in "Other" gear category
Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-7. Number of trips landing snapper grouper by gear (2005-2009).

Gear Type:	Year Landed					Average 2005-2009
	2005	2006	2007	2008	2009	
Hook & Line[1]	12,207	11,749	13,226	13,390	14,116	12,938
Longline[1]	117	143	248	199	257	193
Trap[1]	601	755	612	555	747	654
Other[1]	1,668	1,570	1,658	1,557	1,747	1,640
All Gears[2]	12,809	12,317	13,937	13,881	14,702	13,529

[1] A single trip using multiple gears is counted in multiple categories, once for each gear. As a result, adding trips across the individual gears gives a value larger than the "All Gears" value for the year.
[2] A single trip using multiple gears is counted only once in the "All Gears" results.
Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-8. Average annual price and dockside revenue of snapper grouper by gear and year, 2005-2009.

Gear Type:		Year Landed 2005	2006	2007	2008	2009	Average 2005-2009
Hook & Line	Deflated Price (2009 $) per Pound Gutted	2.61	2.75	2.84	2.71	2.61	2.70
	Deflated Dockside Revenue (2009 $)	10,631,128	10,691,781	13,274,715	12,877,740	12,731,912	12,041,455
Longline	Deflated Price (2009 $) per Pound Gutted	2.72	2.69	2.83	2.58	2.49	2.66
	Deflated Dockside Revenue (2009 $)	477,042	607,076	626,441	675,840	666,470	610,574
Trap	Deflated Price (2009 $) per Pound Gutted	2.41	2.72	2.92	2.63	2.61	2.66
	Deflated Dockside Revenue (2009 $)	805,346	1,080,289	898,018	868,121	1,235,720	977,499
Other	Deflated Price (2009 $) per Pound Gutted	2.39	2.64	2.82	2.55	2.55	2.59
	Deflated Dockside Revenue (2009 $)	211,766	202,065	209,180	145,771	169,304	187,617
Total All Gears	Deflated Price (2009 $) per Pound Gutted	2.60	2.75	2.84	2.70	2.61	2.70
	Deflated Dockside Revenue (2009 $)	12,125,282	12,581,211	15,008,354	14,567,472	14,803,406	13,817,145

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; Bureau of Labor Statistics, price index.

3.3.1.6 Fishery Performance by Species

The discussion below focuses mainly on the three key species affected by this amendment: black grouper, gag, and red grouper.

Black Grouper

Black grouper landings are broadly distributed from North Carolina to Florida, including the west coast of Florida (**Tables 3-9 and 3-10**). From 2005 to 2009, black grouper landings averaged 127,000 lbs gutted weight per year but have been declining since 2007. Approximately 281 vessels landed black grouper, and effort averaged 1,283 trips per year. From 2005 to 2009, the dockside price (2009 dollars) per gutted pound of black grouper has been generally increasing, averaging $3.80. From 2005 to 2009, the dockside revenues (2009 dollars) received for black grouper varied around an average value of $196,000 with higher prices in some years offset by lower landings (**Tables 3-9 and 3-10**).

Table 3-9. Number of vessels, dealers, and trips landing black grouper, by state (2005-2009).

						Average
Vessels	**2005**	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	72	68	68	53	55	63
FL (west)	186	163	162	151	115	155
NC	49	50	42	44	51	47
SC	10	12	19	16	21	16
						Average
Dealers	**2005**	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	39	46	43	40	37	41
FL (west)	39	52	47	48	45	46
NC	28	34	26	25	35	30
SC	3	5	8	7	9	6
						Average
Trips	**2005**	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	200	177	198	152	167	179
FL (west)	1,128	762	875	581	446	758
NC	327	282	206	217	195	245
SC	68	107	137	105	85	100
Total All States	1,723	1,328	1,416	1,055	893	1,283

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-10. Landings (gutted pounds), average annual dockside prices, and dockside revenues for black grouper, 2005-2009.

			Year Landed					Average 2005-2009
			2005	2006	2007	2008	2009	
State Landed:								
FL (east coast) and GA	**Pounds Gutted Weight**		20,089	14,516	26,301	14,260	11,684	17,370
	Deflated Price (2009 $) per Gutted Pound		3.70	3.87	4.18	4.24	4.30	4.06
	Deflated Dockside Revenue (2009 $)		37,406	34,797	47,564	42,297	33,339	39,081
FL (west coast)	**Pounds Gutted Weight**		70,163	35,434	45,898	21,374	15,568	37,687
	Deflated Price (2009 $) per Gutted Pound		3.39	3.65	3.89	3.78	3.89	3.72
	Deflated Dockside Revenue (2009 $)		237,558	129,426	178,499	80,899	60,575	137,391
NC	**Pounds Gutted Weight**		49,479	52,108	25,546	25,325	18,038	34,099
	Deflated Price (2009 $) per Gutted Pound		---	---	---	---	---	---
	Deflated Dockside Revenue (2009 $)		---	---	---	---	---	---
SC	**Pounds Gutted Weight**		26,190	41,799	63,278	35,525	20,244	37,407
	Deflated Price (2009 $) per Gutted Pound		---	---	---	---	4.78	4.78
	Deflated Dockside Revenue (2009 $)		---	---	---	---	96,833	96,833
All States Combined	**Pounds Gutted Weight**		165,921	143,857	161,023	96,484	65,533	126,563
	Deflated Price (2009 $) per Gutted Pound		3.43	3.69	3.94	3.86	4.09	3.80
	Deflated Dockside Revenue (2009 $)		274,964	164,223	226,063	123,197	190,747	195,839

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; Bureau of Labor Statistics, price index.

Gag

Gag landings are broadly distributed from North Carolina to Florida (**Tables 3-11** and **3-12**). Gag landings peaked in 2007 at 516,000 lbs gutted weight but declined to about 380,000 lbs in 2008 and 2009. Landings averaged 433,000 lbs annually over the period 2005-2009. Approximately 395 vessels landed gag, and effort averaged 2,270 trips per year. From 2005 to 2009, the dockside price (2009 dollars) per gutted pound of gag landings increased from $3.82 in 2005 to $4.25 in 2009, averaging $4.13 over the period. From 2005 to 2009, the dockside revenues (2009 dollars) received for gag peaked at $2.28 million in 2007 and declined thereafter, averaging $1.79 million per year over the five-year period.

Table 3-11. Number of vessels, dealers, and trips landing gag, by state (2005-2009).

Vessels						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	138	108	123	111	119	120
FL (west)	36	18	34	21	13	24
NC	87	90	102	114	118	102
SC	47	48	53	49	47	49
Dealers						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	57	56	62	51	52	56
FL (west)	18	14	24	16	11	17
NC	39	45	47	51	50	46
SC	17	18	24	20	19	20
Trips						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	730	601	865	701	808	741
FL (west)	51	26	59	25	19	36
NC	954	962	1,045	1,001	1,041	1,001
SC	464	492	534	494	493	495
Total All States	2,199	2,081	2,503	2,221	2,361	2,273

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-12. Landings (gutted pounds), average annual dockside prices, and dockside revenues for gag, 2005-2009.

State Landed:		Year Landed 2005	2006	2007	2008	2009	Average 2005-2009
FL (east coast) and GA	Pounds Gutted Weight	125,743	115,501	185,408	126,514	121,066	134,846
	Deflated Price (2009 $) per Gutted Pound	3.82	4.13	4.22	4.28	4.29	4.15
	Deflated Dockside Revenue (2009 $)	399,567	400,699	775,527	490,663	478,048	508,901
FL (west coast)	Pounds Gutted Weight	1,068	1,006	3,593	499	320	1,297
	Deflated Price (2009 $) per Gutted Pound	3.41	3.63	3.96	3.91	3.94	3.77
	Deflated Dockside Revenue (2009 $)	3,646	3,652	14,245	1,951	1,261	4,951
NC	Pounds Gutted Weight	148,033	130,634	122,322	110,926	143,708	131,125
	Deflated Price (2009 $) per Gutted Pound	3.59	3.69	3.97	4.03	3.91	3.84
	Deflated Dockside Revenue (2009 $)	531,713	481,684	485,119	447,052	562,597	501,633
SC	Pounds Gutted Weight	183,257	173,208	204,511	148,845	116,502	165,265
	Deflated Price (2009 $) per Gutted Pound	4.34	4.57	4.89	4.94	4.89	4.73
	Deflated Dockside Revenue (2009 $)	795,140	791,156	1,000,489	735,146	569,992	778,385
All States Combined	Pounds Gutted Weight	458,100	420,350	515,834	386,784	381,597	432,533
	Deflated Price (2009 $) per Gutted Pound	3.82	4.02	4.25	4.31	4.25	4.13
	Deflated Dockside Revenue (2009 $)	1,730,068	1,677,191	2,275,380	1,674,812	1,611,898	1,793,870

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; Bureau of Labor Statistics, price index.

Red Grouper

Approximately 369 vessels landed red grouper, and effort averaged 2,650 trips per year (**Table 3-13**). Red grouper landings are broadly distributed from North Carolina to Florida, with North Carolina consistently showing the largest landings (**Table 3-14**). Red grouper landings peaked in 2008 at 499,202 lbs gutted weight and were lowest in 2005 at 169,994 lbs gutted weight. Landings averaged 346,000 lbs annually over the period 2005-2009. From 2005 to 2009, the dockside price (2009 dollars) per gutted pound of red grouper landings increased from $2.85 in 2005 to $3.41 in 2007, averaging $3.18 over the period. From 2005 to 2009, the dockside revenues (2009 dollars) received for red grouper peaked at $1.62 million in 2007 and declined thereafter, averaging $1.10 million per year over the five-year period (**Table 3-14**).

Table 3-13. Number of vessels, dealers, and trips landing red grouper, by state (2005-2009).

Vessels						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	114	87	96	91	66	91
FL (west)	153	122	122	107	91	119
NC	88	95	128	127	124	112
SC	42	49	54	46	44	47
TOTAL						369
Dealers						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	57	49	45	46	28	45
FL (west)	36	35	39	35	33	36
NC	39	45	53	57	54	50
SC	11	16	20	17	17	16
TOTAL						**147**
Trips						**Average**
	2005	**2006**	**2007**	**2008**	**2009**	**2005-2009**
FL (east) and GA	445	370	451	359	317	390
FL (west)	683	420	455	350	325	447
NC	1,020	1,172	1,484	1,512	1,131	1,264
SC	404	551	652	604	533	549
Total All States	2,552	2,513	3,052	2,825	2,306	2,650

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases.

Table 3-14. Landings (gutted pounds), average annual dockside prices, and dockside revenues for red grouper, 2005-2009.

		Year Landed					Average 2005-2009
		2005	2006	2007	2008	2009	
State Landed:							
FL (east coast) and GA	**Pounds Gutted Weight**	13,410	11,725	15,510	11,943	15,503	13,618
	Deflated Price (2009 $) per Gutted Pound	3.04	3.27	3.35	3.24	3.22	3.22
	Deflated Dockside Revenue (2009 $)	31,671	31,108	42,075	24,249	25,166	30,854
FL (west coast)	**Pounds Gutted Weight**	20,615	12,443	12,982	8,618	7,377	12,407
	Deflated Price (2009 $) per Gutted Pound	2.71	2.98	3.09	2.84	2.82	2.89
	Deflated Dockside Revenue (2009 $)	55,950	37,070	40,165	24,459	20,808	35,690
NC	**Pounds Gutted Weight**	101,644	170,921	319,375	339,597	207,086	227,725
	Deflated Price (2009 $) per Gutted Pound	2.87	3.06	3.21	3.06	3.08	3.06
	Deflated Dockside Revenue (2009 $)	291,333	523,564	1,025,492	1,038,127	638,433	703,390
SC	**Pounds Gutted Weight**	34,325	72,234	124,559	139,044	90,059	92,044
	Deflated Price (2009 $) per Gutted Pound	---	3.85	4.11	3.76	3.71	3.86
	Deflated Dockside Revenue (2009 $)	---	277,760	512,309	522,817	334,328	411,804
All States Combined	**Pounds Gutted Weight**	169,994	267,323	472,427	499,202	320,025	345,794
	Deflated Price (2009 $) per Gutted Pound	2.85	3.25	3.41	3.20	3.21	3.18
	Deflated Dockside Revenue (2009 $)	378,954	869,501	1,620,040	1,609,652	1,018,735	1,099,376

Source: NOAA Fisheries Service, Southeast Science Center logbook and accumulated landings system databases; Bureau of Labor Statistics, price index.

3.3.1.7 Imports

NOAA Fisheries Service purchases fisheries trade data from the Foreign Trade Division of the U.S. Census Bureau. Data are available for download at http://www.st.nmfs.noaa.gov/st1/trade/index.html. The list of product codes relevant to this data request includes fresh and frozen snappers, fresh and frozen groupers. See the drop-down menu for products at http://www.st.nmfs.noaa.gov/st1/trade/build_a_database/TradeSelectDateProduct.html).

Data are summarized from 1991-2009. Imports are tabulated in thousands of pounds, product weight. Import values are tabulated in thousands of current year dollars and constant 2009 dollars.

Imports of fresh snappers increased from approximately 10.8 million lbs (product weight) worth $16.0 million (current dollars) in 1991 to 21.5 million lbs worth $49.4 million in 2009 (**Figure 3-2**). Imports peaked at 29 million lbs worth $60.2 million in 2007 before declining in 2008 and 2009. The recent decline in imports probably is linked to the general slow-down of economic activity in the U.S. Imports of fresh snapper primarily originated in Mexico, Central America, or South America, and entered the U.S. through the port of Miami. On average from 2005-2009, imports were above average during the months of March, April and May, and below average in November, December and January.

Imports of frozen snappers were relatively minor from 1991 through 1999, and ranged from 1.4 million lbs (product weight) worth $1.9 million (current dollars) in 1995 to 2.9 million lbs worth $4.0 million in 1998 (**Figure 3-2**). However, imports doubled from 1999 to 2000 and increased to a peak of 12.7 million lbs worth $19.4 million in 2005. Imports remained relatively steady through 2007 and then declined to 8.1 million lbs worth $15.9 million in 2009. Imports of frozen snappers primarily originated in Brazil and entered the U.S. through the port of Miami, or originated from Indonesia and entered the U.S. through New York or Los Angeles. Imports of frozen snappers tend to be greatest during December and January and lowest in March, April and May.

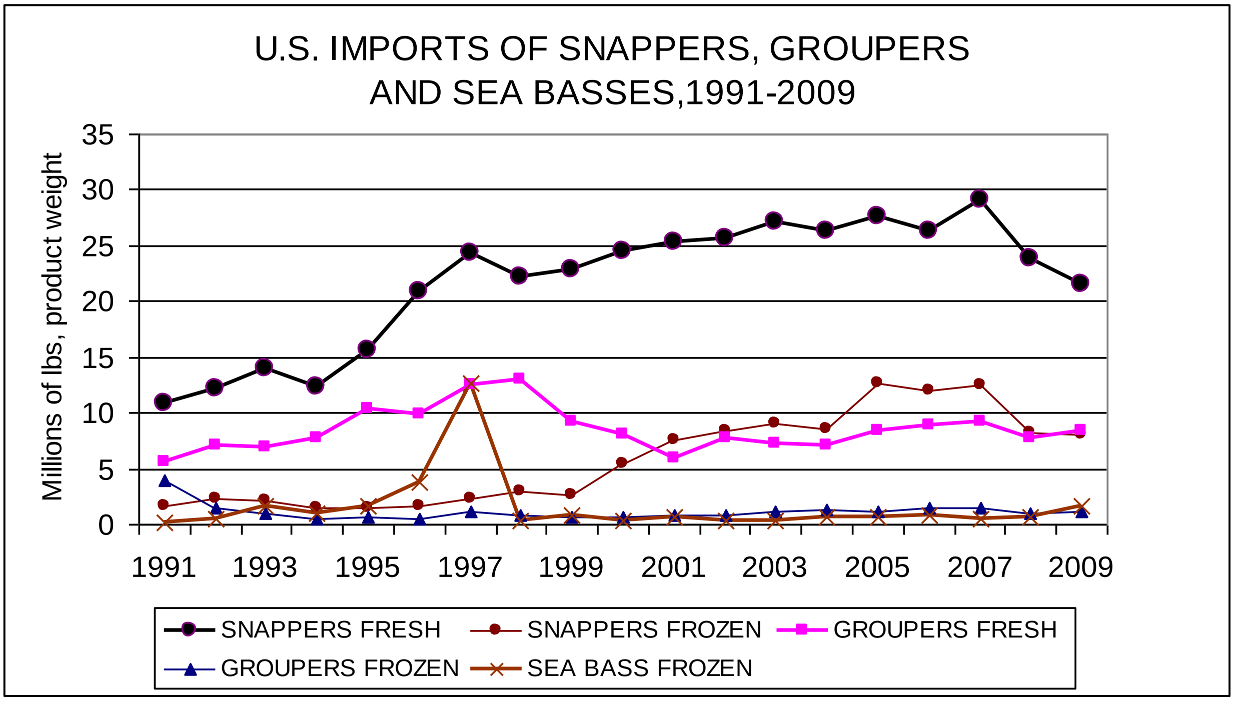


Figure 3-2. Imports relevant to the South Atlantic Snapper Grouper Fishery Management Plan.

Imports of fresh groupers increased from 5.6 million lbs (product weight) worth $6.1 million (current dollars) in 1991 to a peak of 12.9 million lbs worth $18.6 million in 1998 (**Figure 3-2**). Imports have remained relatively steady since 1999, with an annual average of 8 million lbs worth $18.1 million. Imports generally originated in Mexico, and in Panama to a much lesser extent, and entered the U.S. through Miami. Prior to 2006, imports of fresh groupers were above average in March and April and below average in October and November. However, imports in March have declined significantly since 2006.

Imports of frozen grouper were relatively minor, and averaged 1 million lbs worth $1.6 million since 2006 (**Figure 3-2**). Imports generally originated in Mexico or Asia, and entered the U.S. in Miami, Tampa or San Juan. On average from 2006-2009, imports of frozen groupers were above average from December through April and below average from June through August.

3.3.2 Economic Environment: Recreational Sector

The recreational sector of the snapper grouper fishery is comprised of the private sector and for-hire sector. The private sector includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire sector is composed of the charterboat and headboat (also called partyboat) sectors. Charterboats generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers and payment is per person.

3.3.2.1 Harvest

More detailed recreational harvest information on snapper grouper species in the South Atlantic is provided in the Comprehensive ACL Amendment (under review) and is incorporated herein by reference. A summary of the three key species affected by this amendment is presented below. Average recreational harvests of black grouper, gag, and red grouper for the period 2005-2009 are presented in **Tables 3-15** through **3-20**.

Only Florida and South Carolina recorded harvests of black grouper but all states recorded landings of gag and red grouper (**Table 3-15**). Florida is the dominant state in the harvest of black grouper and gag. North Carolina, on the other hand, registered the largest harvest of red grouper. Total recreational harvests of gag and red grouper are close to each other, and harvests of each of these two species far exceed those of black grouper.

Table 3-15. Annual recreational harvest (lbs whole weight) of black grouper, gag and red grouper in the South Atlantic, across all modes (2005-2009).

Year	State				
	Florida	Georgia	South Carolina	North Carolina	Total
Black Grouper					
2005	97,414	0	539	0	97,953
2006	41,091	0	0	0	41,091
2007	70,800	0	0	0	70,800
2008	40,557	0	0	0	40,557
2009	105,554	0	0	0	105,554
Average	71,083	0	108	0	71,191
Gag					
2005	330,585	20,270	26,086	221,030	597,972
2006	252,967	13,810	19,178	250,213	536,168
2007	287,915	5,054	76,384	211,393	580,745
2008	482,857	22,905	8,653	130,641	645,056
2009	203,751	1,904	22,163	87,376	315,193
Average	311,615	12,788	30,493	180,131	535,027
Red Grouper					
2005	140,576	23	1,743	156,775	299,116
2006	76,518	124	10,109	418,560	505,311
2007	213,361	106	32,144	388,322	633,933
2008	70,707	30	2,408	1,025,996	1,099,141
2009	97,845	38	9,224	176,458	283,565
Average	119,801	64	11,126	433,222	564,213

Source: MRFSS, Headboat Survey, NOAA Fisheries, NMFS, SERO.

Harvest through the private mode exceeded the combined harvests of the other modes for all three species (**Table 3-16**). Headboats recorded the second largest harvest of black grouper while the charter mode recorded the second largest harvests of gag and red grouper. Harvest of the three species from shore is relatively small.

Table 3-16. Annual recreational harvest of black grouper, gag, and red grouper in the South Atlantic, across all states (2005-2009).

Year	Mode				
	Shore	Headboat	Charter	Private	Total
Black Grouper					
2005	0	22,912	3,237	71,805	97,953
2006	0	16,471	0	24,620	41,091
2007	0	16,865	2,889	51,047	70,800
2008	0	3,164	2,892	34,501	40,557
2009	0	2,478	4,316	98,760	105,554
Average	0	12,378	2,667	56,147	71,191
Gag					
2005	0	84,650	143,448	369,874	597,972
2006	0	54,914	110,863	370,391	536,168
2007	13,848	78,803	105,946	382,148	580,745
2008	27,675	39,106	64,678	513,597	645,056
2009	7,019	31,556	53,736	222,882	315,193
Average	9,708	57,806	95,734	371,778	535,027
Red Grouper					
2005	0	75,452	27,547	196,117	299,116
2006	0	33,244	53,674	418,393	505,311
2007	7,834	43,651	91,964	490,484	633,933
2008	0	20,786	70,114	1,008,242	1,099,141
2009	0	15,693	12,037	255,836	283,565
Average	1,567	37,765	51,067	473,814	564,213

Source: MRFSS, Headboat Survey, NOAA Fisheries, NMFS, SERO.

In Florida, the private mode dominated the harvest of the three species (**Table 3-17**). The charter and headboat modes are nonetheless important in the harvests of gag, with headboats being relatively important in the harvest of red grouper.

In Georgia, all fishing modes recorded no harvest of black grouper and only the headboat mode recorded a very small harvest of red grouper (**Table 3-18**). The shore mode also recorded no harvest of gag while the other three modes recorded very small harvest of gag.

North Carolina recorded no harvest of black grouper but is relatively important in the harvest of gag and red grouper (**Table 3-19**). The private mode recorded most of the harvest of gag and red grouper in the state. The headboat mode recorded the second largest harvest of gag but the charter mode is second in the harvest of red grouper.

In South Carolina, the headboat mode recorded the largest harvest of gag and the private mode, the largest harvest of red grouper (**Table 3-20**). Harvest of black grouper in the state has been very minimal, with only the charter mode recording harvest of this species.

Table 3-17. Annual recreational harvest of black grouper, gag, and red grouper in Florida (2005-2009).

Year	Mode				
	Shore	Headboat	Charter	Private	Total
Black Grouper					
2005	0	22,912	2,698	71,805	97,414
2006	0	16,471	0	24,620	41,091
2007	0	16,865	2,889	51,047	70,800
2008	0	3,164	2,892	34,501	40,557
2009	0	2,478	4,316	98,760	105,554
Average	0	12,378	2,559	56,147	71,083
Gag					
2005	0	51,313	101,835	177,437	330,585
2006	0	22,260	89,694	141,013	252,967
2007	13,848	34,013	63,776	176,278	287,915
2008	27,675	20,652	51,798	382,733	482,857
2009	0	17,235	38,329	148,187	203,751
Average	8,305	29,095	69,086	205,130	311,615
Red Grouper					
2005	0	56,061	6,107	78,408	140,576
2006	0	18,461	13,842	44,215	76,518
2007	7,834	14,678	7,824	183,025	213,361
2008	0	9,047	5,749	55,911	70,707
2009	0	9,056	3,650	85,139	97,845
Average	1,567	21,461	7,434	89,340	119,801

Source: MRFSS, Headboat Survey, NOAA Fisheries, NMFS, SERO.

Table 3-18. Annual recreational harvest of black grouper, gag, and red grouper in Georgia (2005-2009).

Year	Mode				
	Shore	Headboat	Charter	Private	Total
Black Grouper					
2005	0	0	0	0	0
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	0	0	0	0
Average	0	0	0	0	0
Gag					
2005	0	1,086	8,130	11,054	20,270
2006	0	772	7,212	5,825	13,810
2007	0	425	4,629	0	5,054
2008	0	1,025	1,767	20,113	22,905
2009	0	699	1,205	0	1,904
Average	0	801	4,589	7,398	12,788
Red Grouper					
2005	0	23	0	0	23
2006	0	124	0	0	124
2007	0	106	0	0	106
2008	0	30	0	0	30
2009	0	38	0	0	38
Average	0	64	0	0	64

Source: MRFSS, Headboat Survey, NOAA Fisheries, NMFS, SERO.

Table 3-19. Annual recreational harvest of black grouper, gag, and red grouper in North Carolina (2005-2009).

Year	Mode				
	Shore	Headboat	Charter	Private	Total
Black Grouper					
2005	0	0	0	0	0
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	0	0	0	0
Average	0	0	0	0	0
Gag					
2005	0	24,029	15,619	181,383	221,030
2006	0	18,676	11,808	219,729	250,213
2007	0	18,654	25,902	166,837	211,393
2008	0	9,777	10,112	110,752	130,641
2009	7,019	8,010	4,529	67,818	87,376
Average	1,404	15,829	13,594	149,304	180,131
Red Grouper					
2005	0	17,625	21,440	117,709	156,775
2006	0	11,301	36,022	371,237	418,560
2007	0	21,408	84,140	282,774	388,322
2008	0	9,606	64,060	952,330	1,025,996
2009	0	5,716	8,387	162,356	176,458
Average	0	13,131	42,810	377,281	433,222

Source: MRFSS, Headboat Survey, NOAA Fisheries, NMFS, SERO.

Table 3-20. Annual recreational harvest of black grouper, gag, and red grouper in South Carolina, 2005-2009.

Year	Mode				
	Shore	Headboat	Charter	Private	Total
Black Grouper					
2005	0	0	539	0	539
2006	0	0	0	0	0
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	0	0	0	0
Average	0	0	108	0	108
Gag					
2005	0	8,222	17,864	0	26,086
2006	0	13,206	2,149	3,823	19,178
2007	0	25,711	11,640	39,033	76,384
2008	0	7,652	1,001	0	8,653
2009	0	5,611	9,674	6,878	22,163
Average	0	12,080	8,466	9,947	30,493
Red Grouper					
2005	0	1,743	0	0	1,743
2006	0	3,358	3,810	2,941	10,109
2007	0	7,459	0	24,685	32,144
2008	0	2,103	305	0	2,408
2009	0	884	0	8,340	9,224
Average	0	3,109	823	7,193	11,126

Source: MRFSS, Headboat Survey, NOAA Fisheries, NMFS, SERO.

3.3.2.2 Effort

Recreational effort derived from the Marine Recreational Fisheries Statistical Survey (MRFSS) database can be characterized in terms of the number of trips as follows:

1. Target effort - The number of individual angler trips, regardless of trip duration, where the intercepted angler indicated that the snapper grouper species was targeted as either the first or the second primary target for the trip. The snapper grouper species did not have to be caught.
2. Catch effort - The number of individual angler trips, regardless of trip duration and target intent, where the individual snapper grouper species was caught. The fish caught did not have to be kept.
3. All recreational trips - The total estimated number of recreational trips taken, regardless of target intent or catch success.

Estimates of average annual recreational effort during 2005-2009 for the snapper grouper species addressed in this amendment are provided in **Tables 3-21** through **3-28**. In each table, where appropriate, the "total" refers to the total number of target or catch trips while "all trips" refers to the total number of trips across all snapper grouper species regardless of target intent or catch success.

As might be expected, Florida dominates by far the other South Atlantic states in terms of the number of target or catch trips for each of the three species and for all snapper grouper species combined (**Tables 3-21** and **3-22**). This perfectly correlates with the dominance of Florida in the harvest of snapper grouper species. In terms of catch trips, North Carolina places second to Florida for all snapper grouper species and for each of the three subject species. However, South Carolina places second to Florida in terms of target trips for all snapper grouper species and closely exceeds North Carolina in terms of target trips for gag. Among the three subject species, gag displays a fair amount of target and catch trips in all states. Both target and catch trips are relatively small for red grouper and black grouper in all states, except perhaps Florida.

Table 3-21. Annual snapper grouper recreational target effort (in numbers of trips) in the South Atlantic, across all modes (2005-2009).

Year/Period	State				
	Florida	Georgia	South Carolina	North Carolina	Total
All Snapper Grouper					
Average (2005-09)	733,902	30,527	109,565	92,356	966,350
Black Grouper					
2005	1,355	0	0	0	1,355
2006	0	0	0	0	0
2007	1,309	0	0	0	1,309
2008	1,824	0	0	0	1,824
2009	1,191	0	0	0	1,191
Average	1,136	0	0	0	1,136
Gag					
2005	24,602	0	0	0	24,602
2006	20,348	166	0	2,401	22,915
2007	36,222	0	3,537	2,370	42,129
2008	55,495	0	3,130	953	59,578
2009	41,216	0	0	0	41,216
Average	35,577	33	1,333	1,145	38,088
Red Grouper					
2005	1,927	0	0	0	1,927
2006	0	0	0	0	0
2007	2,310	0	0	2,370	4,680
2008	6,125	0	0	0	6,125
2009	6,439	0	0	0	6,439
Average	3,360	0	0	474	3,834

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

Table 3-22. Annual snapper grouper recreational catch effort (in numbers of trips) in the South Atlantic, across all modes (2005-2009).

Year/Period	State				
	Florida	Georgia	South Carolina	North Carolina	Total
All Snapper Grouper					
Average (2005-09)	3,152,035	123,122	221,684	461,860	3,958,701
Black Grouper					
2005	12,893	0	125	0	13,018
2006	8,636	0	0	0	8,636
2007	19,925	0	0	0	19,925
2008	23,944	0	0	0	23,944
2009	17,722	0	0	0	17,722
Average	16624	0	25	0	16,649
Gag					
2005	78,402	2,485	1,153	15,237	97,277
2006	77,523	3,338	913	16,928	98,702
2007	110,360	702	11,045	27,797	149,904
2008	116,190	8,361	5,874	18,323	148,748
2009	72,211	346	6,912	12,446	91,915
Average	90,937	3,046	5,179	18,146	117,309
Red Grouper					
2005	101,639	23	0	13,528	115,190
2006	68,365	0	674	23,285	92,324
2007	24,561	0	4,076	21,012	49,649
2008	35,523	0	64	26,923	62,510
2009	63,609	0	727	12,025	76,361
Average	58,739	5	1,108	19,355	79,207

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

The private mode is the dominant fishing mode for snapper grouper target or catch trips as well as for each of the three subject species (**Tables 3-23** and **3-24**). Catch and target trips for the private mode exceeded the combined trips for the other modes. The shore mode recorded higher target and catch trips than the charter mode for all snapper grouper species and for black grouper and gag. Charter target and catch trips, however, were not so far behind those of the shore mode. For red grouper, charter target and catch trips substantially exceed those of the shore mode.

Table 3-23. Annual snapper grouper recreational target effort (in numbers of trips) by mode in the South Atlantic, across all states (2005-2009).

Year/Period	Mode			
	Shore	Charter	Private	Total
All Snapper Grouper				
Average (2005-09)	269,576	39,122	657,652	966,350
Black Grouper				
2005	887	0	468	1,355
2006	0	0	0	0
2007	0	0	1,309	1,309
2008	0	0	1,824	1,824
2009	0	0	1,191	1,191
Average	177	0	958	1,136
Gag				
2005	4,313	0	20,289	24,602
2006	0	1,904	21,011	22,915
2007	1,305	2,767	38,057	42,129
2008	1,387	1,428	56,763	59,578
2009	850	0	40,366	41,216
Average	1,571	1,220	35,297	38,088
Red Grouper				
2005	887	0	1,040	1,927
2006	0	0	0	0
2007	0	0	4,680	4,680
2008	0	0	6,125	6,125
2009	0	0	6,439	6,439
Average	177	0	3,657	3,834

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

Table 3-24. Annual snapper grouper recreational catch effort (in numbers of trips) by mode in the South Atlantic, across all states (2005-2009).

Year/Period	Mode			
	Shore	Charter	Private	Total
All Snapper Grouper				
Average (2005-09)	1,231,647	134,665	2,592,389	3,958,701
Black Grouper				
2005	0	1,443	11,575	13,018
2006	1,613	0	7,024	8,637
2007	2,043	678	17,204	19,925
2008	1,078	699	22,167	23,944
2009	2,572	389	14,761	17,722
Average	1,461	642	14,546	16,649
Gag				
2005	11,609	11,976	73,692	97,277
2006	5,089	7,619	85,993	98,701
2007	16,472	6,231	127,200	149,903
2008	10,189	5,540	133,019	148,748
2009	11,245	7,456	73,214	91,915
Average	10,921	7,764	98,624	117,309
Red Grouper				
2005	3,306	15,848	96,036	115,190
2006	1,381	10,234	80,709	92,324
2007	1,188	8,704	39,756	49,648
2008	0	7,798	54,712	62,510
2009	0	11,871	64,490	76,361
Average	1,175	10,891	67,141	79,207

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

In all states in the South Atlantic, the private mode dominates in both target and catch trips (**Tables 3-25 to 3-28**). The charter mode in Florida registered catch trips for all three subject species, but had no target trips for black grouper and red grouper (**Table 3-25**). The other two modes recorded both target and catch trips for all three subject species.

There are no target or catch trips recorded for black grouper in Georgia (**Table 3-26**). This absence of either target or catch trips is also true for red grouper (only the charter mode recorded very minimal catch trips). Target and catch trips for gag are relatively small compared to those of the other states.

As with Georgia, North Carolina recorded no target or catch trips for black grouper (**Table 3-27**). Catch trips for gag and red grouper are relatively important in North Carolina, but the number of target trips for these two species is relatively small. In fact, there are no recorded target trips for red grouper by all modes. Also, there is an absence of recorded shore or charter target trips for gag as well as shore or charter target trips for red grouper.

As with Georgia and North Carolina, South Carolina recorded no target or catch trips for black grouper (**Table 3-28**). There are also no recorded target trips for red grouper in the state, and catch trips for red grouper are relatively small.

Table 3-25. Annual snapper grouper recreational effort (in numbers of trips) in Florida (2005-2009).

Year/Period	Shore		Charter		Private		Total	
	Target	Catch	Target	Catch	Target	Catch	Target	Catch
All Snapper Grouper								
Average (2005-09)	225,948	1,056,735	32,165	76,089	475,789	2,019,211	733,902	3,152,035
Black Grouper								
2005	887	0	0	1,443	468	11,575	1,355	13,018
2006	0	1,613	0	0	0	7,024	0	8,637
2007	0	2,043	0	678	1,309	17,204	1,309	19,925
2008	0	1,078	0	699	1,824	22,167	1,824	23,944
2009	0	2,572	0	389	1,191	14,761	1,191	17,722
Average	177	1,461	0	642	958	14,546	1,136	16,649
Gag								
2005	4,313	11,609	0	7,288	20,289	59,505	24,602	78,402
2006	0	5,089	1,738	3,458	18,610	68,976	20,348	77,523
2007	1,305	13,863	2,767	2,505	32,150	93,991	36,222	110,359
2008	1,387	8,088	1,057	2,750	53,051	105,352	55,495	116,190
2009	850	9,863	0	2,994	40,366	59,354	41,216	72,211
Average	1,571	9,702	1,112	3,799	32,893	77,436	35,577	90,937
Red Grouper								
2005	887	3,306	0	11,330	1,040	87,003	1,927	101,639
2006	0	1,381	0	4,873	0	62,110	0	68,364
2007	0	1,188	0	1,154	2,310	22,219	2,310	24,561
2008	0	0	0	1,101	6,125	34,423	6,125	35,524
2009	0	0	0	10,429	6,439	53,181	6,439	63,610
Average	177	1,175	0	5,777	3,183	51,787	3,360	58,740

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

Table 3-26. Annual snapper grouper recreational effort (in numbers of trips) in Georgia (2005-2009).

Year/Period	Shore		Charter		Private		Total	
	Target	Catch	Target	Catch	Target	Catch	Target	Catch
All Snapper Grouper								
Average (2005-09)	7,361	33,213	920	8,746	22,246	81,163	30,527	123,122
Black Grouper								
2005	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0
Gag								
2005	0	0	0	836	0	1,649	0	2,485
2006	0	0	166	2,188	0	1,150	166	3,338
2007	0	0	0	241	0	461	0	702
2008	0	499	0	139	0	7,723	0	8,361
2009	0	0	0	346	0	0	0	346
Average	0	100	33	750	0	2,197	33	3,046
Red Grouper								
2005	0	0	0	23	0	0	0	23
2006	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
Average	0	0	0	5	0	0	0	5

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

Table 3-27. Annual snapper grouper recreational effort (in numbers of trips) in North Carolina (2005-2009).

Year/Period	Shore		Charter		Private		Total	
	Target	Catch	Target	Catch	Target	Catch	Target	Catch
All Snapper Grouper								
Average (2005-09)	25,429	114,539	1,660	32,234	65,266	315,087	92,356	461,860
Black Grouper								
2005	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0
Gag								
2005	0	0	0	2,699	0	12,538	0	15,237
2006	0	0	0	1,425	2,401	15,503	2,401	16,928
2007	0	1,628	0	2,194	2,370	23,975	2,370	27,797
2008	0	1,602	0	1,880	953	14,841	953	18,323
2009	0	1,382	0	922	0	10,142	0	12,446
Average	0	922	0	1,824	1,145	15,400	1,145	18,146
Red Grouper								
2005	0	0	0	4,494	0	9,033	0	13,527
2006	0	0	0	5,052	0	18,234	0	23,286
2007	0	0	0	7,551	2,370	13,461	2,370	21,012
2008	0	0	0	6,634	0	20,289	0	26,923
2009	0	0	0	1,443	0	10,582	0	12,025
Average	0	0	0	5,035	474	14,320	474	19,355

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

Table 3-28. Annual snapper grouper recreational effort (in numbers of trips) in South Carolina (2005-2009).

Year/Period	Shore		Charter		Private		Total	
	Target	Catch	Target	Catch	Target	Catch	Target	Catch
All Snapper Grouper								
Average (2005-09)	10,837	27,160	4,377	17,596	94,351	176,928	109,565	221,684
Black Grouper								
2005	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
Average	0	0	0	0	0	0	0	0
Gag								
2005	0	0	0	1,153	0	0	0	1,153
2006	0	0	0	548	0	365	0	913
2007	0	980	0	1,292	3,537	8,773	3,537	11,045
2008	0	0	371	771	2,759	5,103	3,130	5,874
2009	0	0	0	3,194	0	3,718	0	6,912
Average	0	196	74	1,392	1,259	3,592	1,333	5,179
Red Grouper								
2005	0	0	0	0	0	0	0	0
2006	0	0	0	309	0	365	0	674
2007	0	0	0	0	0	4,076	0	4,076
2008	0	0	0	64	0	0	0	64
2009	0	0	0	0	0	727	0	727
Average	0	0	0	75	0	1,034	0	1,108

Source: MRFSS, NOAA Fisheries, NMFS, SERO.

Analysis of recreational effort at the individual species or species group level is not possible for the headboat sector because the headboat data are not collected at the angler level. Estimates of effort in the headboat sector are provided in terms of angler days, or the number of standardized 12-hour fishing days that account for the different half-, three-quarter- and full-day fishing trips by headboats. The average annual (2005-2009) number of headboat angler days is presented in **Table 3-29**. Due to confidentiality issues, Georgia estimates are combined with those of Florida. As shown in **Table 3-29**, the total (across all states) average number of headboat angler days has been variable but generally declining since 2005.

Table 3-29. Southeast headboat angler days (2005-2009).

	South Atlantic			
	Florida/ Georgia	**North Carolina**	**South Carolina**	**Total**
2005	171,078	31,573	34,036	236,687
2006	175,522	25,736	56,074	257,332
2007	157,150	29,002	60,729	246,881
2008	124,119	16,982	47,287	188,388
2009	136,420	19,468	40,919	196,807
Average	152,858	24,552	47,809	225,219

Source: The Headboat Survey, NOAA Fisheries, SEFSC, Beaufort Lab.

3.3.2.3 Permits

For-hire vessels are required to have a for-hire snapper grouper permit to fish for or possess snapper grouper species in the South Atlantic EEZ. The number of vessels with for-hire snapper grouper permits for the period 2005-2009 is provided in **Table 3-30**. This sector operates as an open access fishery and not all permitted vessels are necessarily active in the fishery. Some vessel owners obtain open access permits as insurance for uncertainties in the fisheries in which they operate.

The number of for-hire permits issued for the South Atlantic snapper grouper fishery increased from 1,904 permits in 2005 to 2,104 permits in 2008, but decreased slightly to 2,091 in 2009. The majority of snapper grouper for-hire permitted vessels were home-ported in Florida; a relatively high proportion of these permitted vessels were also home-ported in North Carolina and South Carolina. Many vessels with South Atlantic for-hire snapper grouper permits were homeported in states outside of SAFMC's area of jurisdiction, particularly in Alabama and Texas. Although the number of vessels with South Atlantic for-hire snapper grouper permits homeported in states outside of SAFMC's area of jurisdiction increased from 2005 to 2009, they still account for approximately the same proportion (9-10%) of the total number of permits.

Table 3-30. Number of South Atlantic for-hire snapper grouper vessel permits (2005-2009).

HomePort State	2005	2006	2007	2008	2009	Avg.
Florida	1,267	1,304	1,312	1,310	1,280	1,295
North Carolina	294	317	353	399	391	351
South Carolina	136	142	152	160	167	151
Alabama	52	42	37	39	42	42
Georgia	37	36	37	39	42	38
Texas	36	30	31	33	30	32
Other States	82	96	104	124	139	109
Total	1,904	1,967	2,026	2,104	2,091	2,018

Source: Southeast Permits Database, NOAA Fisheries, SERO.

For-hire permits do not distinguish charterboats from headboats. Based on a 1997 survey, Holland et al. (1999) estimated that a total of 1,080 charter vessels and 96 headboats supplied for-hire services in all South Atlantic fisheries during 1997. By 2010, the estimated number of headboats supplying for-hire services in all South Atlantic fisheries had fallen to 85, indicating a decrease in fleet size of approximately 11% between 1997 and 2010 (K. Brennan, Beaufort Laboratory, SEFSC, personal communication, Feb. 2011).

3.3.2.4 Economic Value and Economic Activity

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The monetary value of this satisfaction is referred to as consumer surplus. The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips.

Estimates of the economic value of a day of saltwater recreational fishing in the South Atlantic indicate that the mean value of access per marine recreational fishing trip is $109.31 (Haab et al. 2001). While this estimate is not specific to snapper grouper fishing trips, it may shed light on the magnitude of an angler's willingness to pay for this type of recreational experience.

Haab et al. (2001) estimated willingness to pay for an incremental increase in catch and keep rates per trip at $3.01 for snapper grouper species. Whitehead and Haab (2001) estimated the marginal willingness to pay to avoid a one fish red snapper bag limit decrease to be from $1.06 to $2.20. Finally, Haab et al. (2001) provided a compensating variation (the amount of money a person would have to receive to be no worse off after a reduction of the bag limit) estimate of $2.49 per fish when calculated across all private boat anglers that targeted snapper grouper species in the South Atlantic.

In their study of the North Carolina for-hire fishery, Dumas et al. (2009) estimated several measures of consumer surplus for anglers fishing in the for-hire mode. Anglers were distinguished based on whether fishing was their primary or secondary purpose for taking the trip to the coast.

An additional snapper grouper caught and kept would generate consumer surplus of $93.51 per trip for primary purpose anglers and $60.79 per trip for secondary purpose anglers. Consumer surplus per site per trip for primary purpose anglers ranged from $4.88 to $27.03 in charter trips taken in Federal waters, or from $0.35 to $9.55 in charter trips taken in state waters. The corresponding range of values for secondary purpose anglers was $0.24 to $16.62 for charter trips in Federal waters, or $0.12 to $16.54 for charter trips in state waters. On headboat trips in both state and Federal waters, consumer surplus per site per trip ranged from $0.59 to $4.12 for primary purpose anglers and from $0.48 to $4.76 for secondary purpose anglers. Consumer surplus for the opportunity to take a for-hire fishing trip was estimated at $624.02 per angler per trip on charterboats and $101.64 per anger per trip on headboats.

In addition to the above economic values, there are estimates of the economic value of a red snapper and a red snapper trip provided in the red snapper interim rule for the South Atlantic (NMFS 2008). Although these values are derived for the Gulf of Mexico recreational fishery, they can be used as proxy values for the South Atlantic fishery. However, red snapper is a significantly more important recreational target fishery in the Gulf of Mexico than in the South Atlantic. As a result, the estimates of economic value may overstate the true values for the South Atlantic. The estimated CS to a recreational angler of one red snapper is $6.04, while the estimated CS of a red snapper fishing trip is $53.53.

Most recently, the NMFS Southeast Fisheries Science Center (NMFS 2009b) developed estimates of consumer surplus per angler trip based on various studies and data in the last ten years. These estimates were culled from various studies – Haab et al. (2009), Dumas et al. (2009), and NMFS (2009a). The values/ranges of consumer surplus estimates are (in 2009 dollars) $112 to $128 for red snapper, $123 to $128 for grouper, $11 for other snappers, and $80 for snapper grouper. These values were deemed directly applicable in assessing the changes in consumer surplus due to management measures in Amendment 17B (SAFMC 2010b).

While anglers receive economic value as measured by the consumer surplus associated with fishing, for-hire businesses receive value from the services they provide. Producer surplus (PS) is the measure of the economic value these operations receive. PS is the difference between the revenue a business receives for a good or service, such as a charter or headboat trip, and the cost the business incurs to provide that good or service. Estimates of the PS associated with for-hire trips are not available. However, proxy values in the form of net operating revenues are provided in NMFS (2008). These values are not PS estimates because they are not net of crew costs and returns to the owner. The estimated net operating revenues per angler trip for the for-hire sector are $162 for a charterboat trip and $78 for a headboat trip.

The NOAA Fisheries Service Southeast Science Center recently provided estimates of charterboat and headboat net operating revenues for various areas in the Southeast (NMFS 2009a). These estimates were culled from several studies – Liese et al. (2009), Dumas et al. (2009), Holland et al. (1999), and Sutton et al. (1999). Estimates of net operating revenue per angler trip (2009 dollars) on representative charter trips are $135 for east Florida, $146 for Louisiana through east Florida, $156 for northeast Florida, and $128 for North Carolina. For charter trips into the EEZ only, net operating revenues are $141 in east Florida and $148 in northeast Florida. For full day and overnight trips only, net operating revenues are $155-160 in North Carolina.

Net operating revenues per angler trip are lower for headboats than for charterboats. Net operating revenue estimates for a representative headboat trip are $48 in the Gulf of Mexico (all states and all of Florida), and $63-$68 in North Carolina. For full day and overnight headboat trips, net operating revenues are $74-$77 in North Carolina. Comparable estimates are not available for Georgia and South Carolina.

These valuation estimates should not be confused with angler expenditures or economic activity (impacts) associated with these expenditures. While expenditures for a specific good or service may represent a proxy or lower bound of value (a person would not logically pay more for something than it was worth to them), they do not represent the net value (benefits minus cost), nor the change in value associated with a change in the fishing experience.

Estimates of the economic activity (impacts) associated with the recreational snapper grouper fishery were derived using average coefficients for recreational angling across all fisheries (snapper grouper species), as derived by an economic add-on to the MRFSS, and described and utilized in NMFS (2009a). Business activity is characterized in the form of FTE jobs, income impacts (wages, salaries, and self-employed income), output (sales) impacts (gross business sales), and value-added impacts (difference between the value of goods and the cost of materials or supplies). Job and output (sales) impacts are equivalent metrics across both the commercial and recreational sectors. Income and value-added impacts are not equivalent, though similarity in the magnitude of multipliers may result in roughly equivalent values. Neither income nor value-added impacts should be added to output (sales) impacts because this would result in double counting. Job and output (sales) impacts, however, may be added across sectors.

Estimates of the average expenditures by recreational anglers are provided in NMFS (2009a) and are incorporated herein by reference. Estimates of the average recreational effort (2005-2009) and associated economic impacts (2008 dollars) are provided in **Table 3-31**. Target trips were used as the measure of recreational effort. As previously discussed, more trips may catch a snapper grouper species than target the snapper grouper species. Where such occurs, estimates of the economic activity associated with the average number of catch trips can be calculated based on the ratio of catch trips to target trips because the average output impact and jobs per trip cannot be differentiated by trip intent. This is not done in the current analysis.

It should be noted that output impacts and value added impacts are not additive and the impacts for individual snapper grouper species should not be added because of possible duplication (some trips may target multiple snapper grouper species). Also, the estimates of economic activity should not be added across states to generate a regional total because state-level impacts reflect the economic activity expected to occur within the state before the revenues or expenditures "leak" outside the state, possibly to another state within the region. Under a regional model, economic activity that "leaks" from, for example, Florida into Georgia would still occur within the region and continue to be tabulated. As a result, regional totals would be expected to be greater than the sum of the individual state totals. Regional estimates of the economic activity associated with the fisheries for these snapper grouper species are unavailable at this time.

The distribution of the estimates of economic activity by state and mode are consistent with the effort distribution with the exception that charter anglers, on average, spend considerably more money per trip than anglers in other modes. As a result, the number of charter trips can be a fraction of the number of private trips, yet generate similar estimates of the amount of economic activity. For example, as derived from **Table 3-31**, the average number of charter snapper grouper target trips in Florida (32,165 trips) was only approximately 7% of the number of private trips (475,789), whereas the estimated output (sales) impacts by the charter anglers (approximately $12.6 million) was approximately 70% of the output impacts of the private trips (approximately $18.0 million).

Table 3-31. Summary of snapper grouper target trips (2005-2009 average) and associated economic activity (2008 dollars) by state and mode. Output and value added impacts are not additive.

	North Carolina	South Carolina	Georgia	Florida
	Shore Mode			
Target Trips	25,429	10,837	7,361	225,948
Output Impact	$6,369,109	$1,103,510	$118,570	$6,454,791
Value Added Impact	$3,546,665	$614,461	$71,098	$3,747,360
Jobs	77	14	1	68
	Private/Rental Mode			
Target Trips	65,266	94,351	22,246	475,789
Output Impact	$3,562,445	$4,151,262	$347,565	$17,992,032
Value Added Impact	$2,008,752	$2,422,205	$210,827	$10,751,195
Jobs	38	47	3	189
	Charter Mode			
Target Trips	1,660	4,377	920	32,165
Output Impact	$646,211	$1,476,045	$57,835	$12,605,516
Value Added Impact	$362,655	$833,905	$33,755	$7,421,221
Jobs	8	19	1	130
	All Modes			
Target Trips	92,355	109,565	30,527	733,902
Output Impact	$10,577,764	$6,730,817	$523,970	$37,052,338
Value Added Impact	$5,918,072	$3,870,571	$315,679	$21,919,776
Jobs	123	80	5	387

Source: effort data from the MRFSS, economic activity results calculated by NMFS SERO using the model developed for NMFS (2009a).

As previously noted, the values provided in **Table 3-31** only reflect effort derived from the MRFSS. Because the headboat sector in the Southeast is not covered by the MRFSS, the results in **Table 3-31** do not include estimates of the economic activity associated with headboat anglers. While estimates of headboat effort are available (see **Table 3-29**), species target information is not collected in the headboat survey, which prevents the generation of estimates of the number of headboat target trips for snapper grouper. Further, because the model developed for NMFS (2009a) was based on expenditure data collected through the MRFSS, expenditure data from headboat anglers was not available and appropriate economic expenditure coefficients have not been estimated. As a result, estimates of the economic activity associated with the headboat sector comparable to those of the other recreational sector modes cannot be provided.

3.3.3 Social and Cultural Environment

Additional information on the social and cultural environment of the snapper grouper fishery is contained in previous or concurrent amendments [Amendment 13C (SAFMC 2006), Amendment 15A (SAFMC 2008a), Amendment 15B (SAFMC 2008b), Amendment 16 (SAFMC 2009a), Amendment 17A (SAFMC 2010a), Amendment 17B (SAFMC 2010b), Regulatory Amendment 9 (SAFMC 2011b), Regulatory Amendment 10 (SAFMC 2011a), and Comprehensive ACL Amendment for the South Atlantic Region (under review)] and is incorporated herein by reference.

Permit requirements for the commercial snapper grouper fishery were established in 1998 by Amendment 8 (SAFMC 1997). The amendment created a limited entry system for the fishery and established two types of permits based on the historic landings associated with a particular permit. Those who could demonstrate a certain amount of landings over a certain time period received transferable permits that did not limit the number of pounds of snapper grouper that could be landed from federal waters (hereafter referred to as "unlimited commercial permits"). Vessels with verified landings, but which did not meet the threshold were issued permits that allowed them to land 225 pounds of snapper grouper species from federal waters each trip (hereafter referred to as "limited commercial permits"). These permits were not transferable. New entry into the fishery required the purchase of two unlimited permits from existing permit holders in exchange for a new permit. This "two for one" system was intended to gradually decrease the number of permits in the fishery. These restrictions only applied to the commercial snapper grouper permit.

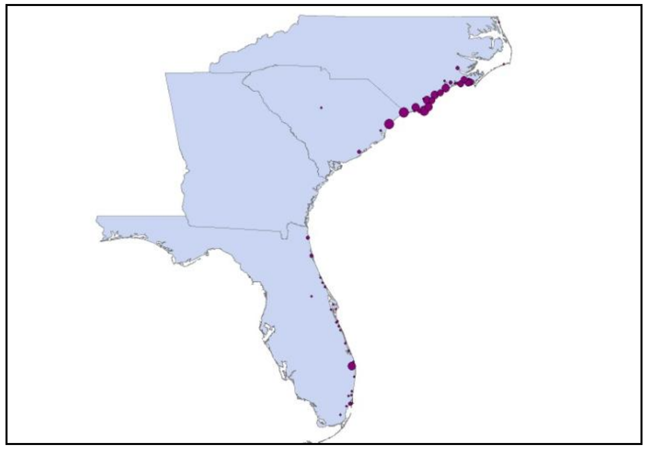
Over time the limited entry system has reduced capacity in the commercial fishery as evidenced by the reduction in the number of permits over the period beginning in 2001 through 2008. During this period, there was a 34% decrease in the number of unlimited permits and a 54% decrease in the number of limited permits, according to the SERO permits database. This downward trend in permits is also reflected in other measures of effort that also show a steady decline, i.e. number of trips, landings, etc. (see SAFMC Amendment 16). While the limited entry program has contributed to the reduced capacity, other factors have also contributed to this downward trend. Economic factors like increased imports, decreasing prices and rising prices for diesel fuel have had a widespread affect on commercial fishing throughout many regions of the U.S. In addition, the loss of working waterfronts has contributed to a growing loss of fishing infrastructure that may play a role in the decline in many different fisheries.

The following description primarily addresses the red grouper fishery, which is the focus of this amendment.

3.3.3.1 Commercial and Recreational Fishing Communities

While studies on the general identification of fishing communities have been undertaken in the past few years, little social or cultural investigation into the nature of the snapper grouper fishery itself has occurred. A socioeconomic study by Waters et al. (1997) covered the general characteristics of the fishery in the South Atlantic, but those data are now over 10 years old and do not capture more recent important changes in the fishery. Cheuvront and Neal (2004) conducted survey work of the North Carolina commercial snapper grouper fishery south of Cape Hatteras, but did not include ethnographic examination of communities dependent on fishing.

The majority of the commercial red grouper landings are concentrated on the northeast coast of South Carolina (Murrells Inlet and Little River), throughout the mid to southern coast of North Carolina (clustered in Brunswick, Carteret, Onslow, Pender, and New Hanover counties), and in the community of Palm Beach Gardens, Florida as seen in **Figure 3-3**. Other areas of the South Atlantic with less concentrated landings include various communities along the remainder of the Florida coast (and the inland community of Lake Mary), communities in several additional North Carolina counties (Craven, Currituck, and Dare counties), and a few additional communities in South Carolina (Charleston, Georgetown, and Columbia).

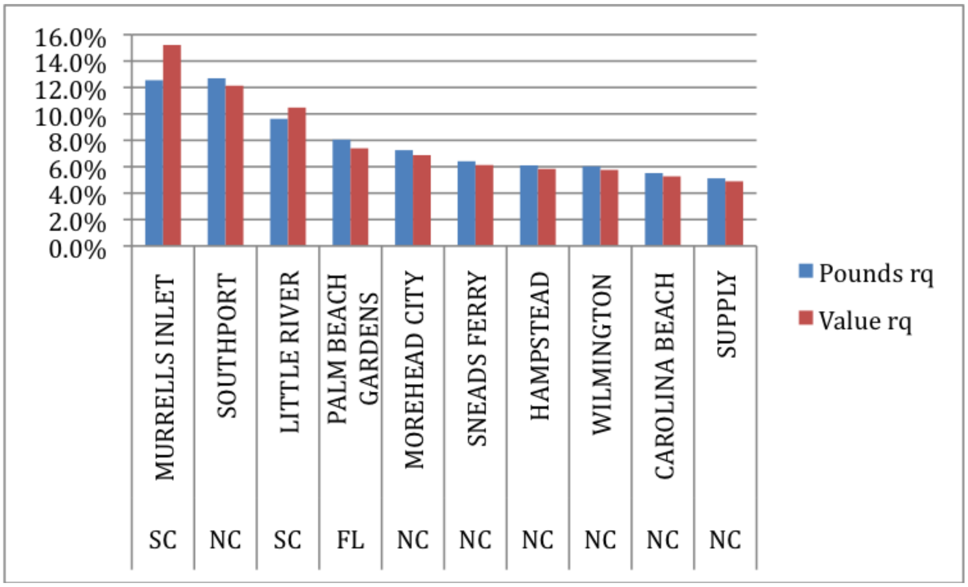


Source: ALS 2008

Figure 3-3. Red grouper 2008 landings by vessel homeport

The communities most involved in the red grouper component of the commercial snapper grouper fishery include (in order of percent of value): Murrells Inlet, South Carolina; Southport, North Carolina; Little River, South Carolina; Palm Beach Gardens, Florida; Morehead City, North Carolina; Sneads Ferry, North Carolina; Hampstead, North Carolina; Wilmington, North Carolina; Carolina Beach, North Carolina; and Supply, North Carolina (see **Figure 3-4**).

These data represent a categorization of communities based upon their overall pounds and value of local commercial landings divided by the overall value of regional commercial landings or regional quotient (rq). These data were assembled from the accumulated landings system which includes all species from both state and federal waters landed in 2008 and does not include the Florida Keys. All communities were ranked on this "rq" and the top ten are displayed here as they have at least 5% of red grouper regional pounds or value. These communities have thus been selected to receive more in-depth descriptions of their fishing involvement.



Source: ALS 2008

Figure 3-4. Proportion (lq) of landings and value for top ten South Atlantic communities out of total landings and value of red grouper.

Recreational fishing communities in the South Atlantic are listed in **Table 3-32**. These communities were selected by their ranking on a number of criteria including the number of charter permits held per thousand community members and the recreational fishing infrastructure identified within each community as listed within the MRIP site survey.

Table 3-32. South Atlantic recreational fishing communities

Community	State	Community	State
Jekyll Island	GA	Cape Carteret	NC
Hatteras	NC	Kill Devil Hill	NC
Manns Harbor	NC	Murrells Inlet	SC
Manteo	NC	Little River	SC
Atlantic Beach	NC	Georgetown	SC
Wanchese	NC	Islamorada	FL
Salter Path	NC	Cudjoe Key	FL
Holden Beach	NC	Key West	FL
Ocean Isle	NC	Tavernier	FL
Southport	NC	Little Torch Key	FL
Wrightsville Beach	NC	Ponce Inlet	FL
Marshallberg	NC	Marathon	FL
Carolina Beach	NC	Sugarloaf Key	FL
Oriental	NC	Palm Beach Shores	FL
Topsail Beach	NC	Big Pine Key	FL
Swansboro	NC	Saint Augustine	FL
Nags Head	NC	Key Largo	FL

Table 3-32. Continued. South Atlantic recreational fishing communities

Community	State	Community	State
Harkers Island	NC	Summerland Key	FL
Calabash	NC	Sebastian	FL
Morehead City	NC	Cape Canaveral	FL

Several of the communities identified as general South Atlantic recreational fishing communities are also the most involved in commercial fishing for red grouper (as shown above in **Figure 3-4)**. These overlapping communities have been highlighted in gray in **Table 3-32**.

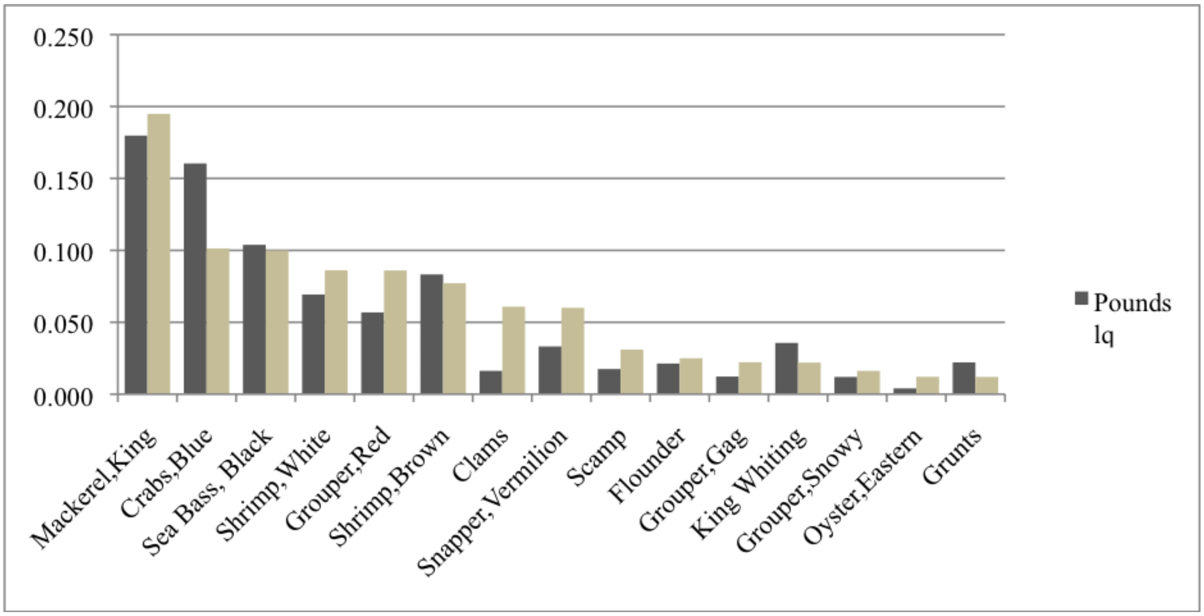
Since recreational catch information by species is not available at the community level, it has been assumed that the top ten communities with the most involvement in the red grouper component of the commercial snapper grouper fishery are also the most involved in the recreational sector for red grouper. The following is a description of these communities by state and follows alphabetical order for each state. More in-depth descriptions of fishing communities along the South Atlantic are contained in Jepson et al. 2005 (available at http://sero.nmfs.noaa.gov/sf/socialsci/pdfs/SA%20Fishing%20Community%20Report.pdf) and incorporated herein by reference.

Fishing Communities by State

North Carolina

Carolina Beach

Carolina Beach was ranked ninth in terms of commercial red grouper landings in 2008 with 5.5% of the total pounds and 5.3% of the total value of the South Atlantic red grouper fishery (**Figure 3-4)**. As shown in **Figure 3-5**, the top species with a high local quotient landed in Carolina Beach include king mackerel, blue crabs, black sea bass, and white shrimp. Red grouper was the number five species for Carolina Beach in terms of pounds (5.7%) and value (8.6%).



Source: ALS 2008

Figure 3-5. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Carolina Beach, North Carolina.

As shown in **Table 3-33** the participation of residents of Carolina Beach in the snapper grouper charter fishery has decreased over the last ten years with a high of 30 vessel permits assigned to the homeport of Carolina Beach in 2003. In 2010, 16 charter permits were registered to vessels homeported in Carolina Beach. The number of snapper grouper commercial unlimited permits attributed to the homeport has also decreased over time from a high of 10 unlimited permits held in 2000 to 6 permits held in 2010. In the early 2000s, several commercial limited snapper grouper permits were attributed to Carolina Beach; however in recent years no limited permits were held.

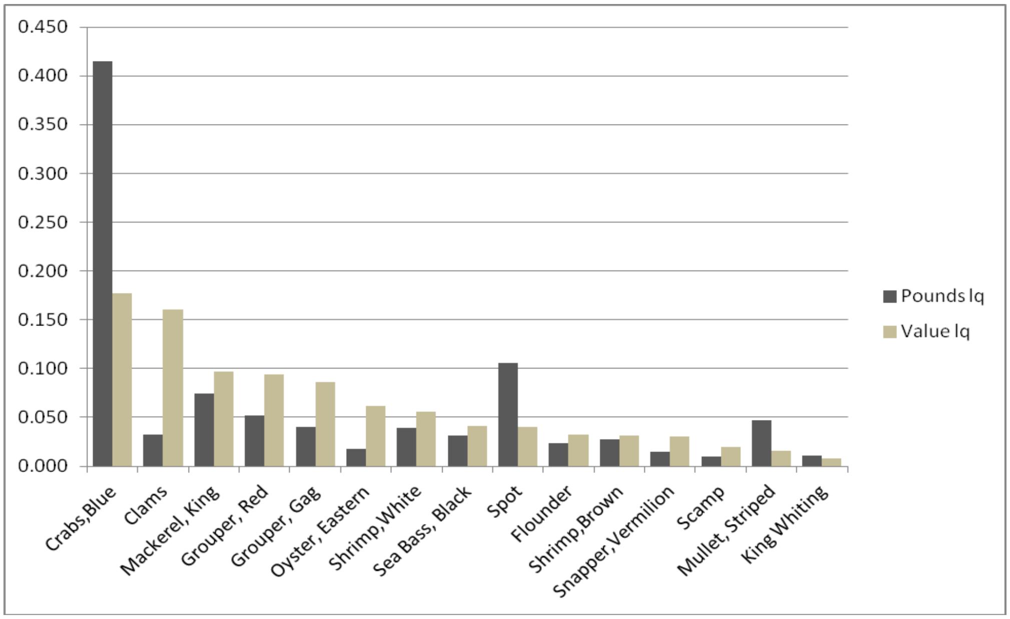
Table 3-33. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Carolina Beach, North Carolina 2000-2010

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	28	10	2
2001	28	9	2
2002	25	7	3
2003	30	8	.
2004	27	7	.
2005	21	4	.
2006	22	5	.
2007	13	4	.
2008	15	5	.
2009	15	5	.
2010	16	6	.

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Hampstead

Hampstead was ranked seventh in terms of red grouper landings in 2008 with 6.1% of the total pounds and 5.8% of the total value of the South Atlantic red grouper fishery (**Figure 3-4)**. The top species with a high local quotient landed in Hampstead include blue crabs, clams, king mackerel, red grouper (at 9.4% of value and 5.2% of pounds), and gag grouper (**Figure 3-6**).



Source: ALS 2008

Figure 3-6. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Hampstead, North Carolina.

As shown in **Table 3-34** the participation of residents of Hampstead in the snapper grouper charter fishery has fluctuated over the last 10 years with no permits attributed to the homeport of Hampstead some years and a high of 10 permits held in 2006. In 2010, 3 charter permits were registered to the homeport. The number of snapper grouper commercial unlimited permits held has also fluctuated over the last 10 years, but has remained relatively stable with a high of 11 permits held in 2000 and 2006, but with a low of six permits held in 2007-2009. In the early 2000s, no commercial snapper grouper limited permits were attributed to the homeport of Hampstead; however in recent years 1-3 limited permits were registered to the community.

Table 3-34. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Hampstead, North Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	.	11	.
2001	.	8	.
2002	1	8	.
2003	.	9	.
2004	1	7	.
2005	2	7	1
2006	10	11	3
2007	4	6	1

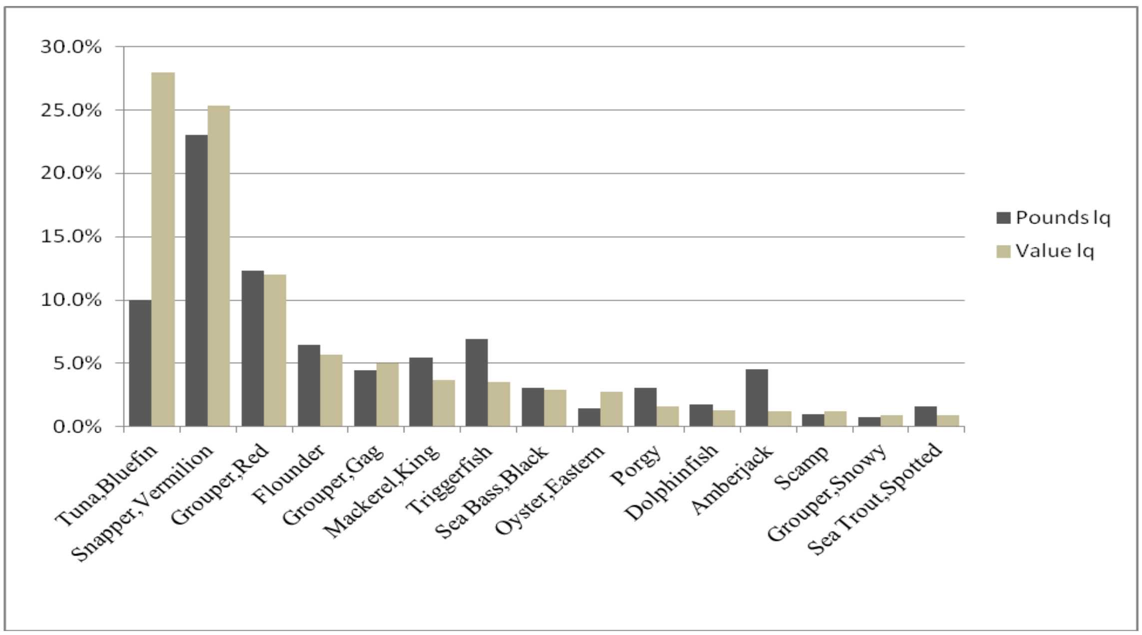
Table 3-34. Continued. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Hampstead, North Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2008	4	6	1
2009	4	6	1
2010	3	7	1

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Morehead City

Morehead City was ranked fifth in terms of red grouper landings in 2008 with 7.3% of the total pounds and 6.9% of the total value of the South Atlantic red grouper fishery (**Figure 3-4)**. The top species with a high local quotient landed in Morehead City include bluefin tuna, vermilion snapper, red grouper (12% of value and 12.3% of pounds), gag grouper, and king mackerel (**Figure 3-7)**.



Source: ALS 2008

Figure 3-7. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Morehead City, North Carolina.

As shown in **Table 3-35** the participation of residents of Morehead City in the snapper grouper charter fishery has fluctuated over the last 10 years with a low of 9 permits attributed to the homeport in 2002 and a high of 32 permits in 2006. In 2010, 26 charter permits were registered to vessels homeported in Morehead City. The number of snapper grouper commercial unlimited permits attributed to the homeport also fluctuated over the last 10 years, but has remained relatively stable with a high of 17 permits in 2009. In 2010, 11 unlimited snapper grouper permits were registered to Morehead City. In the early 2000s, between 1 and 2 commercial snapper grouper limited permits were held by vessel owners with the registered homeport of Morehead City; however in recent years no limited permits were registered.

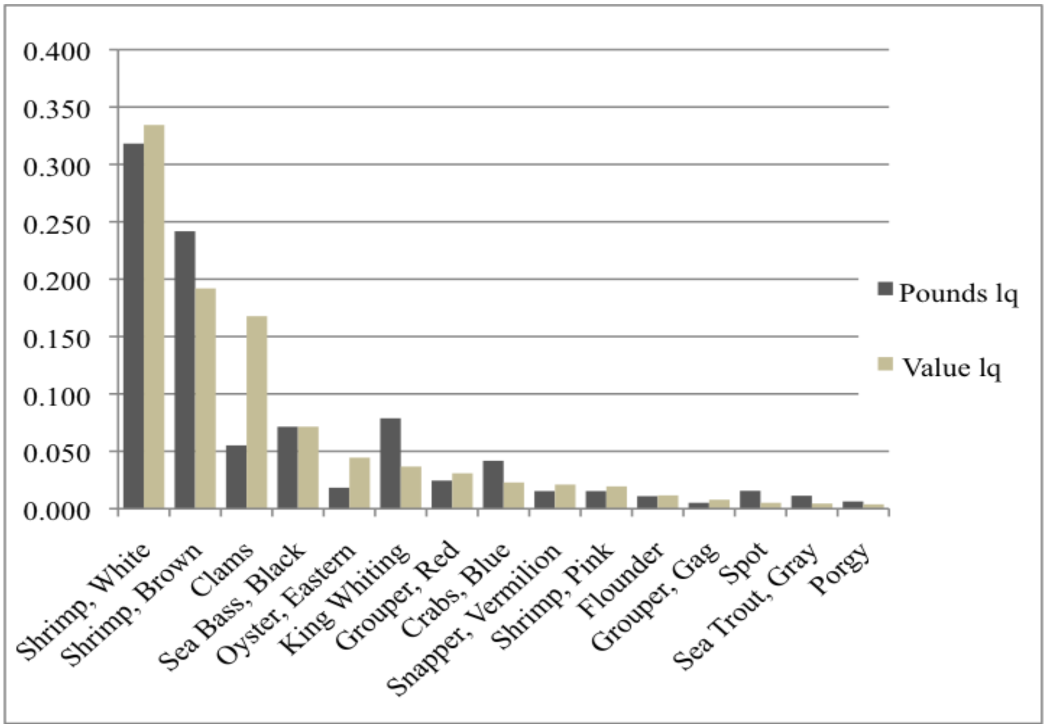
Table 3-35. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Morehead City, North Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	15	15	2
2001	15	15	1
2002	9	15	1
2003	10	16	1
2004	13	15	.
2005	19	14	.
2006	32	14	.
2007	14	9	.
2008	20	10	.
2009	27	17	.
2010	26	11	.

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Sneads Ferry

Sneads Ferry was ranked sixth in terms of red grouper landings in 2008 with 6.4% of the total pounds and 6.1% of the total value of the South Atlantic red grouper fishery (**Figure 3-4)**. The top species with a high local quotient landed in Sneads Ferry include white shrimp, brown shrimp, clams, black sea bass, and eastern oyster. Red grouper is seventh among the top species in terms of the local quotient landed in Sneads Ferry and comprised 3.1% of value and 2.4% of pounds (**Figure 3-8**).



Source: ALS 2008

Figure 3-8. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Sneads Ferry, North Carolina.

As shown in **Table 3-36** the participation of residents of Sneads Ferry in the snapper grouper charter fishery has fluctuated over the last 10 years with a high of 11 permits registered to vessels homeported in the community in 2002 and 2004 and a low of 4 and 5 permits in 2007 and 2006, respectively. In 2010, 9 snapper grouper charter permits were attributed to Sneads Ferry vessels. The number of snapper grouper commercial unlimited permits held has also fluctuated over the last 10 years, but has remained relatively stable with a high of 20 permits in 2001 and 2002. In 2010, 12 unlimited commercial snapper grouper permits were attributed to vessels homeported in the community. The number of snapper grouper limited commercial permits has remained relatively stable over the last 10 years with 0-2 permits held by Sneads Ferry vessels.

Table 3-36. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Sneads Ferry, North Carolina 2000-2010

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	10	18	1
2001	10	20	1
2002	11	20	1
2003	8	16	1
2004	11	16	1

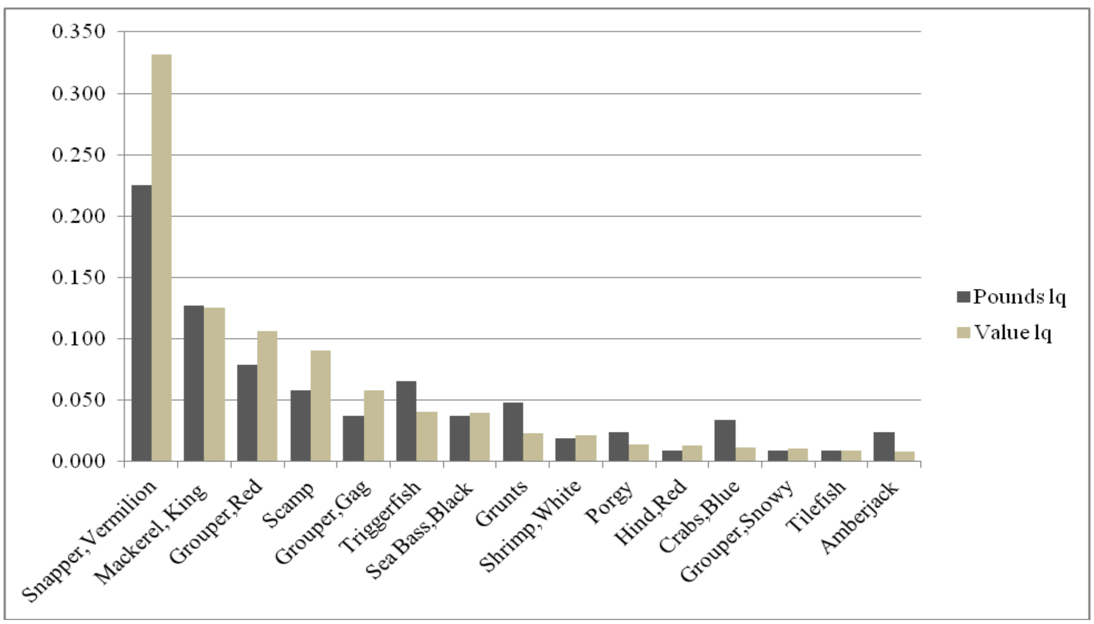
Table 3-36. Continued. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Sneads Ferry, North Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2005	8	12	2
2006	5	13	1
2007	4	8	1
2008	6	12	.
2009	7	14	.
2010	9	12	1

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Southport

Southport was ranked second in terms of red grouper landings in 2008 with 12.7% of the total pounds and 12.1% of the total value of the South Atlantic red grouper fishery (**Figure 3-4)**. The top species with a high local quotient landed in Southport include vermilion snapper, king mackerel, red grouper (10.6% of value and 7.9% of pounds), scamp, and gag grouper (**Figure 3-9)**.



Source: ALS 2008

Figure 3-9. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Southport, North Carolina.

As shown in **Table 3-37** the participation of residents of Southport in the snapper grouper charter fishery has fluctuated extensively over the last 10 years with a high of 33 permits attributed to Southport vessels in 2009 and a low of 7 permits in 2000. A total of 26 permits were held in 2010. The number of snapper grouper commercial unlimited permits has also fluctuated extensively over the last 10 years with a high of 33 permits held in 2006 and a low of 13 in 2007. Vessels homeported in Southport held a total of 30 unlimited permits in 2010. The number of snapper grouper limited commercial permits has remained relatively stable over the last 10 years, fluctuating between 2 and 4 permits.

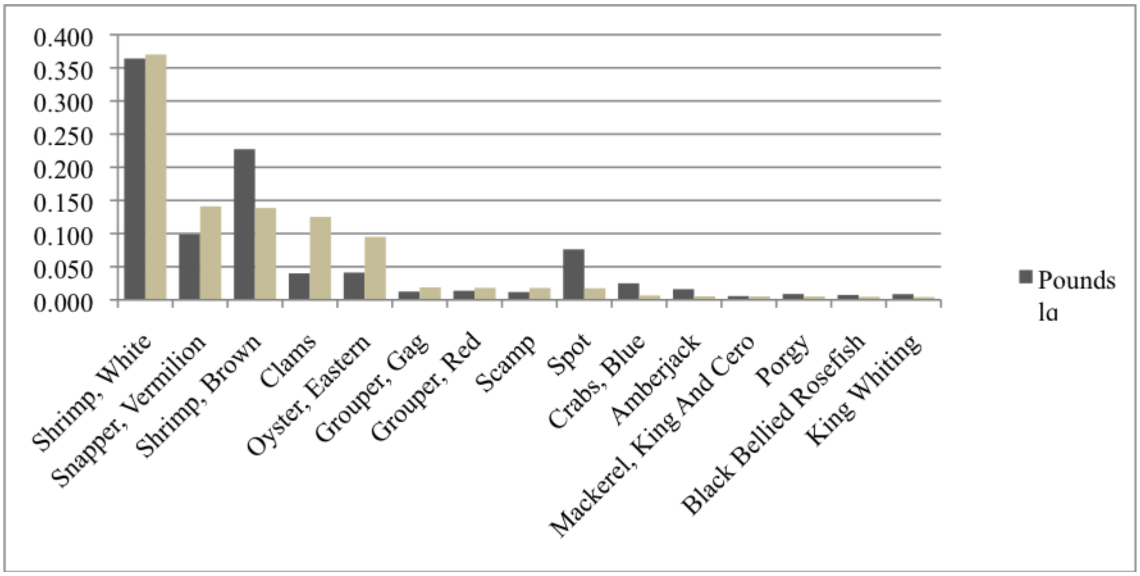
Table 3-37. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Southport, North Carolina 2000-2010

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	7	18	3
2001	9	18	2
2002	8	18	2
2003	17	18	3
2004	12	17	3
2005	16	21	3
2006	31	33	4
2007	11	13	3
2008	26	18	2
2009	33	28	4
2010	26	30	2

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Supply

Supply was ranked tenth in terms of red grouper landings in 2008 with 5.1% of the total pounds and 4.9% of the total value of the South Atlantic red grouper fishery (**Figure 3-4**). The top species with a high local quotient landed in Supply include white shrimp, vermilion snapper, brown shrimp, clams, and eastern oyster. Red grouper ranks seventh among the top species for Supply in terms of the local quotient landed and comprised 1.8% of the value and 1.4% of the pounds (**Figure 3-10**).



Source: ALS 2008

Figure 3-10. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Supply, North Carolina.

As shown in **Table 3-38** the participation of residents of Supply in the snapper grouper charter fishery has remained relatively stable over the last 10 years, fluctuating from 4 to 1 permits registered to vessels naming Supply as their homeport. Over the last 10 years, snapper grouper commercial unlimited permits were attributed to vessels homeported in Supply in 2005-2007 (range of 1-2 permits held), but no permits were held during other years. No snapper grouper limited commercial permits were held by vessels homeported in Supply over the last 10 years.

Table 3-38. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Supply, North Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	1	.	.
2001	1	.	.
2002	2	.	.
2003	2	.	.
2004	4	.	.
2005	3	1	.
2006	4	2	.
2007	1	1	.
2008	2	.	.

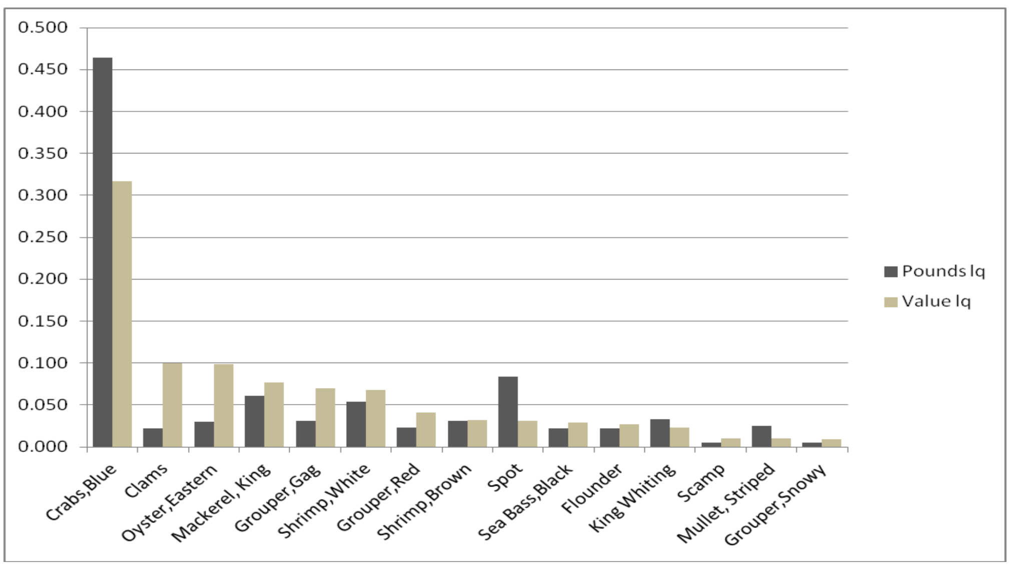
Table 3-38. Continued. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Supply, North Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2009	3	.	.
2010	2	.	.

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Wilmington

Wilmington ranked eighth in terms of red grouper landings in 2008 with 6.0% of the total pounds and 5.8% of the total value of the South Atlantic red grouper fishery (**Figure 3-4**). The top species with a high local quotient landed in Wilmington include blue crabs, clams, eastern oyster, king mackerel, and gag grouper. Red grouper ranks seventh among the top species in terms of the local quotient landed in Wilmington and comprised 4.1% of the value and 2.3% of the pounds (**Figure 3-11**).



Source: ALS 2008

Figure 3-11. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Wilmington, North Carolina.

As shown in **Table 3-39** the participation of residents of Wilmington in the snapper grouper charter fishery has fluctuated from a low of 3 permits registered to vessels homeported in the community in 2002 to a high of 15 permits in 2006. In 2010, 12 snapper grouper charter permits were registered to vessels homeported in Wilmington. Over the last 10 years the snapper grouper commercial unlimited permits held by vessels in the community have fluctuated extensively with nearly a 50% decrease from 2000, when 19 permits were held, to recent years where the number of permits has fluctuated between 8 and 11 permits. The number of snapper grouper limited commercial permits attributed to Wilmington vessels has remained nearly stable over the last 10 years with 3 limited permits in 2000 and 1 permit during the remainder of the time series.

Table 3-39. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Wilmington, North Carolina 2000-2010.

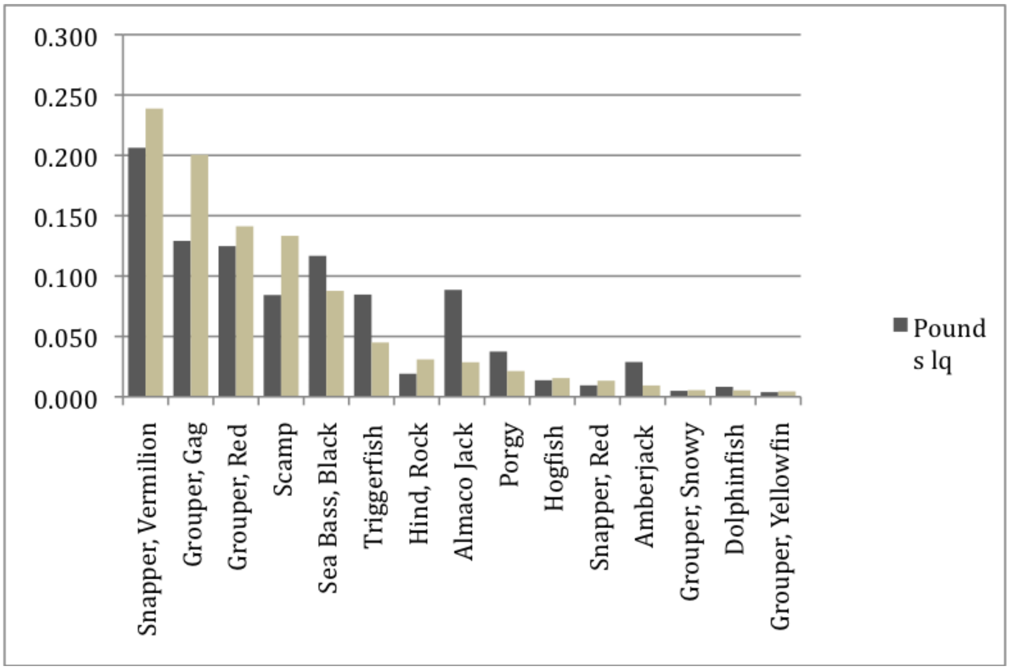
Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	6	19	3
2001	4	17	1
2002	3	18	1
2003	8	14	1
2004	9	16	1
2005	10	15	1
2006	15	14	1
2007	6	8	1
2008	9	10	1
2009	13	11	1
2010	12	10	1

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

South Carolina

Little River

Little River ranked third in terms of red grouper landings in 2008 with 9.6% of the total pounds and 10.5% of the total value of the South Atlantic red grouper fishery (**Figure 3-4**). The top species with a high local quotient landed in Little River include vermilion snapper, gag, red grouper (14.1% of value and 12.5% of pounds), scamp, and black sea bass (**Figure 3-12**).



Source: ALS 2008

Figure 3-12. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Little River, South Carolina.

As shown in **Table 3-40** the participation of residents of Little River in the snapper grouper charter fishery has fluctuated extensively from high of 27 charter permits registered to vessels naming Little River as their homeport in the year of 2010 to lows of 6 to 11 permits held in various other years. The number of snapper grouper commercial unlimited permits held has also fluctuated extensively with a low of 11 permits held in 2000 and 2007 and a high of 26 permits in 2006 and 2010. The number of snapper grouper limited commercial permits attributed to vessels homeported in the community has remained relatively stable over the last 10 years, varying from 0 to 2 permits.

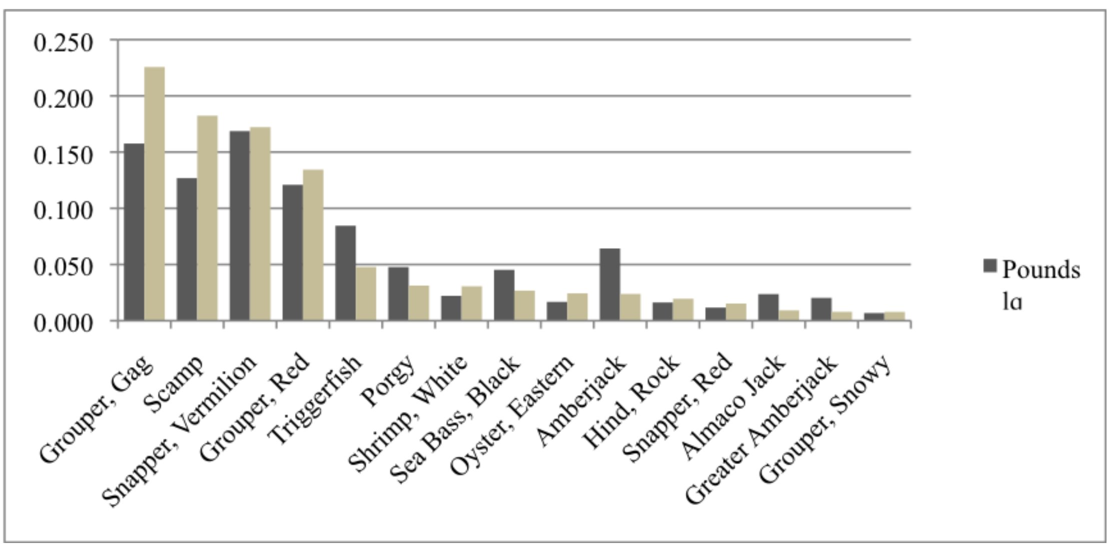
Table 3-40. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Little River, South Carolina 2000-2010.

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	9	11	1
2001	9	12	1
2002	11	13	1
2003	11	14	1
2004	11	14	1
2005	12	14	1
2006	21	26	2
2007	6	11	.
2008	19	18	1
2009	20	20	2
2010	27	26	1

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Murrells Inlet

Murrells Inlet was ranked number one in terms of red grouper landings in 2008 with 12.5% of the total pounds and 15.2% of the total value of the South Atlantic red grouper fishery (**Figure 3-4**). The top species with a high local quotient landed in Murrells Inlet include gag grouper, scamp, vermilion snapper, red grouper (13.4% of value and 12.1% of pounds), and triggerfish (**Figure 3-13**).



Source: ALS 2008

Figure 3-13. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Murrells Inlet, South Carolina.

As shown in **Table 3-41** the participation of residents of Murrells Inlet in the snapper grouper charter fishery has fluctuated extensively with a high of 40 charter permits registered to vessels homeported in the community in 2009 to a low of 13 permits in 2005. A total of 33 charter permits were held in 2010. The number of snapper grouper commercial unlimited permits registered to homeported vessels also fluctuated extensively with a high of 31 unlimited permits in 2003 and a low of 13 in 2007. A total of 21 commercial unlimited permits were held in 2010. At the beginning of decade, between 1 and 4 snapper grouper limited commercial permits were registered to vessels naming Murrells Inlet their homeport; however no limited permits have been held since 2004.

Table 3-41. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Murrells Inlet, South Carolina 2000-2010.

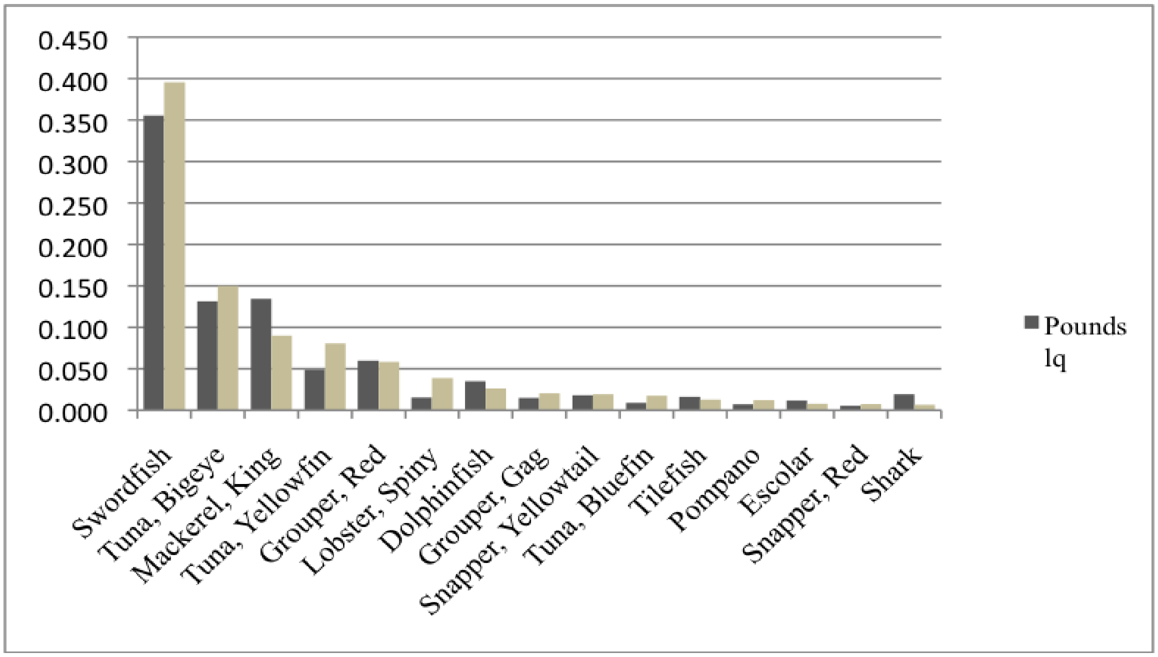
Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	20	29	4
2001	20	29	2
2002	14	28	1
2003	16	31	1
2004	15	26	2
2005	13	25	.
2006	33	28	.
2007	15	13	.
2008	32	19	.
2009	40	24	.
2010	33	21	.

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

Florida

Palm Beach Gardens

Palm Beach Gardens ranked fourth in terms of red grouper landings in 2008 with 8.1% of the total pounds and 7.4% of the total value of the South Atlantic red grouper fishery (**Figure 3-4**). As shown in **Figure 3-14**, the top species with a high local quotient landed in Palm Beach Gardens include swordfish, bigeye tuna, king mackerel, yellowfin tuna, and red grouper (5.8% of value and 6% of pounds).



Source: ALS 2008

Figure 3-14. Proportion (lq) of landings and value for top fifteen species out of total landings and value for Palm Beach Gardens, Florida.

As shown in **Table 3-42** the participation of residents of Palm Beach Gardens in the snapper grouper charter fishery has remained relatively stable, fluctuating from 0 to 2 permits registered to vessels homeported in the community. The number of snapper grouper commercial unlimited permits attributed to vessels homeported in Palm Beach Gardens has followed the same trend, fluctuating from 0 to 2 permits held by community members. The number of snapper grouper limited commercial permits has also remained relatively stable with 0 permits held in the year 2000 and 1 permit held from 2001-2010.

Table 3-42. Snapper grouper charter, unlimited, and 225-lb trip limited permits aggregated by vessel homeport of Palm Beach Gardens, Florida 2000-2 010

Year	Snapper Grouper Charter	Snapper Grouper Unlimited	Snapper Grouper 225-lb Trip Limit
2000	1	.	.
2001	.	.	1
2002	.	.	1
2003	1	1	1
2004	1	1	1
2005	1	1	1
2006	1	2	1
2007	.	1	1
2008	1	2	1
2009	1	2	1
2010	2	1	1

Source: NMFS
Note: These data are presented for trend analysis only as some data anomalies exist.

3.3.4 Environmental Justice Considerations

Executive Order 12898 requires federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. This executive order is generally referred to as environmental justice (EJ).

Persons employed in the snapper grouper fishery, those involved in the recreational fishery, and associated businesses and communities along the South Atlantic coast would be expected to be affected by the actions proposed in this amendment. Information on the race and income status for groups at the different participation levels (vessel owners, crew, dealers, processors, employees, employees of associated support industries, etc.) is not available. Community level data (and in some cases county level data when community level data was not available), however, for all 57 South Atlantic communities with red grouper landings in the year 2008 (as shown in **Figure 3-3)** have been assessed to examine potential EJ concerns. Out of 57 communities with red grouper landings, the communities which exceeded EJ thresholds are displayed below in **Table 3-43**. Because this amendment would be expected to affect fishermen and associated industries in numerous communities along the South Atlantic coast and not just those with commercial landings, it is possible that other communities have poverty or minority rates that exceed the EJ thresholds.

In order to identify the potential for EJ concern, the rates of minority populations (non-white, including Hispanic) and the percentage of the population that was below the poverty line were examined. The threshold for comparison that was used was 1.2 times the state average such that, if the value for the community (or value for the county when community level data was not available) was greater than or equal to 1.2 times the state average, then the community was considered an area of potential EJ concern. Data based upon U.S. Census 2005 to 2009 American Community Survey estimates (released in 2010) were used. These estimates provide an average for the years 2005 to 2009. Estimates of the state minority and poverty rates, associated thresholds, and community rates are provided in **Table 3-43** for those communities which exceeded either the minority or poverty threshold, or both. The exceeded threshold(s) are highlighted in gray in the table.

Table 3-43. Environmental Justice thresholds and examined communities

State	Community	Minority Rate	Minority Threshold*	Poverty Rate	Poverty Threshold*
North Carolina	New Bern	38.0	39.1	23.5	18.1
	Wilmington	26.9		21.0	
South Carolina	Columbia	49.6	41.9	20.2	19.0
	Georgetown	55.5		26.1	
Florida	Cocoa	43.3	47.4	27.0	15.8
	Fort Lauderdale	46.6		17.5	
	Fort Pierce	60.7		26.7	
	Homestead	78.4		29.4	
	Lake Worth	61.8		22.0	
	Miami	88.4		26.3	
	Miami Beach	54.2		14.9	
	Miramar	85.8		7.9	
	South Miami	60.1		15.5	

Source: U.S. Census 2005-2009 American Community Survey Estimates
*Calculated as 1.2 times the state rate.

Among the communities examined, only the community of Wilmington, North Carolina is involved to a large extent (have at least 5% of red grouper regional pounds or value as described above in **Section 3.3.3.1**) in the commercial fishing of red grouper and suggests the most EJ concern. The other examined communities with EJ concern are involved in commercial fishing for the red grouper to a lesser degree, but it is possible that they could be impacted because the proposed management measures would apply to all participants in the affected area. However, information is not available to suggest that minorities or lower income persons are, on average, more dependent on the affected species than non-minority or higher income persons.

As noted above, however, additional communities beyond those profiled would be expected to be affected by the actions in this amendment. Because these communities have not been profiled, the absence of additional potential EJ concerns cannot be assumed and the total number of additional communities that exceed the thresholds is unknown.

However, while some communities expected to be affected by this proposed amendment may have minority or economic profiles that exceed the EJ thresholds and, therefore, may constitute areas of concern, significant EJ issues are not expected to arise as a result of this proposed amendment. No adverse human health or environmental impacts are expected to accrue to this proposed amendment, nor are these measures expected to result in increased risk or exposure of affected individuals to adverse health hazards.

Finally, the general participatory process used in the development of fishery management measures is expected to provide sufficient opportunity for meaningful involvement by potentially affected individuals to participate in the development process of this amendment and have their concerns factored into the decision process.

3.4 Administrative Environment

3.4.1 The Fishery Management Process and Applicable Laws

3.4.1.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the U.S. Exclusive Economic Zone (EEZ), an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over U.S. anadromous species and continental shelf resources that occur beyond the U.S. EEZ.

Responsibility for Federal fishery management decision-making is divided between the U.S. Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for collecting and providing the data necessary for the councils to prepare fishery management plans and for promulgating regulations to implement proposed plans and amendments after ensuring that management measures are consistent with the Magnuson-Stevens Act and with other applicable laws. In most cases, the Secretary has delegated this authority to NOAA Fisheries Service.

The South Atlantic Council is responsible for conservation and management of fishery resources in Federal waters of the U.S. South Atlantic. These waters extend from 3 to 200 miles offshore from the seaward boundary of the States of North Carolina, South Carolina, Georgia, and east Florida to Key West. The South Atlantic Council has thirteen voting members: one from NOAA Fisheries Service; one each from the state fishery agencies of North Carolina, South Carolina, Georgia, and Florida; and eight public members appointed by the Secretary. On the South Atlantic Council, there are two public members from each of the four South Atlantic States. Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and Atlantic States Marine Fisheries Commission (ASMFC). The South Atlantic Council has adopted procedures whereby the non-voting members serving on the Council Committees have full voting rights at the Committee level but not at the full Council level. South Atlantic Council members serve three-year terms and are recommended by State Governors and appointed by the Secretary of Commerce from lists of nominees submitted by State governors. Appointed members may serve a maximum of three consecutive terms.

Public interests also are involved in the fishery management process through participation on Advisory Panels and through council meetings, which, with few exceptions for discussing personnel matters, are open to the public. The South Atlantic Council uses a Scientific and Statistical Committee to review the data and science being used in assessments and fishery management plans/amendments. In addition, the regulatory process is in accordance with the Administrative Procedures Act, in the form of “notice and comment” rulemaking.

3.4.1.2 State Fishery Management

The state governments of North Carolina, South Carolina, Georgia, and Florida have the authority to manage fisheries that occur in waters extending three nautical miles from their respective shorelines. North Carolina's marine fisheries are managed by the Marine Fisheries Division of the North Carolina Department of Environment and Natural Resources. The Marine Resources Division of the South Carolina Department of Natural Resources regulates South Carolina's marine fisheries. Georgia's marine fisheries are managed by the Coastal Resources Division of the Department of Natural Resources. The Marine Fisheries Division of the Florida Fish and Wildlife Conservation Commission is responsible for managing Florida's marine fisheries. Each state fishery management agency has a designated seat on the South Atlantic Council. The purpose of state representation at the Council level is to ensure state participation in Federal fishery management decision-making and to promote the development of compatible regulations in state and Federal waters.

The South Atlantic States are also involved through the ASMFC in management of marine fisheries. This commission was created to coordinate state regulations and develop management plans for interstate fisheries. It has significant authority, through the Atlantic Striped Bass Conservation Act and the Atlantic Coastal Fisheries Cooperative Management Act, to compel adoption of consistent state regulations to conserve coastal species. The ASFMC also is represented at the Council level, but does not have voting authority at the Council level.

NOAA Fisheries Service' State-Federal Fisheries Division is responsible for building cooperative partnerships to strengthen marine fisheries management and conservation at the state, inter-regional, and national levels. This division implements and oversees the distribution of grants for two national (Inter-jurisdictional Fisheries Act and Anadromous Fish Conservation Act) and two regional (Atlantic Coastal Fisheries Cooperative Management Act and Atlantic Striped Bass Conservation Act) programs. Additionally, it works with the ASMFC to develop and implement cooperative State-Federal fisheries regulations.

3.4.1.3 Enforcement

Both the National Oceanic and Atmospheric Administration (NOAA) Fisheries Office for Law Enforcement (NOAA/OLE) and the United States Coast Guard (USCG) have the authority and the responsibility to enforce South Atlantic Council regulations. NOAA/OLE agents, who specialize in living marine resource violations, provide fisheries expertise and investigative support for the overall fisheries mission. The USCG is a multi-mission agency, which provides at sea patrol services for the fisheries mission.

Neither NOAA/OLE nor the USCG can provide a continuous law enforcement presence in all areas due to the limited resources of NOAA/OLE and the priority tasking of the USCG. To supplement at sea and dockside inspections of fishing vessels, NOAA entered into Cooperative Enforcement Agreements with all but one of the States in the Southeast Region (North Carolina), which granted authority to State officers to enforce the laws for which NOAA/OLE has jurisdiction. In recent years, the level of involvement by the States has increased through Joint Enforcement Agreements, whereby States conduct patrols that focus on Federal priorities and, in some circumstances, prosecute resultant violators through the State when a state violation has occurred.

NOAA General Counsel issued a revised Southeast Region Magnuson-Stevens Act Penalty Schedule in June 2003, which addresses all Magnuson-Stevens Act violations in the Southeast Region. In general, this Penalty Schedule increases the amount of civil administrative penalties that a violator may be subject to up to the current statutory maximum of $120,000 per violation. NOAA General Counsel requested public comment through December 20, 2010, on a new draft policy.

Chapter 4. Environmental Consequences

4.1 Action 1. Re-define Maximum Sustainable Yield (MSY)

The following discussion addresses the expected effects from the proposed modifications to the MSY for red grouper (**Table 4-1**).

Table 4-1. MSY alternatives for red grouper.

Alternatives	Equation	F_{MSY}	MSY Values (lbs whole weight)
Alternative 1 (No Action)	Do not change the current definition of MSY for red grouper. Currently, MSY equals the yield produced by F_{MSY}. $F_{30\%SPR}$ is used as the F_{MSY} proxy.	$F_{30\%SPR}$=0.189[1]	not specified
Alternative 2 (Preferred)	**MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy. MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.**	**0.221[2]**	**1,110,000[3]**

[1]Estimate from the Beaufort Assessment Model (BAM)
[2,3]SEDAR 19 (2010)

What Does SPR Mean?

SPR stands for **S**pawning **P**otential **R**atio. It is defined as the average fecundity of a recruit over its lifetime when the stock is fished divided by the average fecundity of a recruit over its lifetime when the stock is unfished. The yield at F_{SPR} may serve as proxy, or substitute, for F_{MSY} if the spawner-recruit relationship cannot be estimated reliably.

4.1.1 Biological Effects

The maximum sustainable yield (MSY) is a reference point used by managers to assess fishery performance over the long term. As a result, redefined management reference points could require regulatory changes in the future as managers monitor the long term performance of the stock with respect to the new reference point. Therefore, these parameter definitions would affect subject stocks and the ecosystem of which they are a part, by influencing decisions about how to maximize and optimize the long-term yield of fisheries under equilibrium conditions and triggering action when stock biomass decreases below a threshold level.

Specifying MSY will not impact protected species; however, subsequent regulatory changes implemented to achieve long-term performance goals based on MSY could potentially impact protected species. The biological effects of the choice of management reference points are described below.

MSY in **Alternative 1 (No Action)** is defined as the yield produced by F_{MSY} where $F_{30\%SPR}$ is used as the F_{MSY} proxy and represents the overfishing level defined in Amendment 11 to the Fishery Management Plan (FMP) for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 11, SAFMC 1998). In **Alternative 1 (No Action)**, a poundage for MSY is not specified since one was not specified in Amendment 11 due to data limitations. SEDAR 19 (2010) did not estimate the MSY level for the yield at $F_{30\%SPR}$.

Alternative 2 (Preferred) would redefine the MSY proxy of the red grouper stock based on the recommendation of the SEDAR 19 Review Panels and Scientific and Statistical Committee (SSC) to equal the value associated with the yield at F_{MSY} (1,110,00 lbs whole weight). The implementation of a MSY equation would have beneficial effects on the red grouper stock as it provides a reference point to monitor the long-term performance of the stock.

The implementation of a MSY equation would not directly affect protected species because it is meant to be a reference point to monitor the long-term performance of the stock once it is rebuilt. In the future, when the stock is rebuilt, any specific management actions based on the MSY equation that may affect protected species will be evaluated as they are developed.

4.1.2 Economic Effects

What Is the Proposed MSY Equation?

MSY = yield produced by F_{MSY} (or the F_{MSY} proxy). MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.

Defining the MSY for red grouper does not alter the current harvest or use of the resource. Specification of this measure merely establishes a benchmark for fishery and resource evaluation from which additional management actions for the species would be based, should comparison of the fishery and resource with the benchmark indicate that management adjustments are necessary. The impacts of these management adjustments will be evaluated at the time they are proposed. As a benchmark, MSY would not limit how, when, where, or with what frequency participants in the fishery engage in harvesting the resource. This includes participants who directly utilize the resource (principally commercial vessels, for-hire operations, and recreational anglers), as well as participants associated with peripheral and support industries.

Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Direct effects only accrue to actions that alter harvest or other use of the resource. Specifying MSY, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, MSY may be considered to have indirect effects on fishery participants.

As a benchmark, MSY sets off the parameters that condition subsequent management actions, and as such, defining MSY takes special significance. Of the alternatives considered in this action, **Alternative 2 (Preferred)**, which is recommended in the most recent SEDAR and by the SSC, has a better scientific basis. Hence, it provides a more solid ground for management actions that have economic implications.

4.1.3 Social Effects

The setting of MSY for red grouper is primarily a biological threshold that may impact the social environment depending upon where the threshold is set. These thresholds are determined through stock assessments by several scientific panels and are entirely determined on the biology of the species being assessed. Therefore, any indirect effect on the social environment would depend upon the level determined for each threshold and how it relates to current recreational and commercial landings. The setting of this threshold becomes even more critical if sector allocations are chosen and at what level each sector allocation is set. Certainly if this threshold is set below current landing levels, there will be changes to the social environment and setting sector allocation will become controversial.

Alternative 1 (No Action) would likely have few social impacts as it uses the present value for F_{MSY}. **Alternative 2 (Preferred),** which uses the MSY proxy recommended by the SSC, will likely have few negative social effects if the threshold is above the mean landings and not substantially reduced by other management action.

4.1.4 Administrative Effects

The potential administrative effects of these alternatives differ in terms of the implied restrictions required to constrain the fisheries to the respective benchmarks. Defining a MSY proxy establishes a harvest goal for the fishery, for which management measures will be implemented. Those management measures would directly impact the administrative environment according to the level of conservativeness associated with the chosen MSY and subsequent restrictions placed on the fishery to constrain harvest levels. **Alternative 2 (Preferred)** would implement an MSY equation that would allow for periodic adjustments of F_{MSY} and MSY values based on new assessments without the need for a plan amendment. This would reduce the administrative burden from current levels and is the least administratively burdensome MSY proxy alternatives considered under this action.

4.2 Action 2. Re-define Minimum Stock Size Threshold (MSST)

The following discussion addresses the expected effects from the proposed modifications to the MSST for red grouper (**Table 4-2**).

Table 4-2. Summary of MSST alternatives.

Alternatives	MSST Equation	M equals	MSST Values (lbs whole weight)
Alternative 1 (No Action)	Do not change the current definition of MSST for red grouper. MSST equals SSB_{MSY} ((1-M) or 0.5, whichever is greater).	0.14[1]	4,914,053[1]
Alternative 2	MSST equals 50% of SSB_{MSY}	n/a	2,857,162
Alternative 3 (Preferred)	**MSST equals 75% of SSB_{MSY}**	**n/a**	**4,285,742**
Alternative 4	MSST equals 85% of SSB_{MSY}	n/a	4,857,175
Alternative 5	MSST at which rebuilding to the MSY level would be expected to occur within 10 years at the MFMT level.[2]		

[1]Source: Determination from SEDAR 19 (2010).
[2]At the December 2010 meeting, the South Atlantic Council requested the Southeast Fisheries Science Center (SEFSC) provide an estimate of the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years when fishing mortality is at the minimum fishing mortality threshold (MFMT) level and that this be added as an alternative. This analysis is contained in **Appendix D**.

4.2.1 Biological Effects

Alternative 1 (No Action) would retain the MSST definition established in Snapper Grouper FMP Amendment 11 (SAFMC 1998). The current definition requires MSST to be at least one half of SSB_{MSY}, but allows for it to be greater than this value if natural mortality rate (M) is suitably low. If (1-M) is less than or equal to 0.5, then the value obtained from this alternative would be the same as that obtained from **Alternative 2**. However, M is very low (0.14) for red grouper. **Alternative 1 (No Action)** would result in MSST equal to 4,914,053 lbs whole weight if M=0.14. This MSST estimate is close to SSB_{MSY} (5,714,323 whole weight) as defined by the South Atlantic Council's current MSST definition; SSB_{MSY} is the stock biomass expected to exist under equilibrium. Therefore, if this alternative were chosen, then MSST would be very close to SSB_{MSY}, which is the stock biomass expected to exist under equilibrium conditions when fishing at F_{MSY}.

Because the natural mortality rate is low, the current definition of MSST would trigger a rebuilding plan if biomass fell slightly below SSB_{MSY}. However, natural variation in recruitment could cause stock biomass to frequently alternate between an overfished and rebuilt condition, even if the fishing mortality rate applied to the stock was within the limits specified by the MFMT. Therefore, under **Alternative 1 (No Action)** a rebuilding plan for red grouper could be required when the stock is not overfished. **Alternative 1 (No Action)** could be considered to have the greatest biological benefit among **Alternatives 1 (No Action)** through **4** because an overfished determination would be made when biomass is only slightly less than B_{MSY}. However, as explained in the following sections, **Alternative 1 (No Action)** could have unnecessary negative economic, social, and administrative effects.

Alternatives 2 through **4** would establish a larger buffer than **Alternative 1 (No Action)** between what is considered to be an overfished and rebuilt condition. **Alternative 2** would allow stock biomass to decrease to as little as 50% of the MSY level before an overfished determination was made. As such, it would have the least biological benefit among **Alternatives 1 (No Action)-4**. The biological effect of **Alternative 3 (Preferred)** would be intermediate between **Alternatives 2** and **4**. The impacts of **Alternative 4** would be similar to **Alternative 1 (No Action)** as the difference in the MSST value between the two alternatives is 56,878 lbs whole weight. The biological impacts of **Alternative 5** have not been estimated as the Southeast Fisheries Science Center (SEFSC) stated that the computation of MSST as recommended by **Alternative 5** would need to be completed through projection methods usually done during the stock assessment process. The computation of MSST through projection methods raises several practical and technical issues as documented in **Appendix D**.

Specifying MSST will not impact protected species; however, subsequent regulatory changes implemented to achieve long-term performance goals based on MSST could potentially impact protected species.

4.2.2 Economic Effects

Like MSY, MSST does not alter the current harvest or use of the resource, and thus would have no direct economic effects on fishery participants and associated industries or communities. Unlike MSY, however, MSST is directly related to actions for rebuilding the stock, actions that would have economic implications.

In general, a high MSST level is susceptible to triggering rebuilding actions that could limit harvest or fishing opportunities, thereby affecting the economic status of fishery participants. A low MSST level would be associated with lower probability of enacting rebuilding actions that would alter the economic environment. To the extent that rebuilding actions necessitated by a chosen MSST would tend to have economic effects, it is possible to provide some general implications of the MSST alternatives.

With rebuilding taking place over a number of years, management actions and their economic consequences could change over time depending on a variety of factors, including the status of the stock and fishing conditions. **Alternative 2** would appear to be best from an economics standpoint, because it is unlikely to trigger restrictive rebuilding actions in the short term. One possible downside of this alternative is that once the stock is considered overfished, the required rebuilding actions could be very restrictive and potentially remain for quite some time. **Alternative 1 (No Action)** lies on the opposite end because it has the highest probability of triggering restrictive rebuilding actions. As discussed in **Section 4.2.1**, **Alternative 1 (No Action)** defines MSST so close to SSB_{MSY} that the stock biomass would likely frequently fluctuate between an overfished and rebuilt status even as a result of the natural variation in recruitment. A possible mitigating factor with this alternative is the possibility that the required management actions that would have adverse economic effects would not last long. But a frequently varying regulatory regime would tend to de-stabilize business planning and fishing decisions which could have potentially worse economic consequences. The economic implications of the other alternatives may be characterized as falling between **Alternatives 1 (No Action)** and **2**.

4.2.3 Social Effects

Like MSY, the setting of the MSST for red grouper is primarily a biological threshold that may impact the social environment depending upon where the threshold is set. With all of these thresholds it is assumed that the long-term effect will ensure a stable stock and should have positive social benefits. But as mentioned earlier, there can be short-term negative social effects if the thresholds impose levels that reduce the current levels of harvest. These thresholds are determined through stock assessments by several scientific panels and are entirely determined on the biology of the species being assessed. Therefore, the effect on the social environment would depend upon the level determined for the overfishing threshold and how it relates to current recreational and commercial landings . Like the other alternatives, the setting of this threshold becomes important if sector allocations are chosen and at what level each sector allocation is set.

Alternative 1 (No Action) would likely have few impacts as it uses the present definition. Although, if this value for MSST is highest, the stock can be determined to be overfished at a higher level than the other alternatives. **Alternatives 2-4** provide MSST values of increasing percentage of the SSB (50%, 75%, 85%). In general, as the MSST value decreases, short-term social impacts (likely due to harvest limits or closures) would also decrease, but broad long-term social impacts would increase if any management action was delayed due to a low MSST. **Alternative 3 (Preferred)** provides an MSST value in between those in **Alternatives 2** and **4**. **Alternative 3 (Preferred)** is expected to result in greater short-term social impacts than **Alternative 2** from closures and other regulations that limit harvest due to MSST being reached, but fewer long-term social impacts than **Alternative 4**. The social impacts of **Alternative 5** would depend on the MSST level, which is not available at this time.

4.2.4 Administrative Effects

Because the current MSST would cause red grouper to readily fluctuate between an overfished and rebuilt condition (constantly triggering rebuilding plans), **Alternative 1 (No Action)** is the most administratively burdensome of the MSST alternatives under consideration. The larger the buffer between MSST and SSB_{MSY}, the lower the probability that red grouper would be considered overfished and require a rebuilding plan. Therefore, **Alternative 2** would be considered the least administratively burdensome alternative of all the alternatives considered since under **Alternative 2** red grouper would be least likely to be considered overfished and least likely to require a rebuilding plan. The potential administrative impacts of **Alternatives 3 (Preferred)** and **4** increase as the buffer between MSST and SSB_{MSY} decreases. As the distance between the value of MSST and SSB_{MSY} gets smaller, the probability red grouper would be considered overfished and require a rebuilding plan increases. **Alternative 5**, depending upon the SEFSC estimate, may or may not be more or less administratively burdensome than **Alternatives 3 (Preferred)** and **4**. However, **Alternative 5** is unlikely to result in greater administrative impacts than **Alternative 1 (No Action)**, or a reduced administrative burden compared to **Alternative 2**, which is the lowest value at which MSST may be set.

4.3 Action 3. Establish a Rebuilding Schedule

The South Atlantic Council is proposing the implementation of a rebuilding plan for red grouper as the stock is overfished. The South Atlantic Council is considering a range of rebuilding schedule alternatives that define the time it takes to rebuild the stock **(Table 4-3)**.

Table 4-3. Rebuilding schedule alternatives for red grouper.

Alternatives	Definition
Alternative 1 (No Action)	Do not implement a rebuilding plan for red grouper. There currently is not a rebuilding plan for red grouper. Snapper Grouper Amendment 4 (regulations effective January 1992) implemented a 15-year rebuilding plan beginning in 1991, which expired in 2006.
Alternative 2	Define a rebuilding schedule as the shortest possible period to rebuild in the absence of fishing mortality (T_{MIN}). This would equal <u>3 years</u> with the rebuilding time period ending in 2013. 2011 is Year 1.
Alternative 3	Define a rebuilding schedule intermediate between the shortest possible and maximum recommended period to rebuild. This would equal <u>7 years</u> with the rebuilding time period ending in 2017. 2011 is Year 1.
Alternative 4	Define a rebuilding schedule of <u>8 years</u> with the rebuilding time period ending in 2018. 2011 is Year 1.
Alternative 5 (Preferred)	**Define a rebuilding schedule as the maximum period allowed to rebuild (T_{MAX}). This would equal <u>10 years</u> with the rebuilding time period ending in 2020. 2011 is Year 1.**

4.3.1 Biological Effects

Alternative 1 (No Action) would not establish a rebuilding schedule for red grouper. Without a rebuilding schedule, the stock would rebuild to SSB_{MSY} if overfishing were ended; however, there would be no timeframe to specify when the stock would be rebuilt. Therefore, even though this alternative would rebuild the stock, it would not meet the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). This alternative would also maintain the existing levels of risk to Endangered Species Act (ESA)-listed species.

The overall effects of **Alternatives 2, 3, 4,** and **5 (Preferred)** are expected to be beneficial to the red grouper stock because each defines a plan for rebuilding the stock. Regardless of the approach chosen (shorter versus longer schedules), specifying a rebuilding schedule for red grouper will have no immediate effect on species protected under the ESA and the Marine Mammal Protection Act because these parameters are not used in determining immediate harvest objectives.

The choice of a rebuilding schedule has a direct effect on the biological, ecological, and physical environments by determining the length of time over which rebuilding efforts can be extended.

Alternatives 2, 3, 4, and **5 (Preferred)** would establish schedules that would achieve rebuilding time periods allowed by the Magnuson-Stevens Act, and therefore, **Alternatives 2, 3, 4,** and **5 (Preferred)** would be expected to benefit the ecological environment by restoring a crucial component (i.e., the red grouper stock) within of the South Atlantic ecosystem. See the text box for a comparison between short and long rebuilding schedules. **Alternative 2** would have the greatest biological benefits as it would rebuild the stock in the shortest amount of time. **Alternative 5** (**Preferred**) would provide the least biological benefit of **Alternatives 2-5 (Preferred)** as it specifies the longest amount of time to rebuild the stock.

The SSC recommended the South Atlantic Council select 10 years as their preferred rebuilding alternative. However, it must be noted that the SSC also recommended the strategy used to rebuild red grouper have a 70% probability of success within the 10-year timeframe, rather than the 50% probability of rebuilding success required by the Magnuson-Stevens Act (rebuilding strategy alternatives are considered in **Action 4**). Therefore, the South Atlantic Council is adopting the SSC's recommended approach that would consider a higher probability of rebuilding success than required.

A Comparison of Shorter vs. Longer Rebuilding Periods*

Shorter	***Longer***
• Generally greater beneficial impacts to biological environment	• Generally lower beneficial impacts to biological environment
• Generally require stocks be provided a greater amount of (and more immediate) relief from fishing pressure	• Allow stocks to be harvested at higher rates as they rebuild
• Allows biomass, the age and size structure, sex ratio, and community structure to be restored to healthy levels at the fastest possible rate	• Increases the risk that environmental or other factors could prevent the stocks from recovery

*Assumes the probability of rebuilding would be the same for the different time periods.

4.3.2 Economic Effects

A major economic issue associated with the choice of a rebuilding schedule relates to the cost/benefit configuration of the various alternatives over time. This cost/benefit configuration depends on the functional distance between current and target fishery status and the length of the rebuilding schedule. The length of the rebuilding period would determine how stringent the management measures should be; the shorter the rebuilding period, the more stringent would be the required management measures, but the sooner the benefits would also accrue. Conversely, longer rebuilding periods would require less stringent management measures, but benefits would accrue later.

Regardless of the length of the rebuilding period chosen, the long-term benefits from the fishery would depend on, among others, the regulatory regime adopted over time and the discount factor. Regulatory regimes that promote economic efficiency generally have a higher likelihood of generating higher economic values while preserving the sustainability of the fish stock. Other regulatory regimes could very well erode the economic benefits over time, even at higher stock levels. For example, if regulations proposed in this amendment were successful in rebuilding the red grouper stock, higher levels of harvest approaching the chosen OY would be allowed. But if nothing is done to address overcapacity and other open-access problems in the fishery that currently beset the fishery or will develop over time, the economic status of the fishery could fall back to its current, or possibly worse, condition.

Larkin et al. (2006) explored the issue of rebuilding timeframes in fisheries management. They constructed a dynamic programming bioeconomic model and applied it to two hypothesized fisheries, one involving a moderate-lived stock and the other, a long-lived stock. They noted the possibility of generating higher net present values when moving from a 10-year rebuilding timeframe to 20-year and 30-year timeframes, with a higher discounting rate resulting in larger increases than a lower one. One of the additional regulations they simulated was a 10-year fishery closure within a 40-year rebuilding timeframe. Their results showed minimal changes in net present values and allowable catch under a low discount rate, but an increase in allowable catch with slight reduction in net present value under a higher discount rate.

Alternative 1 (No Action) would not be a viable alternative because the most recent stock assessment determined red grouper to be overfished, thereby requiring a rebuilding plan. **Alternative 2** would provide the shortest rebuilding period of 3 years and very likely the most restrictive management measures over the rebuilding timeframe. **Alternative 5 (Preferred)** would provide the longest rebuilding period of 10 years and hence possibly the least restrictive management measures over the rebuilding timeframe. The restrictiveness of management measures for **Alternative 3** (7 years) and **Alternative 4** (8 years) would fall between that of **Alternatives 1 (No Action)** and **5 (Preferred)**. The degree of short-term adverse economic consequences would directly vary with the restrictiveness of management measures implied under the various alternatives. It can be expected that more future benefits would accrue soonest under **Alternative 1 (No Action)** and latest under **Alternative 5 (Preferred)**. Determining which alternative would provide the largest net benefit over time would require at least two sets of information, one related to the management actions provided under each alternative and the other pertaining to each alternative's underlying cost and benefits over time. The economic analysis reported in **Section 4.6.2** provides some insights into the economic implications of shorter versus longer rebuilding periods for red grouper.

4.3.3 Social Effects

Although defining a rebuilding schedule is an administrative action, the schedule determines the severity of the management measures necessary to rebuild the resource within the allotted timeframe. The severity of these measures, in turn, determines the magnitude of the associated social and economic effects expected to accrue during the recovery period. Generally, the shorter the rebuilding schedule, the more severe the necessary harvest restrictions. The more severe the harvest restrictions, the greater the short-term adverse effects associated with business failure, job or living dislocations, and overall adjustments for the social environment. Commercial and recreational fishermen may be able to adjust to the restrictions by switching to other species or by leaving fishing and seeking other employment or recreational pursuits, thereby mitigating any potential adverse social impacts. If other species are also depleted, regulations may prevent switching to another fishery, or if other forms of employment or recreational activities are unavailable or difficult to find, then mitigation opportunities are reduced and net adverse social impacts are potentially more severe.

With respect to individual user groups, depending on the value of the resource and the yield stream of benefits realized upon recovery, particularly severe restrictions may result in losses to current users that cannot be recovered in the long term, or can be recovered, but are realized by different users, particularly if current users choose or are economically forced to exit the fishery due to the measures implemented to achieve any required harvest reductions.

Because the red grouper resource has been declared overfished, a rebuilding schedule is required. Therefore, **Alternative 1 (No Action),** which would not establish a rebuilding schedule, would require subsequent additional management action to adopt a legally compliant rebuilding schedule.

Alternatives 2-5 (Preferred) specify rebuilding schedules of different length. Red grouper would be closed during the initial years under each rebuilding schedule and would likely be closed for longer periods within the years for rebuilding schedules of shorter length, which require more restrictive management measures. Faster recovery conceptually allows faster receipt of the benefits of a recovered resource—a long-term positive effect on fishermen and fishing communities—but it is less likely that the resource could recover under the shortest schedule (**Alternative 2**) and the restrictions would likely be more severe, increasing immediate social impacts on fishermen. Regardless of duration, severe restrictions on red grouper harvest could result in loss of jobs in commercial and for-hire fleets, and after even just a few years, the commercial and for-hire sectors may not recover. Under the intermediate rebuilding schedules in **Alternative 3** and **Alternative 4**, recovery of the red grouper stock is realistic and likely would not require reduced harvest to meet the rebuilding strategy, resulting in less short-term social impacts than under **Alternative 2**. **Alternative 5 (Preferred)** would allow the longest possible rebuilding timeframe, which would be expected to allow the greatest flexibility to recover red grouper and minimize the adverse social and economic effects on the fishermen, associated businesses and communities.

4.3.4 Administrative Effects

In general, the shorter the rebuilding schedule the more restrictive the harvest limitations need to be in order to rebuild the stock within the specified timeframe. Greater restrictions can result in increased impacts on the administrative environment due to an increased need to closely track landings; enforce bag, trip; and size limits; or implement in-season and post-season AMs. **Alternative 1 (No Action)** would not establish a rebuilding schedule and would therefore, not comply with Magnuson-Stevens Act requirements for developing rebuilding plans. If **Alternative 1 (No Action)** were chosen as a preferred alternative and litigation resulted from that choice, the impact on the administrative environment would be significant. **Alternative 2** is the shortest rebuilding schedule considered and would require implementation of additional harvest restrictions to meet the goal of rebuilding the stock within 3 years. Therefore, of all the rebuilding schedule alternatives that specify a timeframe, **Alternative 2** would be most likely to impact the administrative environment in the form of developing, implementing, and monitoring more restrictive harvest regulations for red grouper. **Alternative 5 (Preferred)** would specify the longest rebuilding schedule at 10 years, and would not require implementation of additional harvest restrictions beyond the status quo.

Alternative 5 (Preferred) would incur the lowest impact on the administrative environment since measures to limit harvest of red grouper and other shallow water grouper species already in place are considered sufficient to end overfishing of red grouper. **Alternatives 3** and **4** would specify rebuilding schedules of 7 and 8 years, respectively, and would therefore result in administrative impacts in between those of **Alternative 2** and **Alternative 5 (Preferred)**.

4.4 Action 4. Establish a Rebuilding Strategy and Acceptable Biological Catch (ABC)

The South Atlantic Council is proposing the implementation of a rebuilding plan for red grouper as the stock is overfished. The South Atlantic Council is considering a range of rebuilding strategy alternatives that define the maximum fishing mortality rate throughout the rebuilding timeframe. **Tables 4-4 and 4-5** below summarize the alternatives that follow.

Table 4-4. A summary of the rebuilding strategy alternatives for red grouper.

Alternatives	Rebuilding strategy (F_{OY} Equal To) Scenario	F rate	ABC (lbs whole weight) *Landings and Discards*	ABC (lbs whole weight) *Landings*
Alternative 1 (No Action)	$F_{45\%SPR}$	0.1055	399,000 (2011) 468,000 (2012) 537,000 (2013) 602,000 (2014)	374,000 (2011) 442,000 (2012) 511,000 (2013) 575,000 (2014)
Alternative 2	$F_{REBUILD}$ (10 years)	0.181	665,000 (2011) 737,000 (2012) 806,000 (2013) 866,000 (2014)	622,000 (2011) 693,000 (2012) 762,000 (2013) 822,000 (2014)
Alternative 3 (Preferred)	**75%F_{MSY}**	**0.166**	613,000 (2011) 687,000 (2012) 759,000 (2013) 821,000 (2014)	**573,000 (2011)** **647,000 (2012)** **718,000 (2013)** **780,000 (2014)**
Alternative 4	65%F_{MSY}	0.144	535,000 (2011) 610,000 (2012) 683,000 (2013) 749,000 (2014)	501,000 (2011) 575,000 (2012) 648,000 (2013) 713,000 (2014)
Alternative 5	$F_{REBUILD}$ (7 years)	0.157	583,000 (2011) 657,000 (2012) 730,000 (2013) 794,000 (2014)	545,000 (2011) 619,000 (2012) 691,000 (2013) 755,000 (2014)
Alternative 6	$F_{REBUILD}$ (8 years)	0.168	620,000 (2011) 695,000 (2012) 765,000 (2013) 828,000 (2014)	580,000 (2011) 654,000 (2012) 724,000 (2013) 787,000 (2014)

NOTE: **Alternatives 2-4** are based on a 70% probability of rebuilding success in 10 years. **Alternative 5** is based on a 70% probability of rebuilding success in 7 years. **Alternative 6** is based on a 70% probability of rebuilding success in 8 years.

Table 4-5. A comparison of rebuilding strategy alternatives for red grouper in terms of probability of stock recovery.

	Alternatives					
	1 (No Action)	**2** $F_{REBUILD}$ (10 years)	**3** 75%F_{MSY} (Preferred)	**4** 65%F_{MSY}	**5** $F_{REBUILD}$ (7 years)	**6** $F_{REBUILD}$ (8 years)
Probability of rebuilding to SSB_{MSY} in 10 years (2020)	n/a	70%	81%	92%	n/a	n/a
Probability of rebuilding to SSB_{MSY} in 7 years (2017)	n/a	54%	64%	78%	70%	n/a
Probability of rebuilding to SSB_{MSY} in 8 years (2018)	n/a	61%	72%	85%	n/a	70%
Year in which 50% probability of rebuilding to SSB_{MSY} would be reached	2014[1]	2017	2016	2016	2015[2]	2016[3]

[1]Based upon a $F_{30\%SPR}$ proxy for F_{MSY}
[2]A 48% probability of rebuilding
[3]A 54% probability of rebuilding
NOTE: **Alternatives 2-4** are based on a 70% probability of rebuilding success in 10 years. **Alternative 5** is based on a 70% probability of rebuilding success in 7 years.
Alternative 6 is based on a 70% probability of rebuilding success in 8 years.

Alternatives

Alternative 1 (No Action). Do not specify a rebuilding strategy for red grouper.

Alternative 2. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in T_{MAX} (ten years for red grouper). Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2017 and 70% chance of rebuilding to SSB_{MSY} by 2020.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 665,000 lbs whole weight (2011), 737,000 lbs whole weight (2012), 806,000 lbs whole weight (2013), and 866,000 lbs whole weight (2014).
- The Acceptable Biological Catch values without dead discards would be 622,000 lbs whole weight (2011), 693,000 lbs whole weight (2012), 762,000 lbs whole weight (2013), and 822,000 lbs whole weight (2014).

Table 4-6. Projection results if the fishing mortality rate is fixed at F = Rebuild with a 70% probability of rebuilding success in 10 years.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.181	0.01	622,000	43,000	665,000
2012	0.181	0.06	693,000	44,000	737,000
2013	0.181	0.15	762,000	44,000	806,000
2014	0.181	0.26	822,000	44,000	866,000
2015	0.181	0.36	873,000	45,000	918,000
2016	0.181	0.46	915,000	45,000	960,000
2017	0.181	0.54	951,000	45,000	996,000
2018	0.181	0.61	980,000	45,000	1,025,000
2019	0.181	0.66	1,004,000	46,000	1,050,000
2020	0.181	0.7	1,023,000	46,000	1,069,000

Where Does a 70% Probability of Rebuilding Success Come From?

The SSC is recommending a P* of .30. A P* is the risk that overfishing is occurring. The probability of rebuilding success = 100-P*. So in the case of red grouper, the SSC is recommending that the South Atlantic Council chooses a rebuilding plan that would be expected to have a 70% chance or better of rebuilding to the target within the specified rebuilding timeframe.

Alternative 3 (Preferred). Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $75\%F_{MSY}$. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2016 and 81% chance of rebuilding to SSB_{MSY} by 2020.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values without dead discards would be 573,000 lbs whole weight (2011), 647,000 lbs whole weight (2012), 718,000 lbs whole weight (2013), and 780,000 lbs whole weight (2014).

Table 4-7. Projection results if the fishing mortality_rate is fixed at F = 75%F_{MSY}.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.166	0.01	573,000	40,000	613,000
2012	0.166	0.07	647,000	40,000	687,000
2013	0.166	0.18	718,000	41,000	759,000
2014	0.166	0.31	780,000	41,000	821,000
2015	0.166	0.44	834,000	41,000	875,000
2016	0.166	0.55	880,000	42,000	922,000
2017	0.166	0.64	919,000	42,000	961,000
2018	0.166	0.72	951,000	42,000	993,000
2019	0.166	0.77	977,000	42,000	1,019,000
2020	0.166	0.81	999,000	42,000	1,041,000

Alternative 4. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at 65%F_{MSY}. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2016 and 92% chance of rebuilding to SSB_{MSY} by 2020.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 535,000 lbs whole weight (2011), 610,000 lbs whole weight (2012), 683,000 lbs whole weight (2013), and 749,000 (2014).
- The Acceptable Biological Catch values without dead discards would be 501,000 lbs whole weight (2011), 575,000 lbs whole weight (2012), and 648,000 lbs whole weight (2013), and 713,000 lbs whole weight (2014).

Table 4-8. Projection results if the fishing mortality rate is fixed at F = 65%$F_{MSY.}$

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,00	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.144	0.01	501,000	34,000	535,000
2012	0.144	0.08	575,000	35,000	610,000
2013	0.144	0.23	648,000	35,000	683,000
2014	0.144	0.4	713,000	36,000	749,000
2015	0.144	0.56	770,000	36,000	806,000
2016	0.144	0.69	820,000	36,000	856,000
2017	0.144	0.78	863,000	37,000	900,000
2018	0.144	0.85	898,000	37,000	935,000
2019	0.144	0.89	928,000	37,000	965,000
2020	0.144	0.92	953,000	37,000	990,000

Alternative 5. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in 7 years. Under this strategy, the fishery would have at least a 48% chance of rebuilding to SSB_{MSY} by 2015 and 70% chance of rebuilding to SSB_{MSY} by 2017.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 583,000 lbs whole weight (2011), 657,000 lbs whole weight (2012), 730,000 lbs whole weight (2013), and 794,000 lbs whole weight (2014).
- The Acceptable Biological Catch values without dead discards would be 545,000 lbs whole weight (2011), 619,000 lbs whole weight (2012), 691,000 lbs whole weight (2013), and 755,000 lbs whole weight (2014).

Table 4-9. Projection results if the fishing mortality rate is fixed at F = Rebuild with a 70% probability of rebuilding success in 7 years.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.157	0.01	545,000	38,000	583,000
2012	0.157	0.07	619,000	38,000	657,000
2013	0.157	0.20	691,000	39,000	730,000
2014	0.157	0.34	755,000	39,000	794,000
2015	0.157	0.48	810,000	39,000	849,000
2016	0.157	0.60	858,000	40,000	898,000
2017	0.157	0.7	898,000	40,000	938,000

Alternative 6. Define a rebuilding strategy for red grouper that sets ABC equal to the yield at $F_{REBUILD}$. $F_{REBUILD}$ is a fishing mortality rate that would have a 70% probability of rebuilding success to SSB_{MSY} in 8 years. Under this strategy, the fishery would have at least a 54% chance of rebuilding to SSB_{MSY} by 2016 and 70% chance of rebuilding to SSB_{MSY} by 2018.

- The Overfishing Limit is the yield at F_{MSY}.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee is the projected yield stream with a 70% probability of rebuilding success.
- The Acceptable Biological Catch values with dead discards would be 620,000 lbs whole weight (2011), 695,000 lbs whole weight (2012), 765,000 lbs whole weight (2013), and 828,000 lbs whole weight (2014).
- The Acceptable Biological Catch values without dead discards would be 580,000 lbs whole weight (2011), 654,000 lbs whole weight (2012), 724,000 lbs whole weight (2013), and 787,000 lbs whole weight (2014).

Table 4-10. Projection results if the fishing mortality rate is fixed at F = Rebuild with a 70% probability of rebuilding success in 8 years.

Year	F (per year)	Probability of Rebuilt Stock	Projections		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.168	0.01	580,000	40,000	620,000
2012	0.168	0.07	654,000	41,000	695,000
2013	0.168	0.17	724,000	41,000	765,000
2014	0.168	0.3	787,000	41,000	828,000
2015	0.168	0.42	840,000	42,000	882,000
2016	0.168	0.54	886,000	42,000	928,000
2017	0.168	0.63	924,000	42,000	966,000
2018	0.168	0.70	956,000	42,000	998,000

4.4.1 Biological Effects

This action determines the target level of fishing mortality during the rebuilding time frame, hence the term "strategy". The outcome of the decision is the acceptable biological catch (ABC) upon which the annual catch limit (ACL) and the optimum yield (OY) are based (see **Action 6**).

There are negative consequences with retaining **Alternative 1 (No Action)**. Although the rebuilding strategy is currently specified ($F_{45\%SPR}$), the ABC, ACL, and OY levels are not explicitly stated. The specification of targets and limits is a crucial component of any management program involving natural resources. Without the designation of these components, regulations may not be sufficient to prevent overfishing and rebuild the stock.

Potential adverse impacts from overfishing (fishing mortality too high) include a decrease in the average age and size structure of the red grouper stock, which may decrease population robustness to environmental perturbations. Also, older and larger females have greater reproductive potential because fecundity increases exponentially with size. Therefore, high fishing mortality rates can lower the potential to more rapidly increase the number of young each year (recruitment)

In turn, continued overexploitation of any snapper grouper species may disrupt the natural community structure of the reef ecosystems that support these species. Predator species could be expected to decrease in abundance in response to a decline of an exploited species. Alternatively, predators could target other species as prey items. Conversely, the abundance of those prey and competitor species of the overexploited species that are not targeted in fisheries (e.g., scup and tomtate) could increase in response to a decline in the abundance of a targeted species such as red grouper.

Alternatives 2-6 would have positive biological effects on the stock since the South Atlantic Council would manage towards a biological benchmark based on scientific advice in the form of an ABC level. The specification of an ABC would protect the red grouper stock to allow sustainable exploitation. Sustainable exploitation would allow the existence of an appropriate number of older, larger fishes in the population. A robust population provides additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae. Conversely, delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing.

The alternatives may be ranked by the maximum allowable fishing mortality rate of each rebuilding strategy. Beginning with the least amount of expected biological beneficial effects, the ranking of alternatives is as follows: **Alternative 2** (F rate = 0.181), **Alternative 6** (F rate = 0.168), **Alternative 3 (Preferred)** (F rate = 0.166), **Alternative 5** (F rate = 0.157), and **Alternative 4** (F rate = 0.144). The effects of **Alternatives 3 (Preferred)** and **6** would be expected to be similar as the difference in the allowable fishing mortality rate is only 0.002. ABC, ACL, and OY values at equilibrium in the alternatives are distinguished from each other by the level of risk (and associated tradeoffs) each would assume. The more conservative the estimates, the larger the sustainable biomass when the stock is rebuilt.

It must be noted that **Alternative 2** is the rebuilding strategy recommended by the South Atlantic Council's SSC. When evaluating SEDAR 19 at their August 2010 meeting, the SSC recommended the South Atlantic Council consider a 10-year rebuilding schedule with a strategy that had a 70% chance of rebuilding the stock within this time period. **Alternative 2** is more conservative than rebuilding strategies that have only a 50% chance of rebuilding the stock within 10 years. **Alternative 3 (Preferred)**, which has an 81% chance of rebuilding within the specified time frame, would have a greater biological effect than the South Atlantic Council's SSC recommended **Alternative 2**.

There is likely to be no additional biological benefit to protected species from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between ESA-listed species and the fishery. Previous ESA consultations determined the snapper grouper fishery was not likely to adversely affect marine mammals or *Acropora* species. **Alternatives 2-6** are unlikely to alter fishing behavior in a way that would cause new adverse effects to these species. The impacts of **Alternatives 2-6** on sea turtles and smalltooth sawfish will likely vary depending on the rebuilding strategy selected. Assuming that smaller ACBs, ACLs, and OYs result in less fishing effort for red grouper, more conservative values may reduce the likelihood of interactions between fishers targeting red grouper and sea turtles and smalltooth sawfish. Under that assumption, **Alternative 4** would be the most beneficial to sea turtles and smalltooth sawfish and **Alternative 2** would be the least beneficial because those alternatives result in the lowest and highest ABCs, respectively. The benefit of the remaining alternatives would fall between those extremes.

4.4.2 Economic Effects

4.4.2.1 Economic Effects on the Commercial Sector

Fishermen with permits to fish in federal waters for species in the snapper grouper fishery have been required since 1993 to submit trip reports of their landings by species. These logbook trip reports from 2005-2009 constitute the source of data used in this analysis.

The simulation model uses logbook trip reports to predict the short-term economic effects of proposed management alternatives.[1] The general method of analysis is to hypothetically impose proposed regulations on individual fishing trips as reported to the logbook database, and then calculate their effects on trip catches, revenues, and costs. Trip-level results are totaled by year for 2005-2009, and the five-year average of simulated results is interpreted as the expected annual outcome of proposed regulations. The five-year average is used so that short-term anomalies that may have affected fishing success in any one year will be averaged out. The simulated average annual dockside revenue less trip costs (excluding labor cost) for the proposed alternatives is compared to **Alternative 1 (No Action)** to estimate the expected economic effects on commercial fishermen. This net income calculation will henceforth be referred to as *net operating revenues*. A description of the methodology used and more details of the assessment results are found in **Appendix H**.

The net present values of changes in net operating revenues (NOR) to the commercial sector associated with the rebuilding strategy alternatives proposed in **Action 4** are presented in **Table 4-11** organized into two separate time horizons, 7 and 10 years, for a range of discount rates from zero to 7%. The choice of the appropriate discount rate does not change the relative ranking of the alternatives but will change the magnitude of the net present value of future NOR streams. The projected NOR streams of the red grouper rebuilding strategies (i.e., **Alternatives 2-6**) created by the proposed ACLs and projected biomass figures were discounted over a period of 7 and 10 years to populate **Table 4-11**.

The analysis suggests that from an industry-wide perspective **Alternative 2** is economically superior to the other rebuilding strategy alternatives presented in **Action 4**. **Alternatives 6** and **3 (Preferred)** provide the second and third highest economic benefits, respectively.

In **Table 4-11,** if we assume a discount rate of 7%, then **Alternative 2** is expected to generate an additional $1,116,000 over the first seven years of the rebuilding schedule relative to **Alternative 1 (No Action)** with an additional $380,000 generated in years 8 through 10. Over a time horizon of 10 years with an assumed discount rate of 7%, **Alternative 2** is expected to generate at least $200,000 more than the next two best alternatives, which are **Alternatives 6** and **3 (Preferred)**. **Alternative 3 (Preferred)** is expected to generate an additional $990,000 over the first 7 years of the rebuilding schedule relative to **Alternative 1 (No Action)** with an additional $310,000 generated in years 8 through 10 assuming a discount rate of 7%. The least favorable alternative to the commercial fleet is **Alternative 4,** which will result in a gain of about $660,000 relative to the **Alternative 1 (No Action)** in the first seven years of the rebuilding

[1] The simulation model is described in more detail in Waters, James R. July 2008. An Economic Model to Analyze Management Alternatives Proposed for the Commercial Fishery in Amendment 16 to the Snapper-Grouper Fishery Management Plan. NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, 14p.

plan assuming a discount rate of 7% (**Table 4-11**).

The anticipated economic effects of the projected increase in red grouper landings are relatively small compared to the size of the snapper grouper fishery as a whole. Over ten years, the predicted increase in NOR due to red grouper landings relative to all landings on trips that catch at least one pound of snapper grouper species ranges from 1.4% (**Alternative 4**) to 2.4% (**Alternative 2**) assuming a discount rate of 7%. Another interesting trend from **Table 4-11** is that the relative increase in NOR during years 8 through 10 is much larger than that for the first 7 years of each of the rebuilding plans. This phenomenon is driven by the projected increase in biomass during the latter years of the rebuilding schedule while the ACLs are held constant after year four. This is a preliminary conclusion, at best, as the simulation model is best suited for short-term predictions.

Table 4-11. Net present value of changes in net operating revenues (NOR) to the commercial sector associated with the rebuilding strategy alternatives in **Action 4** over time horizons of seven and ten years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and using different discount rates. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy and Discount Rate	**7-Year Horizon**					**10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Change in NOR[1]	$1.51	$1.28	$0.86	$1.15	$1.32	$2.21	$1.85	$1.23	$1.66	$1.92
% Change in NOR	2.4%	2.0%	1.4%	1.8%	2.1%	2.4%	2.1%	1.4%	1.8%	2.1%
Rebuilding Strategy and Discount Rate	**7-Year Horizon**					**10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Change in NOR	$1.35	$1.14	$0.76	$1.02	$1.18	$1.88	$1.58	$1.05	$1.42	$1.63
% Change in NOR	2.4%	2.0%	1.4%	1.8%	2.1%	2.4%	2.1%	1.4%	1.8%	2.1%
Rebuilding Strategy and Discount Rate	**7-Year Horizon**					**10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	$1.16	$0.99	$0.66	$0.89	$1.02	$1.54	$1.30	$0.87	$1.17	$1.34
% Change in NOR	2.4%	2.1%	1.4%	1.8%	2.1%	2.4%	2.1%	1.4%	1.8%	2.1%

[1]Percent change in NOR is relative to NOR from all trips landing at least one pound of snapper grouper.

The changes in the net present values of NOR by state of landing to the commercial sector associated with the various rebuilding alternatives in **Action 4** are presented in **Table 4-12** organized into three separate time horizons–7, 8, and 10 years–with an assumed discount rate of 3%. The projected NOR streams of all the proposed rebuilding strategies (i.e., **Alternatives 2-6**) created by the proposed ACLs and projected biomass figures were discounted over a period of ten years while NOR streams associated with **Alternatives 5** and **6** were also discounted over a period of 7 and 8 years, respectively.

Table 4-12. Net present value of changes in net operating revenues (NOR) by state of landing to the commercial sector associated with the rebuilding strategy alternatives in **Action 4** over time horizons of 7, 8, and 10 years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and a discount rate of 7%. Dollar amounts are in thousands of 2010 dollars.

Rebuilding Strategy and Discount Rate	**North Carolina – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**North Carolina - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$608	$774	$1,052	$896	$607	$810	$920
% Change in NOR	N/A	N/A	N/A	4.6%	5.3%	6.0%	5.1%	3.5%	4.6%	5.3%
Rebuilding Strategy and Discount Rate	**South Carolina – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**South Carolina - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$269	$350	$474	$398	$268	$351	$411
% Change in NOR	N/A	N/A	N/A	3.1%	3.6%	4.1%	3.5%	2.3%	3.1%	3.6%
Rebuilding Strategy and Discount Rate	**Georgia/NE Florida – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Georgia/NE Florida - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$(20)	$(31)	$(40)	$(38)	$(40)	$(41)	$(41)
% Change in NOR	N/A	N/A	N/A	-0.4%	-0.6%	-0.7%	-0.6%	-0.7%	-0.7%	-0.7%

Table 4-12. Continued. Net present value of changes in net operating revenues (NOR) by state of landing to the commercial sector associated with the rebuilding strategy alternatives in Action 4 over time horizons of 7, 8, and 10 years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and a discount rate of 7%. Dollar amounts are in thousands of 2010 dollars.

Rebuilding Strategy and Discount Rate	**Central and South Florida – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Central and South Florida - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$17	$20	$32	$26	$20	$21	$31
% Change in NOR	N/A	N/A	N/A	0.1%	0.2%	0.2%	0.2%	0.1%	0.1%	0.2%

Rebuilding Strategy and Discount Rate	**Florida Keys – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Florida Keys - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$16	$20	$23	$18	$12	$13	$23
% Change in NOR	N/A	N/A	N/A	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%

The information at the state-level provides more insight into which rebuilding strategy would be preferable. In the state-level analysis each rebuilding alternative is evaluated within its proposed time frame. **Alternatives 2-4** are evaluated over a period of 10 years while **Alternatives 5** and **6** are evaluated over a time horizon of 7 and 8 years, respectively. **Alternatives 5** and **6** are also discounted over 10 years for comparison among alternatives. The change in NOR reported in the table should not be compared across alternatives when the time frames are different although a comparison of the benefits of each rebuilding plan over the 10 year horizon is valid. The percentage change is comparable across rebuilding alternatives for different time periods, as this statistic is a relative measure of the change in NOR associated with each alternative and a comparable baseline estimate under the same time horizon.

Again, **Alternative 2** is economically superior to the other alternatives due to the amount of additional NOR that is expected to be generated in a particular time horizon. Also, in all cases fishermen who land their catch in North Carolina are expected to benefit the greatest relative to fishermen in other states. Only fishermen in Georgia and northeast Florida are expected to lose a relatively small amount of NOR (not more than $40,000). This reinforces that **Alternative 2** is not only globally (i.e., industry-wide) superior from an economic perspective but also regionally superior. The predicted benefits of **Alternative 2** are greater than those of all the other alternatives as well. This is strong evidence from an economic perspective about the superiority of **Alternative 2** relative to the other alternatives. **Preferred Alternative 3** ranks third behind **Alternatives 2** and **6**. Finally, fishers in Georgia and Florida are predicted to only receive relatively minor benefits from the proposed rebuilding plans. The most generated by these fishers would be

$32,000 by central south Florida boats under **Alternative 2**.

The changes in the net present values of NOR by primary gear type to the commercial sector associated with the rebuilding strategy alternatives proposed in **Action 4** are presented in **Table 4-13**. We define the primary gear for a trip as that which produced a plurality of revenues on a trip. The vertical line sector includes all hook and line gear including handlines, electric and bandit gear, and troll lines. The diving sector includes both spears and powerhead gear. Fishermen primarily using other gears are projected to not be affected by the red grouper legislation. **Table 4-13** organizes these changes into three separate time horizons, 7, 8, and 10 years, with an assumed discount rate of 7%. The projected NOR streams of all the proposed rebuilding strategies (i.e., **Alternatives 2-6**) created by the proposed ACLs and projected biomass figures were discounted over a period of 10 years while NOR streams associated with **Alternatives 5** and **6** were also discounted over a period of 7 and 8 years, respectively.

Table 4-13 suggests that most of the benefits from the rebuilding strategy alternatives will accrue to the vertical line fishers, especially those who utilize hook-and-line and bandit gears. Assuming a discount rate of 7%, **Alternative 2** creates the most benefits totaling $1,516,000 to the vertical line sector and $21,000 to the diving sector over a period of 10 years. The ranking of the other alternatives is the same as the previous analyses above. **Alternatives 3 (Preferred)** and **6** are the next best alternatives, followed by **Alternative 5**. **Alternative 4** accrues the least benefits.

Table 4-13. Net present value of changes in net operating revenues (NOR) by primary gear to the commercial sector associated with the rebuilding strategy alternatives in **Action 4** over time horizons of seven, eight, and ten years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and a discount rate of 7%. Dollar amounts are in thousands of 2010 dollars.

Rebuilding Strategy and Discount Rate	**Vertical Lines – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Vertical Lines - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$871	$1,110	$1,516	$1,276	$851	$1,142	$1,317
% Change in NOR	N/A	N/A	N/A	2.3%	2.7%	3.1%	2.6%	1.7%	2.3%	2.7%
Rebuilding Strategy and Discount Rate	**Diving – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Diving - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$13	$17	$21	$19	$12	$18	$20
% Change in NOR	N/A	N/A	N/A	0.5%	0.6%	0.6%	0.5%	0.3%	0.5%	0.6%

In addition to the estimated change in economic value discussed above, management actions would also have consequences on the level of business activity (**Table 4-14**). Business activity is characterized in the form of employment (FTE jobs) impacts, income impacts (wages, salaries, and self-employed income), and output (sales) impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting.

Business activity and economic value are not equivalent concepts, but the calculation of the change in business activity utilizes variables that were used in the calculation of the expected change in economic value, specifically dockside revenues in the commercial sector. Because both assessments (change in economic value and change in business activity) use this common variable, the ranking of alternatives based on the magnitude of these effects would likely be unaffected by the metric examined; the greater the estimated change in economic value, the greater the estimated change in business activity.

The estimates of the change in business activity should be interpreted and used with caution. While some change (loss or gain) of business activity would be expected to result from any change in commercial revenues, the full loss or gain of the estimates provided below should not be expected to occur as a result of the proposed management changes. The primary reason for this is the calculation of these results does not account for behavioral changes that would be expected to occur in response to the proposed management changes. An estimated loss in dockside revenues may be overstated if fishermen are able to re-direct their fishing effort to substitute species, while an estimated gain in dockside revenues may come at the expense of reduced harvests of, and revenues from, other species.

Fishing revenues generate business activity in multiple sectors of the economy. These sectors are combined and summarized in the business activity model as harvester, dealer/processor, wholesaler/distributor, grocer, and restaurant sectors. It is sufficient for the current purpose to present only the overall changes in business activity to the harvesters and seafood industry.

The dockside revenues used to generate the impacts on business activities were average annual revenues. These were derived by taking the average of annual stream revenues from each alternative. In this way, the impacts shown in the table may be interpreted as annual changes in business activities over the rebuilding period. Note that impacts on business activities for Georgia are combined with those of Northeast Florida for confidentiality reasons. The dollar values are expressed in 2008 dollars.

The magnitude of business activity impacts shown in **Table 4-14** mimics the magnitude of dockside revenues for each state due to the various alternatives, with North Carolina having the largest impacts, followed by South Carolina, Florida, and Georgia/Northeast Florida. Georgia/Northeast Florida would experience reductions in business activity under all rebuilding alternatives.

Alternative 2 would generate the largest positive impacts on employment, income, and output for all states combined. On a state-by-state basis, **Alternative 2** would dominate the other alternatives for all states, except Georgia/Northeast Florida and Florida for which **Preferred Alternative 3** would be best. While the overall effects of **Preferred Alternative 3** would be positive for all states combined, Georgia/Northeast Florida would experience some reductions in business activity. Negative effects on business activity for all states would result from **Alternatives 5** and **6**.

Table 4-14. Potential change in business activities associated with the rebuilding strategy alternatives relative to **Alternative 1 (No Action)**. All dollar values are in thousands of 2008 dollars.

	North Carolina	South Carolina	Georgia/NE FL	Florida
	Alternative 2			
Employment	26	10	-2	1
Income	$611	$219	-$35	$22
Output	$1,136	$454	-$71	$41
	Preferred Alternative 3			
Employment	22	9	-2	1
Income	$520	$185	-$34	$18
Output	$966	$384	-$70	$33
	Alternative 4			
Employment	15	6	-2	0
Income	$356	$125	-$35	$13
Output	$661	$258	-$73	$25
	Alternative 5			
Employment	-137	-79	-66	-126
Income	-$3,202	-$1,668	-$1,424	-$3,381
Output	-$5,949	-$3,456	-$2,930	-$6,363
	Alternative 6			
Employment	-83	-49	-45	-84
Income	-$1,923	-$1,036	-$962	-$2,246
Output	-$3,572	-$2,147	-$1,979	-$4,227

4.4.2.2 Economic Effects on the Recreational Sector

Due to the direct relationships between rebuilding strategies, allocations, and ACL/OY, the effects of the alternatives for rebuilding strategy are evaluated assuming the preferred alternatives for allocations and ACLs/OYs.

This assessment evaluated the expected change in economic value relative to the no action alternative. The change in economic value is measured in terms of the consumer surplus (CS) to recreational anglers. The relatively sparse number of target trips for red grouper by anglers fishing through the for-hire vessels precluded the estimation of effects on the net operating revenues (NOR) of for-hire vessels. 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 an appropriate measure of economic effects on recreational anglers as a result of changes in fishing regulations. More details on the methodology and assessment results are found in **Appendix I**.

In estimating the CS effects of the various rebuilding strategies, the current preferred alternatives for **Actions 5** and **6** were assumed. Specifically, these assumptions are ACL being equal to ABC and the recreational allocation being equal to 56% of ABC. In addition, the aggregate ACL for black grouper, gag, and red grouper was assumed not to have been met during the period of the analysis. A 7% discount rate was used to convert the stream for CS over time into net present values. The use of other discount rates would merely change the magnitude of effects but not the ranking of alternatives (see **Appendix J**).

All the rebuilding strategies would result in CS increases to recreational anglers, mainly because the baseline recreational landings are lower than the ACL resulting from the rebuilding alternatives (**Table 4-15**). Indeed the assumptions regarding the ACL being equal to ABC and the recreational allocation being equal to 56% of ACL played some important roles in determining the economic outcome of the various rebuilding strategies.

The ranking of the rebuilding alternatives, assuming the preferred alternatives for all other actions, is fairly consistent across CS values and time horizons. Over 4 years or 10 years, the alternatives may be ranked in descending order as follows: **Alternative 2**, **Alternative 6**, **Alternative 3 (Preferred)**, **Alternative 5**, and **Alternative 4**. **Preferred Alternative 3** would result in CS increases ranging from $0.84 million to $3.86 million over 4 years, or from $3.07 million to $14.1 million over 10 years.

Table 4-15. Net present value of changes in CS to the recreational sector associated with the rebuilding strategies over 4 years and 10 years, assuming recreational allocation of 56% of ACL and ACL=ABC, and using a 7% discount rate. Dollar amounts are in millions of 2010 dollars.
High, Medium, and Low represent the range of CS effects using various estimates of CS per fish found in empirical studies.

Rebuilding Strategy	4- Year Horizon	10-Year Horizon
	High	
Alternative 2: $F_{REBUILD}$(10)	$4.90	$15.92
Alternative 3 (Preferred): 75%F_{MSY}	**$3.86**	**$14.10**
Alternative 4: 65%F_{MSY}	$2.23	$11.10
Alternative 5: $F_{REBUILD}$(7)	$3.23	$12.97
Alternative 6: $F_{REBUILD}$(8)	$4.01	$14.38
	Medium	
Alternative 2: $F_{REBUILD}$(10)	$4.10	$13.32
Alternative 3 (Preferred): 75%F_{MSY}	**$3.23**	**$11.79**
Alternative 4: 65%F_{MSY}	$1.87	$9.29
Alternative 5: $F_{REBUILD}$(7)	$2.70	$10.85
Alternative 6: $F_{REBUILD}$(8)	$3.36	$12.03
	Low	
Alternative 2: $F_{REBUILD}$(10)	$1.07	$3.46
Alternative 3 (Preferred): 75%F_{MSY}	**$0.84**	**$3.07**
Alternative 4: 65%F_{MSY}	$0.49	$2.41
Alternative 5: $F_{REBUILD}$(7)	$0.70	$2.82
Alternative 6: $F_{REBUILD}$(8)	$0.87	$3.13

4.4.3 Social Effects

The rebuilding strategies and associated ABCs in this action are trade-offs of long-term and short-term biological benefits, which are directly tied to long-term and short-term social benefits. A more conservative rebuilding strategy will likely result in short-term negative social impacts such as loss of income and decreased fishing opportunities due to lower target fishing mortality. However, the resulting larger sustainable biomass once the stock is rebuilt is expected to produce long-term social benefits, including stable and sustainable livelihoods for commercial fishermen and the for-hire sector; consistent product for fish houses and restaurants; and private recreational fishing opportunities.

The preferred rebuilding strategy from the perspective of the social environment would be expected to be influenced by the fishermen's perceptions of stock status. If the commercial and recreational fishermen believe that the resource is overfished, then fishermen and associated businesses would be expected to generally accept short-term socioeconomic losses in exchange for long-term increases in harvest rates if timing and amount of payback is reasonable. However, if fishermen disagree with the stock assessment, then they would be expected to be less willing to incur reductions in current harvest rates.

The rebuilding strategy decision will result in the establishment of the ABC for red grouper, which will be used by the South Atlantic Council to select the ACL for the species, a number that can be set at the same level but not higher than the ABC. **Alternative 1 (No Action)** includes the lowest F rate and the lowest resulting ABC, while **Alternative 2** includes the highest F rate and associated ABC. **Alternatives 3 (Preferred)-6** include a range between the F rates in the first two alternatives. **Alternative 3 (Preferred)** includes an F rate and ABC between the highest and lowest F rates, and would be expected to have fewer short-term social impacts than **Alternatives 1 (No Action)** and **2**. Although a more conservative F rate would likely result in a higher probability in rebuilding over a shorter period of time, the probability of rebuilding using the strategy in **Alternative 3 (Preferred)** will provide more long-term social benefits than **Alternative 2** or **Alternative 6**.

4.4.4 Administrative Effects

Alternative 1 (No Action) would not establish a rebuilding strategy and would therefore, not comply with Magnuson-Stevens Act requirements for developing rebuilding plans. If **Alternative 1 (No Action)** were chosen as a preferred alternative and litigation resulted from that choice, the impact on the administrative environment would be significant. **Alternative 4** is the most conservative rebuilding strategy, not including **Alternative 1 (No Action)**, and would result in an ABC of 713,000 lbs whole weight (without dead discards) by 2014. **Alternative 4** is likely to result in the greatest impact on the administrative environment since it may require additional management measures to limit harvest to below the ACL. The lower the ABC, the more pro-active AMs and monitoring of landings need to be to maintain harvest at or below the resultant ACL. As the ABC increases under **Alternatives 5**, **3 (Preferred), 6**, and **2**, the ACL specified could increase proportionately, and AMs would be less likely to be triggered due to ACL overages.

Alternative 2 would result in the highest ABC and would likely be associated with the highest ACL value specified in **Action 6**. Therefore, impacts on the administrative environment that would result from AMs being triggered would likely be lowest under **Alternative 2**. **Alternatives 3 (Preferred)**, **5**, and **6** are unlikely to result in administrative impacts greater than **Alternative 1 (No Action)**, or lower than **Alternative 2**. All the rebuilding strategy alternatives considered would require continued monitoring of commercial and recreational landings in addition to continued enforcement of current harvest restrictions for red grouper including the 20-inch size limit, the 3-fish aggregate bag limit, and the shallow water seasonal closure. Overall, administrative impacts under any of the rebuilding strategy alternatives, with the exception of **Alternative 1 (No Action)**, are not likely to be significant.

4.5 Action 5. Specify Sector Allocations

The South Atlantic Council and NOAA Fisheries Service also intend to divide the red grouper ACL into sector ACLs based upon allocation decisions. A "sector" means a distinct user group to which separate management strategies and separate catch quotas apply. Examples of sectors include commercial and recreational; the recreational sector may also be divided into for-hire and private recreational groups. The South Atlantic Council and NOAA Fisheries Service have determined sector ACLs and sector AMs are important components of red grouper management as each sector differs in scientific and management uncertainty. A range of options will be evaluated in the environmental assessment, including those that base allocation decisions on historical landings.

Alternative 1 (No Action). Do not establish a sector allocation of the red grouper annual catch limit (ACL).

Alternative 2 (Preferred). Specify allocations for the commercial and recreational sectors based on criteria outlined in one of the following options:

> **Subalternative 2a**. Commercial = 52% and recreational = 48% (Established by using average landings from 1986-2008).
> **Subalternative 2b**. Commercial = 54% and recreational = 46% (Established by using average landings from 1986-1998).
> **Subalternative 2c**. Commercial = 49% and recreational = 51% (Established by using average landings from 1999-2008).
> **Subalternative 2d**. Commercial = 41% and recreational = 59% (Established by using average landings from 2006-2008).
> **Subalternative 2e (Preferred)**. Commercial = 44% and recreational = 56% (Established by using 50% of average landings from 1986-2008 + 50% of average landings from 2006-2008).

Table 4-16. Recreational and commercial red grouper catches and percent distribution of the catch between commercial and recreational sectors (pounds whole weight.)

Year	Recreational	% Rec	Commercial	%Com	Total
1986	775,164	65%	416,778	35%	1,191,942
1987	122,558	27%	337,101	73%	459,659
1988	160,621	29%	388,956	71%	549,577
1989	335,050	47%	376,499	53%	711,549
1990	78,198	21%	300,991	79%	379,189
1991	50,803	18%	234,303	82%	285,106
1992	176,044	49%	184,808	51%	360,852
1993	337,910	63%	202,134	37%	540,044
1994	216,995	53%	192,027	47%	409,022
1995	241,106	48%	262,162	52%	503,268
1996	333,076	50%	326,795	50%	659,871
1997	316,706	47%	361,009	53%	677,715
1998	327,083	39%	511,295	61%	838,378
1999	187,357	29%	461,654	71%	649,011
2000	172,432	31%	388,397	69%	560,829
2001	188,190	32%	406,803	68%	594,993
2002	300,258	43%	396,943	57%	697,201
2003	383,175	52%	360,662	48%	743,837
2004	423,043	55%	351,021	45%	774,064
2005	314,667	57%	235,718	43%	550,385
2006	619,598	63%	362,510	37%	982,108
2007	667,750	51%	639,513	49%	1,307,263
2008	1,125,328	63%	656,417	37%	1,781,745

Source: SEDAR 19 data

4.5.1 Biological Effects

Alternative 1 (No Action) would not specify a commercial or recreational allocation for red grouper. If allocations are not specified then it would not be possible to identify the sector-ACLs. Only a single ACL would be established for both sectors. **Alternative 2**, including the associated subalternatives, would have positive effects to the stock as allocation decisions allow managers to separate the stock ACL into sector-ACLs. As such, the specification of allocations is often a necessary component of the fishery management system that specifies catch limits and accountability measures.

Options that capture early landings would allocate more of the ABC to the commercial sector than the recreational sector. For example, **Subalternatives 2a** and **2b**, which are based on landings from 1986-2008 and 1986-1998, would allocate 52% and 54% of the ABC to the commercial sector, respectively. In contrast, options which capture recent landings (**Subalternatives 2d, 2e (Preferred)**) would allocate a lower percentage of the ABC to the commercial sector and a higher percentage to the recreational sector.

Preferred Subalternative 2e would be based on data from 1986-2008, which includes the early time period when the commercial sector dominated the catch, as well as recent data from 2006-2008 when the for-hire sector dominated catch. As a result, ABC would be somewhat evenly divided among the commercial (44%) and recreational (56%) sectors.

The biological effects of the different allocation alternatives would be similar if landings in both sectors could be closely monitored. Further, the biological effects of options that allocate more of the ABC to the commercial sector could have a greater biological effect because there is less of a chance a commercial ACL would be exceeded than a recreational ACL. Commercial data can often be more closely monitored as they are based on dealer reports, whereas much of the recreational data (except headboat data) are based on survey information.

There is likely to be no additional biological benefit to protected species from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between ESA-listed species and the fishery. Previous ESA consultations determined the snapper grouper fishery was not likely adversely affect marine mammals or *Acropora* species. **Alternative 2** and its subalternatives are unlikely to alter fishing behavior in a way that would cause new adverse effects to these species. The impacts from **Alternative 2** and its subalternatives on sea turtles and smalltooth sawfish are unclear. If these allocations perpetuate the existing amount of fishing effort they are unlikely to change the level of interaction between sea turtles and smalltooth sawfish and the fishery as a whole. This scenario is likely to provide little additional biological benefits to sea turtles and smalltooth sawfish, if any. However, if these alternatives reduce the overall amount of effort in the fishery the risk of interaction with sea turtles and smalltooth sawfish will likely decrease, providing additional biological benefits to these species.

4.5.2 Economic Effects

4.5.2.1 Economic Effects on the Commercial Sector

The results from the economic analysis for **Action 5** are summarized in **Table 4-17**, including the net present values of changes in NOR to the commercial sector associated with the allocation alternatives proposed in **Action 5**. **Table 4-17** compares these changes assuming the preferred rebuilding strategy (**Alternative 3**) proposed in **Action 4** for various discount rates. The projected NOR streams created by the proposed ACLs and projected biomass figures derived from the preferred rebuilding strategy were discounted over a period of 10 years.

When the different allocation ratios are analyzed, it should be no surprise that predicted changes in the net present value of future NOR streams get larger as the commercial allocation increases; however, determining an optimal allocation rate is outside the scope of this analysis. Since **Subalternative 2e (Preferred)** equals the historical (2005-2009) distribution of the catch between commercial and recreational sectors, the simulation model does not predict any effects by adopting a 44% commercial allocation.

Table 4-17. Net present value of changes in net operating revenues (NOR) to the commercial sector associated with the various allocation alternatives in **Action 5** over a time horizon of 10 years, assuming ACL=ABC, no commercial sector ACT, and using different discount rates. Dollar amounts are in million 2010 dollars.

	Sector Allocation of Commercial ACL				
Rebuilding Strategy	**Subalternative 2a**	**Subalternative 2b**	**Subalternative 2c**	**Subalternative 2d**	**Subalternative 2e (Preferred)**
	Comm. – 52% Rec. – 48%	**Comm. – 54% Rec. – 46%**	**Comm. – 49% Rec. – 51%**	**Comm. – 41% Rec. – 59%**	**Comm. – 44% Rec. – 56%**
	Net Present Value of Changes in NOR – 0% Discount Rate				
75%F_{MSY}	\$0.99	\$1.19	\$0.67	-\$0.45	\$0.0
	Net Present Value of Changes in NOR – 3% Discount Rate				
75%F_{MSY}	\$0.83	\$0.99	\$0.56	-\$0.37	\$0.0
	Net Present Value of Changes in NOR – 7% Discount Rate				
75%F_{MSY}	\$0.66	\$0.79	\$0.45	-\$0.30	\$0.0

The magnitude of effects of the allocation alternatives on business activity would fairly correspond to the proportion of ACL allocated to the commercial sector for all states combined (**Table 4-18**). **Subalternative 2b**, which would assign the largest allocation to the commercial sector (54%), would result in the largest positive effects for all states combined. A slightly different scenario is depicted when state-by-state effects are considered. **Subalternatives 2a, 2b, and 2c** would have negative impacts on Georgia/Northeast Florida and positive for all other states. **Subalternative 2d** would result in negative effects for all states. **Preferred Subalternative 2e** would not result in any changes to business activity, because it equals the historical (2005-2009) distribution of the catch between commercial and recreational sectors.

Table 4-18. Potential change in business activities associated with the commercial/recreational allocation alternatives relative to **Alternative 1 (No Action)**. All dollar values are in thousands of 2008 dollars.

	North Carolina	South Carolina	Georgia/NE FL	Florida
	Subalternative 2a			
Employment	11	4	0	0
Income	$256	$94	-$2	$9
Output	$476	$194	-$4	$17
	Subalternative 2b			
Employment	13	5	0	0
Income	$307	$110	-$3	$11
Output	$571	$228	-$5	$20
	Subalternative 2c			
Employment	7	3	0	0
Income	$172	$65	$0	$6
Output	$319	$134	$0	$12
	Subalternative 2d			
Employment	-5	-2	0	0
Income	-$118	-$43	-$1	-$4
Output	-$220	-$89	-$2	-$7
	Preferred Subalternative 2e			
Employment	0	0	0	0
Income	$0	$0	$0	$0
Output	$0	$0	$0	$0

4.5.2.2 Economic Effects on the Recreational Sector

In evaluating the economic effects of the allocation alternatives, the following assumptions were made: the rebuilding strategy would be 75%F_{MSY} and ACL would be equal to ABC. Again, the aggregate ACL for black grouper, gag, and red grouper was assumed not to have been reached over the period of the analysis.

All allocation alternatives would result in CS increases, as can be gleaned from **Table 4-19**. Interestingly, CS increases would also accrue to alternatives providing less than 50% recreational allocation ratio. As with the rebuilding strategy alternatives, a major driving factor for positive CS effects is the condition that any of the ACL alternatives would provide for allowable harvests above the baseline harvests. Although the results are not shown here, it was estimated that a recreational allocation ratio below 40% would result in negative economic effects.

Regardless of the time horizon, the alternatives may be ranked in descending order as follows: **Subalternative 2d**, **Subalternative 2e (Preferred)**, **Subalternative 2c**, **Subalternative 2a**, and **Subalternative 2b**. This ranking is mainly driven by the size of the recreational allocation, with the highest allocation under **Subalternative 2d** and the lowest under **Subalternative 2b**.

Preferred Subalternative 2e would result in CS increases ranging from $0.84 million to $3.86 million over 4 years, or from $3.07 million to $14.1 million over 10 years. Note that these are the same figures mentioned earlier as the effects of the preferred alternative for a rebuilding strategy, because these numbers are based on all preferred alternatives as in the previous case.

Table 4-19. Net present value of changes in CS to the recreational sector associated with the commercial/recreational allocation alternatives over 4 years and 10 years, assuming 75%F_{MSY} rebuilding strategy and ACL=ABC, and using a 7% discount rate. Dollar amounts are in millions of 2010 dollars.
High, Medium, and Low represent the range of CS effects using various estimates of CS per fish found in empirical studies.

Recreational Allocation	4- Year Horizon	10-Year Horizon
	High	
Subalternative 2a: 48% of ACL	$1.64	$8.62
Subalternative 2b: 46% of ACL	$1.08	$7.26
Subalternative 2c: 51% of ACL	$2.47	$10.68
Subalternative 2d: 59% of ACL	$4.69	$16.15
Subalternative 2e (Preferred): 56% of ACL	**$3.86**	**$14.10**
	Medium	
Subalternative 2a: 48% of ACL	$1.37	$7.21
Subalternative 2b: 46% of ACL	$0.91	$6.07
Subalternative 2c: 51% of ACL	$2.07	$8.93
Subalternative 2d: 59% of ACL	$3.92	$13.51
Subalternative 2e (Preferred): 56% of ACL	**$3.23**	**$11.79**
	Low	
Subalternative 2a: 48% of ACL	$0.36	$1.88
Subalternative 2b: 46% of ACL	$0.24	$1.58
Subalternative 2c: 51% of ACL	$0.54	$2.32
Subalternative 2d: 59% of ACL	$1.02	$3.51
Subalternative 2e (Preferred): 56% of ACL	**$0.84**	**$3.07**

4.5.3 Social Effects

By establishing sector allocations there would likely be some changes in fishing behavior and impacts to the social environment. The mere act of separating the ACL into two sector ACLs results in perceived scarcity in that limits have been imposed on each individual sector. The setting of an ACL has the same impact but on the overall fishery. Each subsequent division will drive perceptions of scarcity and likely change the fishing behavior of those within a particular sector.

By not establishing sector allocations, **Alternative 1 (No Action)** allows for an overall ACL for the recreational and commercial sectors. This alternative would allow for harvest to freely flow between the commercial and recreational sectors as it has in the past; although, if harvest exceeds the overall ACL then both sectors could be closed. This would likely become more an issue for the commercial sector, because the recreational sector has shown a pattern of growth and recreational effort may continue to increase, requiring more of the ACL. However, by not allocating separate ACLs to the sectors, it is more likely that the overall red grouper ACL could be reached collectively through recreational and commercial harvest. This would be expected to provide broad social benefits by optimizing use of the resource.

Preferred Alternative 2 presents five subalternatives of allocation between the commercial and recreational sector based on different qualifying periods to reflect long-term harvest trends versus more recent harvest. In general, it would be expected that there might be negative social effects to whichever sector receives less than their current allocation and those effects would correspond to the amount of reduction. The subalternatives in this action use average landings to calculate options for sector allocations, and in general the more older years that are used in the qualifying period, the higher the percentage for the commercial sector. Using more recent years would allocate a higher percentage to the recreational sector. The allocations that would result from **Subalternatives 2a** and **2b** would benefit the commercial sector more than the recreational sector, since the commercial allocation would be slightly higher. Because more recently the recreational catch has increased above the commercial catch, the likelihood of an early closure would increase for the recreational sector and would be expected to impact recreational fishing opportunities and affiliated businesses, such as for-hire captains and crew, bait and tackle shops, and associated tourism. Although the allocations that would result from the formula under **Subalternative 2c** are close to an equal division (49% commercial, 51% recreational), this would likely still have more negative social impacts on the recreational sector, since in more recent years the recreational landings have been higher than the commercial landings. **Subalternative 2d** reflects a more recent distribution between the commercial and recreational sector, which would benefit the recreational sector by allowing continued fishing opportunities. However, the allocation scenario could impact the commercial sector by limiting growth, or a return to historic levels. With restrictions and closures in other fisheries, the commercial sector may increase harvest of red grouper; the smaller allocation could prevent this harvest and impact fishermen and affiliated businesses, such as fish houses and restaurants. For example, in Murrells Inlet, SC, red grouper are nearly as important to the community as gag or vermilion snapper. Should new management measures limit harvest of those two species, the commercial fishermen in the community may shift effort to red grouper, but ultimately be limited by the commercial ACL. **Subalternative 2e (Preferred)** has a similar allocation (44% commercial, 56% recreational) and would result in more social benefits for the commercial sector than **Subalternative 2d**, and more social benefits for the recreational sector than **Subalternatives 2a, 2b** and **2c**.

4.5.4 Administrative Effects

Alternative 1 (No Action) would establish a single ACL for both commercial and recreational sectors for red grouper, if an ACL alternative other than the no action is chosen under **Action 6**. **Alternative 2 (Preferred)** and its subalternatives would not necessarily result in additional administrative burden beyond the status quo since commercial and recreational landings are already tracked separately through MRFSS/MRIP, headboat logbooks, dealer reports, and commercial vessel logbooks. **Subalternatives 2a-2e (Preferred)** would likely result in the same administrative impact, varying only by the percentage of allocation given to each sector.

4.6 Action 6. Specify Annual Catch Limits (ACL) and Optimum Yield (OY)

Alternative 1 (No Action). Do not specify an individual ACL for red grouper. An individual ACL is currently not in place for red grouper. Retain aggregate recreational and commercial ACLs for black grouper, red grouper, and gag. The commercial sector ACL for gag, black grouper, and red grouper is 662,403 lbs gw (781,636 lbs ww) and 648,663 lbs gw (765,422 lbs ww) for the recreational sector. The total group ACL is 1,311,066 lbs gw (1,547,058 lbs ww). These values are equivalent to the expected catch resulting from the implementation of management measures for red grouper in Amendment 16 and specified in Amendment 17B.

Alternative 2 (Preferred). ACL = OY = ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 3. ACL = OY = 90% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 4. ACL = OY = 80% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 5 (Preferred). Eliminate the commercial sector aggregate ACL of 662,403 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of all shallow water groupers once the commercial aggregate ACL is projected to be met.

Alternative 6 (Preferred). Eliminate the recreational sector aggregate ACL of 648,663 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of black grouper, gag, and red grouper once the ACL is projected to be met if any one of the three species is listed as overfished. Eliminate the post-season AM that specifies a reduction in a subsequent year's ACL by the amount of an overage if landings exceed the aggregate ACL. Eliminate the regulation that states that the recreational landings are evaluated relative to the ACL as follows: For 2010, only 2010 recreational landings will be compared to the ACL; in 2011, the average of 2010 and 2011 recreational landings will be compared to the ACL; and in 2012 and subsequent fishing years, the most recent 3-year running average recreational landings will be compared to the ACL.

Table 4-20. The ACL values (lbs whole weight) for red grouper in Preferred **Alternative 2** (ACL=ABC). ACL values are based on preferred allocation alternative (44% commercial/56% recreational). ABC values are indicated in gray.

Alt 2 (Preferred) ACL=ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	693,000	647,000	575,000	619,000	654,000
	2013	762,000	718,000	648,000	691,000	724,000
	2014	822,000	780,000	713,000	755,000	787,000
landings & discards	2012	737,000	687,000	610,000	657,000	695,000
	2013	806,000	759,000	683,000	730,000	765,000
	2014	866,000	821,000	749,000	794,000	828,000
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	304,920	284,680	253,000	272,360	287,760
	2013	335,280	315,920	285,120	304,040	318,560
	2014	361,680	343,200	313,720	332,200	346,280
landings & discards	2012	324,280	302,280	268,400	289,080	305,800
	2013	354,640	333,960	300,520	321,200	336,600
	2014	381,040	361,240	329,560	349,360	364,320
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	388,080	362,320	322,000	346,640	366,240
	2013	426,720	402,080	362,880	386,960	405,440
	2014	460,320	436,800	399,280	422,800	440,720
landings & discards	2012	412,720	384,720	341,600	367,920	389,200
	2013	451,360	425,040	382,480	408,800	428,400
	2014	484,960	459,760	419,440	444,640	463,680

Table 4-21. The ACL values (lbs whole weight) for red grouper in **Alternative 3** (ACL=90%ABC). ACL values are based on preferred allocation alternative (44% commercial/56% recreational).

Alt. 3 ACL=90%ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	623,700	582,300	517,500	557,100	588,600
	2013	685,800	646,200	583,200	621,900	651,600
	2014	739,800	702,000	641,700	679,500	708,300
landings & discards	2012	663,300	618,300	549,000	591,300	625,500
	2013	725,400	683,100	614,700	657,000	688,500
	2014	779,400	738,900	674,100	714,600	745,200
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	274,428	256,212	227,700	245,124	258,984
	2013	301,752	284,328	256,608	273,636	286,704
	2014	325,512	308,880	282,348	298,980	311,652
landings & discards	2012	291,852	272,052	241,560	260,172	275,220
	2013	319,176	300,564	270,468	289,080	302,940
	2014	342,936	325,116	296,604	314,424	327,888
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	349,272	326,088	289,800	311,976	329,616
	2013	384,048	361,872	326,592	348,264	364,896
	2014	414,288	393,120	359,352	380,520	396,648
landings & discards	2012	371,448	346,248	307,440	331,128	350,280
	2013	406,224	382,536	344,232	367,920	385,560
	2014	436,464	413,784	377,496	400,176	417,312

Table 4-22. The ACL values (lbs whole weight) for red grouper in **Alternative 4** (ACL=80%ABC). ACL values are based on preferred allocation alternative (44% commercial/56% recreational).

Alt. 4 ACL=80%ABC						
Total						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	554,400	517,600	460,000	495,200	523,200
	2013	609,600	574,400	518,400	552,800	579,200
	2014	657,600	624,000	570,400	604,000	629,600
landings & discards	2012	589,600	549,600	488,000	525,600	556,000
	2013	644,800	607,200	546,400	584,000	612,000
	2014	692,800	656,800	599,200	635,200	662,400
Commercial (44%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	243,936	227,744	202,400	217,888	230,208
	2013	268,224	252,736	228,096	243,232	254,848
	2014	289,344	274,560	250,976	265,760	277,024
landings & discards	2012	259,424	241,824	214,720	231,264	244,640
	2013	283,712	267,168	240,416	256,960	269,280
	2014	304,832	288,992	263,648	279,488	291,456
Recreational (56%)						
	Year	**$F_{REBUILD}$ (10years)**	**75%F_{MSY}**	**65%F_{MSY}**	**$F_{REBUILD}$ (7 years)**	**$F_{REBUILD}$ (8 years)**
landings	2012	310,464	289,856	257,600	277,312	292,992
	2013	341,376	321,664	290,304	309,568	324,352
	2014	368,256	349,440	319,424	338,240	352,576
landings & discards	2012	330,176	307,776	273,280	294,336	311,360
	2013	361,088	340,032	305,984	327,040	342,720
	2014	387,968	367,808	335,552	355,712	370,944

4.6.1 Biological Effects

Alternative 1 (No Action) would retain the aggregate ACLs for red grouper, black grouper, and gag of 662,403 lbs gw (781,636 lbs ww) and 648,663 lbs gw (765,422 lbs ww) for the commercial and recreational sectors, respectively. The red grouper portion of this group ACL was estimated to be 221,577 lbs gw (261,461 lbs ww) and 276,740 lbs gw (326,553 lbs ww) for the commercial and recreational sectors, respectively based on the expected catch resulting from the implementation of management measures in Amendment 16 to the Snapper Grouper FMP.

Alternatives 2 (Preferred)-4 would establish an ACL = OY for red grouper in the commercial and recreational sector based on assessment information specified in SEDAR 19 (2010). OY is defined as "(A) the amount of fish which will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery." National Standard 1 establishes the relationship between conservation and management measures, preventing overfishing, and achieving OY from each stock, stock complex or fishery. The NS1 guidelines discuss the relationship of OFL to MSY and ACT (ACL) to OY. The OFL, if provided by a SSC, is an annual amount of catch that corresponds to the estimate of MFMT applied to a stock or complex's abundance; MSY is the long-term average of such catches. The ACL would be the limit that triggers AMs, and ACT, if specified, would be the management target for a fishery. Management measures for a fishery should, on an annual basis, prevent the ACL from being exceeded. The long-term objective is to achieve OY through annual achievement of an ACL or ACT. The NS1 guidelines state that if OY is set close to MSY, the conservation and management measures in the fishery must have very good control of the amount of catch in order to achieve the OY without overfishing.

Setting OY equal to ACL or a portion of the ACL, would provide greater assurance that overfishing is prevented and the long-term average biomass is near or above B_{MSY}. Setting OY equal to the ACL, which can range from being equal to the ABC in **Alternative 2 (Preferred)** to some portion of the ABC in **Alternatives 3-4**, would be based on the ABC specified by SEDAR 19 (2010), which takes into consideration scientific uncertainty in the specification of OFL and ABC. **Alternative 1 (No Action)** could have adverse effects to the red grouper stock as an ACL helps to prevent overfishing. However, the adverse biological effects may not be significant as a three-species aggregate is in place.

Alternatives 2 (Preferred)-4 would specify an individual ACL for red grouper based on the ABC from the recent SEDAR stock assessment. The South Atlantic Council's SSC has specified that for overfished stocks, like red grouper, a rebuilding ABC must be set to reflect the annual catch that is consistent with the schedule of fishing mortality rates in the rebuilding plan. The South Atlantic Council's preferred rebuilding plan outlined in **Actions 3 and 4** would specify an ABC = yield at 75% of F_{MSY} and a rebuilding time period of 10 years.

Based on the preferred allocation alternatives in **Action 5**, 44% of the ACL would be allocated to the commercial sector and 56% of the ACL would be allocated to the recreational sector. The commercial and recreational ACLs based on alternatives in this action as well as the preferred allocation alternative in **Action 5** are shown in **Tables 4-20, 4-21,** and **4-22. Table 4-22a** shows commercial landings by month in 2010 during the open season, excluding the Jan-April closure. Based on 2010 landings and assuming effort remains the same, the proposed commercial ACL would be reached in October/November (**Table 4-22a**).

Table 4-22a. Red grouper commercial landings by month during the open season for 2010. Proposed commercial ACL = 284,680 lbs whole weight

	Reported Monthly 2010 Landings (lbs whole weight)	Cumulative 2010 Landings (lbs whole weight)
January	0	0
February	0	0
March	0	0
April	0	0
May	85,057	85,057
June	55,486	140,543
July	35,893	176,436
August	32,205	208,641
September	24,857	233,498
October	41,625	275,123
November	31,272	306,395
December	23,620	330,015
Total	330,015	

Alternative 2 (Preferred) would set the ACL equal to the ABC. The National Standard 1 guidelines indicate the ACL may typically be set very close to the ABC. **Alternatives 3** and **4** would have a greater positive biological effect to the stock than **Alternative 2 (Preferred)** because they would create a buffer between the ACL and ABC, with **Alternative 4** setting the most conservative ACL at 80% of the ABC. Therefore, **Alternative 4** would have the greatest positive biological effect. Creating a buffer between the ACL and ABC would provide greater assurance overfishing would not occur. Setting a buffer between the ACL and ABC would be appropriate in situations where there is uncertainty in whether or not management measures are constraining fishing mortality to target levels. Annual catch targets, which are not required, can also be set below the ACLs to account for management uncertainty and provide greater assurance overfishing does not occur.

Alternatives 5 and **6 (Preferreds)** would eliminate the aggregate commercial and recreational ACLs and accountability measures (AMs) currently in place for red grouper, black grouper, and gag. The ACL for red grouper would be based on **Alternative 2 (Preferred)** in this action. **Actions 9** and **10** of this amendment would specify commercial and recreational AMs for red grouper, respectively.

The removal of the three species aggregate ACL and AM could biologically affect the stock adversely as the ACL and AM offer an additional method to prohibit harvest. However, this action would implement a red grouper individual ACL/AM. Gag ACLs/AMs are already in place, and the Comprehensive ACL Amendment (in review) proposes the implementation of black grouper ACLs/AMs. All three ACLs are based upon the SSC's catch recommendation that in turn is based upon SEDAR stock assessments. These ACLs are based upon the best scientific information whereas the three-species aggregate ACL implemented through Amendment 17B used catch history for black grouper and red grouper to determine the aggregate ACL.

Appendix G evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided in the Magnuson-Stevens Fishery Conservation and Management Act. In summary, the actions in Amendment 24 could increase bycatch of red grouper if fishermen continue to encounter red grouper if the annual catch limit is reached and the fishery is closed to possession and retention. The estimated release mortality of red grouper is 20%. However, fishermen may fish in specific areas to avoid red grouper once, and if, the annual catch limit is reached. Recently implemented regulations including the requirements of dehooking devices, circle hooks, a recreational/commercial seasonal closure for shallow water groupers, reduction of recreational bag limits, and closing all shallow water groupers when a gag quota is met, could also help to reduce bycatch of red grouper.

Fishery management actions can adversely affect species and/or habitat protected by the Endangered Species Act and/or Marine Mammal Protection Act by increasing bycatch and/or fishing gear interactions with these species, and/or by redistributing fishing effort to areas where protected species and/or critical habitat occurs. However, the proposed alternatives are unlikely to alter fishing in ways that would cause new adverse affects to species not previously considered. Re-initiation of ESA section 7 consultation for Amendment 24 is not required. The amount or extent of incidental take authorized by the 2006 biological opinion has not been exceeded, and no new information exists that indicates the agency action is causing effects to listed species that were not previously considered. The proposed action is also not likely to modify the agency action in a manner that would cause new effects not previously considered. Fishing activities anticipated to occur once Amendment 24 is effective would fall within the level of effort and scope of the action analyzed in the June 7, 2006, opinion. The proposed use of hook-and-line gear is consistent with the description of snapper-grouper fishing in Section 2 of the opinion. Amendment 24 would not change how the gear types evaluated during previous section 7 consultations are used. Thus, no new effects from the fishery are anticipated. No new species or critical habitat has been designated that may be affected by the identified action.

4.6.2 Economic Effects

4.6.2.1 Economic Effects on the Commercial Sector

Table 4-23 presents the results of the analysis on ACL/OY alternatives. **Preferred Alternative 2** which equates the ACL to the ABC defined by the preferred rebuilding strategy (**Action 4 – Alternative 3**) is predicted to generate an additional $180,000 in NOR when compared to **Alternative 1 (No Action)** over 10 years and assuming a discount rate of 7%. If the ACL is set at 90% of the ABC (**Alternative 3**) then fishermen are expected to lose $280,000 over the same ten-year period. If the ACL is set at 80% of the ABC (**Alternative 4**) losses are expected to total $760,000 over a ten-year period and assuming a discount rate of 7%.

The dissolution of the aggregate quota for red, gag, and black is not expected to have any effect on the commercial fleet. Since landings of shallow water groupers have been constrained to zero during the first four months of the year, the aggregate quota is not predicted to be met based on model simulations. However, if fishermen change their behavior and fish more in the remaining 8 months then the aggregate quota may be met and a reduction in benefits would be expected.

Table 4-23. Net present value of net operating revenues (NOR) to the commercial sector associated with the ACL alternatives in **Action 6** over a time horizon of 10 years, assuming the preferred rebuilding path in **Action 4 (Alternative 3)**, 44% commercial allocation, no commercial sector ACT, and using different discount rates. Dollar amounts are in millions of 2010 dollars.

	Specification of Alternative Commercial ACLs				
Rebuilding Strategy	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**
	No Action	**(Preferred) ACL = ABC**	**ACL = 90%ABC**	**ACL = 80%ABC**	**(Preferred) Eliminate aggregate quota**
	Net Present Value of NOR Streams – 0% Discount Rate				
75%F_{MSY}	$91.68	$92.08	$91.40	$90.72	$92.08
	Net Present Value of NOR Streams – 3% Discount Rate				
75%F_{MSY}	$78.11	$78.41	$77.84	$77.25	$78.41
	Net Present Value of NOR Streams – 7% Discount Rate				
75%F_{MSY}	$64.22	$64.40	$63.94	$63.46	$64.40

The magnitude of effects of the ACL/OY alternatives on business activity would directly correlate with the level of ACL. **Preferred Alternative 2** would provide the largest ACL, and would also result in the largest positive impacts on business activity for all states combined (**Table 4-24**). It should be noted, though, that South Carolina would experience reductions in business activity under any of the alternatives. Under **Preferred Alternative 2,** all states except South Carolina would experience positive impacts on business activity. Under **Alternatives 3 and 4**, only Georgia/Northeast Florida would experience increases in business activity. **Preferred Alternative 5** would have the same impacts on business activity as **Preferred Alternative 2**. The impacts of these two preferred alternatives on business activity should not be added, because one alternative practically assumed the other. In particular, **Preferred Alternative 2** was evaluated by closing the fishery during the first four months of the year, resulting in the commercial aggregate ACL not being reached.

Table 4-24. Potential change in business activities associated with the ACL/OY alternatives relative to **Alternative 1 (No Action).** All dollar values are in thousands of 2008 dollars.

	North Carolina	South Carolina	Georgia/NE FL	Florida
	Preferred Alternative 2			
Employment	4	-5	0	0
Income	$91	-$107	$10	$0
Output	$169	-$221	$21	$1
	Alternative 3			
Employment	-4	-8	0	0
Income	-$87	-$173	$10	-$5
Output	-$162	-$358	$21	-$9
	Alternative 4			
Employment	-12	-11	1	0
Income	-$273	-$239	$21	-$13
Output	-$508	-$495	$43	-$24
	Preferred Alternative 5			
Employment	4	-5	0	0
Income	$91	-$107	$10	$0
Output	$169	-$221	$21	$1

4.6.2.2 Economic Effects on the Recreational Sector

In evaluating the economic effects of the ACL/OY alternatives, the following assumptions were made: the rebuilding strategy would be 75%F_{MSY} and the recreational allocation would be 56% of the ACL. Again, the aggregate ACL for black grouper, gag, and red grouper was assumed not to have been reached over the period of the analysis.

The estimated economic effects of the various ACL/OY alternatives would directly correlate with the level of ACL as a percent of ABC. That is, the closer the ACL is to ABC, the higher the consequent effects on the recreational sector. Thus, the ranking of alternatives is rather straightforward, with **Alternative 2 (Preferred)** being first and **Alternative 4**, last. Under **Alternative 2 (Preferred)**, CS increases to the recreational sector would range from $0.84 million to $3.86 million over four years, or from $3.07 million to $14.1 million over ten years (**Table 4-25**). Again, these results are the same as those of the preferred alternatives for previous actions.

As noted earlier, the estimates of economic effects were generated assuming the recreational sector aggregate ACL for black grouper, gag, and red grouper would not be reached in any year during the rebuilding period. In this sense, the economic effects of **Alternative 6 (Preferred)** would be the same as those for **Alternative 2**. Without **Alternative 6 (Preferred)**, the economic effects of the various alternatives would be lower than that shown in **Table 4-25**, particularly for higher ACLs, such as those under **Alternatives 2 (Preferred)** and **3.**

Table 4-25. Net present value of changes in CS to the recreational sector associated with the ACL/OY alternatives over 4 years and 10 years, assuming 75%F_{MSY} rebuilding strategy and recreational allocation of 56% of ACL, and using a 7% discount rate. Dollar amounts are in millions of 2010 dollars.
High, Medium, and Low represent the range of CS effects using various estimates of CS per fish found in empirical studies.

ACL/OY Alternative	4- Year Horizon	10-Year Horizon
	High	
Alternative 2 (Preferred): ACL=OY=ABC	**$3.86**	**$14.10**
Alternative 3: ACL=OY=90%ABC	$2.30	$10.27
Alternative 4: ACL=OY=80%ABC	$0.75	$6.44
	Medium	
Alternative 2 (Preferred): ACL=OY=ABC	**$3.23**	**$11.79**
Alternative 3: ACL=OY=90%ABC	$1.93	$8.59
Alternative 4: ACL=OY=80%ABC	$0.63	$5.38
	Low	
Alternative 2 (Preferred): ACL=OY=ABC	**$0.84**	**$3.07**
Alternative 3: ACL=OY=90%ABC	$0.50	$2.23
Alternative 4: ACL=OY=80%ABC	$0.16	$1.40

4.6.3 Social Effects

Although an administrative action, defining the optimum yield (OY) for a species or species complex establishes a management target for allowable harvests. If defined as a percentage (less than one) of the maximum sustainable yield, the target would incorporate a protective buffer to help ensure the biological health of the resource is not threatened, thereby helping support stable environmental, economic, and social benefit streams. The larger the buffer, the greater the certainty of biological protection. However, an excessively large buffer (i.e., a buffer that exceeds the biological variability of the resource, environmental challenges, and potential for fishery-induced problems) would result in overly restrictive harvest allowances, leading to foregone social benefits. While none of the relevant biological parameters are ever likely known with certainty, the best OY specification would be expected to balance the risk and costs of being insufficiently conservative against the costs of potentially unnecessarily “leaving fish in the water,” all decisions which incorporate best available knowledge of the biology of the resource, environmental challenges, and the harvest capabilities of the fishing sectors. **Alternative 2 (Preferred), Alternative 3,** and **Alternative 4** set the OY equal to the ACL, which leaves no buffer and is likely to result in underutilized resource.

4.6.4 Administrative Effects

Establishing sector ACLs and OY for red grouper are not themselves actions that have direct impacts on the administrative environment, outside of the requisite public notices. However, indirect administrative burdens such as monitoring landings, and correcting for and preventing ACL overages would stem from the specification of an ACL and OY for red grouper. In general, the lower the ACL is set the more likely it is to be met or exceeded (if no additional harvest restrictions are implemented), and the more likely an AM would be triggered. **Alternative 2 (Preferred)**, combined with the preferred allocation alternative under **Action 5** would establish the highest sector ACLs for red grouper and would provide no buffer between the ACL and the ABC and is thus the least precautionary of the alternatives considered. Because the sector ACLs are slightly higher under **Alternative 2 (Preferred)** than under **Alternatives 3** and **4**, greater harvest would be allowed before an AM is triggered. **Alternatives 3** and **4** would implement lower sector ACLs than **Alternative 2 (Preferred)** and are therefore more likely to be met or exceeded than ACLs specified under **Alternative 2 (Preferred)**. In the long-term, taking action to prevent an ACL overage or correcting for an ACL overage, may be administratively beneficial since those actions may prevent the stock from reaching an overfished condition that would trigger development of a new rebuilding plan.

Alternatives 5 (Preferred) and **6 (Preferred)** would remove red grouper from the aggregate ACL species group established in Amendment 17B (SAFMC 2010b) so an individual ACL may be established for the stock. Removing the ACL and AM regulations implemented for red grouper in Amendment 17B would relieve the administrative burdens associated with tracking an aggregate ACL and calculating the comparative three-year running average for the recreational sector. An expanded discussion of the administrative difficulties associated with the recreational red grouper AMs implemented through Amendment 17B (SAFMC 2010b) is included in **Action 10** of this document.

4.7 Action 7. Specify a Commercial Sector Annual Catch Target (ACT)

Alternative 1 (No Action) (Preferred). Do not specify a commercial ACT for red grouper. Currently, there is no commercial ACT for red grouper (The proposed commercial ACL would equal 284,680 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 2. The commercial ACT equals 90% of the commercial ACL (The proposed commercial ACT would equal 256,212 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 3. The commercial ACT equals 80% of the commercial ACL (The proposed commercial ACT would equal 227,744 pounds whole weight in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

NOTE: The ACT value would not increase if the total ACL was exceeded as discussed in **Action 6**.

Table 4-26. Red grouper commercial ACTs.
Values are in lbs whole weight.

		Commercial Sector ACT		
Year	Preferred Commercial Sector ACL	Alt 1 (No Action)	Alt 2 ACT=90%(ACL)	Alt 3 ACT= 80%(ACL)
2012	284,680	n/a	256,212	227,744
2013	315,920	n/a	284,328	252,736
2014+	343,200	n/a	308,880	274,560

4.7.1 Biological Effects

The National Standard 1 guidelines recommend the use of ACTs in systems of AMs so that an ACL is not exceeded. For fisheries without in-season management control to prevent the ACL from being exceeded, AMs may utilize ACTs that are set below ACLs as a target level. If management measures are set to keep landings near the ACT, then overages of the ACL are less likely to occur. If an ACT is specified as part of the AMs for red grouper, an ACT control rule that accounts for management uncertainty may be utilized for setting the ACT. The objective for establishing an ACT and related AMs is that the ACL not be exceeded.

Alternative 1 (No Action) (Preferred) would not specify a commercial ACT for red grouper. **Alternatives 2** and **3** would establish reduced harvest levels (90% and 80% of the ACL, respectively) designed to hedge against an ACL overage and therefore, provide a buffer between the ACT and ACL, and account for management uncertainty. Establishing an ACT that is 90% or 80% of the commercial ACL would also reduce the probability that post-season AMs that are meant to correct for an ACL overage would be needed and would equate to positive effects on the red grouper stock and associated ecosystem.

There is likely to be no additional biological benefit to protected species from **Alternative 1 (No Action) (Preferred)** because it would perpetuate the existing level of risk for interactions between ESA-listed species and the fishery. Previous ESA consultations determined the snapper grouper fishery was not likely to adversely affect marine mammals or *Acropora* species. **Alternatives 2** and **3** are unlikely to alter fishing behavior in a way that would cause new adverse effects to these species. The biological benefits to sea turtles and smalltooth sawfish from **Alternatives 2** and **3** and the associated subalternatives are unclear. If they perpetuate the existing amount of fishing effort they are unlikely to change the level of interaction between sea turtles and smalltooth sawfish and the fishery as a whole. This scenario is likely to provide little additional biological benefits to sea turtles and smalltooth sawfish, if any. However, if these alternatives reduce the overall amount of effort in the fishery the risk of interaction with sea turtles and smalltooth sawfish will likely decrease, providing additional biological benefits to these species.

4.7.2 Economic Effects

The various ACT alternatives are presented in **Table 4-27**. Assuming a discount rate of 3%, if the ACT is set at 90% of the ACL, as proposed under **Alternative 2**, then fishermen are predicted to lose $570,000 over the ten-year period. If the ACL is set at 80% of the ABC, as proposed under **Alternative 3**, losses are expected to total $1,160,000 over a ten-year period.

Under the assumption of a 7% discount rate, **Alternative 2** would result in a loss of $460,000 over the ten year period whereas **Alternative 3** would result in losses totaling $940,000 over a ten year period.

Table 4-27. Net present value of net operating revenues (NOR) to the commercial sector associated with the AM alternatives in **Action 7** over a time horizon of 10 years, assuming the preferred rebuilding path in **Action 4 (Alternative 3)**, 44% commercial allocation, ACL=ABC, and using different discount rates. Dollar amounts are in millions of 2010 dollars.

	Specification of Alternative Commercial AMs		
Rebuilding Strategy	**Alternative 1** (Preferred) No Comm. ACT	**Alternative 2** ACT = 90%ACL	**Alternative 3** ACT = 80%ACL
	Net Present Value of NOR Streams – 0% Discount Rate		
75%F_{MSY}	$92.08	$91.40	$90.72
	Net Present Value of NOR Streams – 3% Discount Rate		
75%F_{MSY}	$78.41	$77.84	$77.25
	Net Present Value of NOR Streams – 7% Discount Rate		
75%F_{MSY}	$64.40	$63.94	$63.46

Should ACTs be used to trigger AMs, the impacts of the various ACT alternatives on business activity would be those presented in **Table 4-28**. **Alternative 1 (No Action) (Preferred)** would essentially equate ACT to ACL, and thus would have no impacts on business activity, as it is essentially the no action alternative. **Alternatives 2 and 3** would result in negative impacts on business activity for North Carolina, South Carolina, and Florida but positive impacts for Georgia/Northeast Florida.

Table 4-28. Potential change in business activities associated with the ACT alternatives relative to **Alternative 1 (No Action) (Preferred).** All dollar values are in thousands of 2008 dollars.

	North Carolina	South Carolina	Georgia/NE FL	Florida
	Preferred Alternative 1			
Employment	0	0	0	0
Income	$0	$0	$0	$0
Output	$0	$0	$0	$0
	Alternative 2			
Employment	-8	-3	0	0
Income	-$178	-$66	$0	-$5
Output	-$331	-$136	$0	-$10
	Alternative 3			
Employment	-16	-6	0	0
Income	-$364	-$132	$11	-$13
Output	-$677	-$274	$22	-$25

4.7.3 Social Effects

It is the setting of an ACT where social and economic considerations might enter the equation as management uncertainty is evaluated. Setting of ACTs is utilized in fisheries where there may be management uncertainty that adds risk to reaching target harvest levels beyond the biological risks. It usually entails a further reduction in harvest levels to ensure catch remains at or below the ACL and does not wildly fluctuate. For fisheries where information is scarce and management is uncertain, it becomes a real possibility that there can be negative short-term impacts that may not have been necessary if thresholds are too restrictive. In other fisheries which have more certainty in management and monitoring of catch, a more precise harvest level can be set with certainty and reduce volatility in the fishery.

Additionally, the ACT is associated with the AMs, which can have significant impacts on the social environment if the AMs include restrictions or closures.

For the commercial sector, **Alternative 1 (No Action) (Preferred)** would not impose that buffer through the ACT and is less restrictive than **Alternatives 2** or **3**. With **Alternatives 2** and **3,** a buffer could be imposed. Therefore there is an increasing possibility of negative short-term social effects going from **Alternative 1 (No Action) (Preferred)** to **Alternative 3**.

Some of those effects are similar to other thresholds being met and may involve switching to other species or discontinuing fishing altogether. Although these are common responses to closures, it is not known how fishermen may respond if closures are anticipated for several different species or groups. There could be a domino effect as one closure forces them to switch to another species which closes as thresholds are met with the added fishing pressure.

4.7.4 Administrative Effects

Specifying an ACT for the commercial sector may create an unnecessary administrative burden since commercial landings can be tracked in-season with a relatively high degree of certainty. As the ACT alternatives are presented here, no corrective or preventative action would be triggered if the ACT is met or exceeded. Therefore, the ACT would simply act as an additional layer of precautionary monitoring, and would only be used as a performance reference point to measures effectiveness of management measures currently in place. For this reason no additional administrative impact would be realized regardless of the preferred alternative chosen under this action. If the South Atlantic Council determines that a commercial ACT is appropriate in the future, an ACT may be created for the sector via a regulatory amendment to the FMP based on the updated framework procedures included in Amendment 17B (SAFMC 2010b).

4.8 Action 8. Specify a Recreational Sector Annual Catch Target (ACT)

Alternative 1 (No Action). Do not specify a recreational ACT for red grouper. Currently, there is no recreational ACT for red grouper (The proposed recreational ACL would equal 362,320 lbs ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 2. The recreational ACT equals 85% of the recreational ACL (The proposed recreational ACT would equal 307,972 lbs ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 3. The recreational ACT equals 75% of the recreational ACL (The proposed recreational ACT would equal 271,740 lbs ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

Alternative 4 (Preferred). The recreational ACT equals the recreational ACL*(1-PSE) or ACL*0.5, whichever is greater (The proposed recreational ACT would equal 271,740 lbs ww in 2012 but would increase in 2013 and 2014 as long as the total ACL is not exceeded).

NOTE: The ACT values would not increase if the total ACL was exceeded as discussed in **Action 6**.

Table 4-29. Proportional Standard Error (PSE) values for red grouper 2004-2008 including 3-year and 5-year averages.

PSE Values (weight)	
2004	24.7
2005	22.7
2006	26.0
2007	27.1
2008	25.6
3 Yr Avg	26.2
5 Yr Avg	25.2
Council using PSE=25%	

Source: MRFSS

Table 4-30. Red grouper recreational ACTs.
Average PSE during 2004-2008 equals 25 (**Table 4-29**). Values are in lbs whole weight.

Year	Preferred Recreational Sector ACL	Recreational Sector ACT		
		Alt 2; ACT=85%(ACL)	Alt 3; ACT=75%(ACL)	Alt 4 (Preferred); ACT equals sector ACL*(1-PSE) or ACL*0.5, whichever is greater
2012	362,320	307,972	271,740	**271,740**
2013	402,080	341,768	301,560	**301,560**
2014+	436,800	371,280	327,600	**327,600**

4.8.1 Biological Effects

The National Standard 1 guidelines recommend the use of ACTs in systems of AMs so that an ACL is not exceeded. For fisheries without in-season management control to prevent the ACL from being exceeded, AMs may utilize ACTs that are set below ACLs as a target level. If management measures are set to keep landings near the ACT, then overages of the ACL are less likely to occur. If an ACT is specified as part of the AMs for red grouper, an ACT control rule that accounts for management uncertainty may be utilized for setting the ACT. The objective for establishing an ACT and related AMs is that the ACL not be exceeded. In this sense, the ACT would serve as a "performance standard". The NS 1 guidelines suggest a performance standard such that if catch of a stock exceeds its ACL more often than once in the last four years, then the system of ACLs, ACTs and AMs should be re-evaluated to improve its performance and effectiveness. If the South Atlantic Council and its SSC determined that the management measures in place are not constraining catch to a target level such as the ACT, adjustments could be made through a future regulatory amendment.

Alternative 1 (No Action) would not specify a recreational ACT for red grouper. **Alternatives 2** and **3** would establish reduced harvest levels (85% and 75% of the ACL, respectively) designed to hedge against an ACL overage and therefore, provide a buffer between the ACT and ACL, and account for management uncertainty.

Alternative 4 (Preferred) would have the greatest biological benefit of the alternatives by adjusting the ACL by 50% or one minus the proportional standard error (PSE) from the recreational fishery, whichever is greater (**Table 4-30**). The lower the value of the PSE, the more reliable the landings data. Establishing an ACT below the recreational ACL would also reduce the need to close or implement post-season AMs that are meant to correct for an ACL overage.

4.8.2 Economic Effects

Should the ACTs become binding constraints on the harvest of red grouper, the potential economic effects of the various subalternatives would be those presented in **Table 4-31**. Under the assumption that ACL is equal to ABC, **Alternative 2** would provide an ACT equal to 85% of ACL. This alternative would result in larger positive economic effects ($0.33 million to $1.53 million over four years, **Table 4-31**) than the alternative setting the ACT equal to 75% of

ACL (-$0.03 million to -$0.01 million, **Table 4-25**). For the current analysis, a PSE of 0.25 was used, so that **Alternative 4 (Preferred)** would have exactly the same economic effects as **Alternative 3**.

Table 4-31. Net present value of changes in CS to the recreational sector associated with the ACT alternatives over 4 years and 10 years, assuming 75%F_{MSY} rebuilding strategy, ACL=ABC, recreational allocation of 56% of ACL, and using a 7% discount rate. Dollar amounts are in millions of 2010 dollars.
High, Medium, and Low represent the range of CS effects using various estimates of CS per fish found in empirical studies.

ACT Alternatives	4- Year Horizon	10-Year Horizon
	High	
Alternative 2: ACT=85%ACL	$1.53	$8.35
Alternative 3: ACT=75%ACL	-$0.03	$4.52
Alternative 4 (Preferred): ACT= ACL (1-PSE)	**-$0.03**	**$4.52**
	Medium	
Alternative 2: ACT=85%ACL	$1.28	$6.99
Alternative 3: ACT=75%ACL	-$0.02	$3.78
Alternative 4 (Preferred): ACT= ACL (1-PSE)	**-$0.02**	**$3.78**
	Low	
Alternative 2: ACT=85%ACL	$0.33	$1.82
Alternative 3: ACT=75%ACL	-$0.01	$0.98
Alternative 4 (Preferred): ACT= ACL (1-PSE)	**-$0.01**	**$0.98**

4.8.3 Social Effects

The general effects on the social environment of an ACT for the recreational sector would be similar to the effects described in **Section 4.7.3**. **Alternative 1 (No Action)** would not implement a recreational ACT and there would be no additional social impact on the recreational sector. The variations in **Alternatives 2-4 (Preferred)** impose a buffer, as a certain percentage of the ACL, and it would be expected that short-term negative social effects would accrue as the buffer increased**.** The actual limits for the ACT under **Alternative 3** and **Alternative 4 (Preferred)** are identical, and would produce the same social effects, primarily by limiting recreational fishing opportunities. **Alternative 2** would implement a higher level for the recreational ACT than **Alternative 3** or **Alternative 4 (Preferred),** and the short-term social impacts on the recreational fishermen would be less under **Alternative 2**.

4.8.4 Administrative Effects

Under this action, it is important to note that recreational data collection can be more administratively burdensome due to time delays and lengthy reviews. Specifying an ACT alone would not increase the administrative burden over the status quo, other than adding an additional layer of precautionary monitoring to the system of AMs. In-season monitoring needed for tracking how much of the ACT has been harvested throughout a particular fishing season can potentially result in a need for additional cost and personnel resources if a monitoring mechanism is not already in place. However, because the ACT alternatives as they are presented here, do not trigger any corrective or preventative action, no additional in-season monitoring is required regardless of where the

ACT level is set. Therefore, there is no difference in the potential administrative impacts associated with **Alternatives 2-4 (Preferred)**.

4.9 Action 9. Specify Commercial Accountability Measures (AMs)

Alternative 1 (No Action). Do not specify new commercial AMs for red grouper. There currently are commercial AMs for a black grouper, gag, and red grouper complex.

Table 4-32. Current commercial regulations for red grouper.

Current Commercial Regulations	
Aggregate ACL and in-season closures	Group commercial ACL for gag, black grouper and red grouper of 662,403 lbs gutted weight. After the commercial ACL is met, all purchase and sale of the following species is prohibited and harvest and/or possession is limited to the bag limit: gag; black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby; and coney.
Minimum size limit	20 inches total length
Seasonal closure	No fishing for and/or possession of the following species is allowed January through April: gag, black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby; and coney.

Alternative 2 (Preferred). If the commercial ACL is met or is projected to be met, all subsequent purchase and sale of red grouper is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 3 (Preferred). If the commercial ACL is exceeded, the Regional Administrator shall publish a notice to reduce the commercial ACL in the following season by the amount of the overage.

NOTE: Paybacks are not required when new projections are adopted that incorporate ACL overruns and the ACLs are adjusted in accordance with those projections.

4.9.1 Biological Effects

There are several types of AMs that may be applied to the red grouper fishery. In-season AMs are those that are triggered during the fishing season, typically before an ACL is projected to be met. Some examples of in-season AMs include quota closures, trip or bag limit changes, gear restrictions, or catch shares. Post-season AMs would be triggered if the ACL is exceeded and would typically be implemented the following fishing season. Post-season AMs could include seasonal closures, reduced trip or bag limits, or shortening of the fishing season implemented in the subsequent year. Ideally, a combination of in-season and post-season AMs would be used to first prevent the ACL from being exceeded, and then provide a mechanism to correct for an overage if one should occur. Implementing a post-season AM in addition to an in-season AM would reduce the risk of overfishing since there would be two layers of protection against unsustainable harvest rates. It is important to note that the new framework procedure for setting ACLs in the snapper grouper fishery in Amendment 17B (SAFMC 2010b) would allow for timely adjustments to be made to AMs if the South Atlantic Council and NOAA Fisheries Service determine a change is needed.

The South Atlantic Council may choose one or more post-season AMs to supplement any of the in-season AMs. If an ACL overage were to occur after an in-season AM has been implemented, a post-season AM would be available to the Regional Administrator (RA) as a means to correct an overage and prevent overfishing. Post-season AMs would allow all landings for a particular season to be reported before any harvest restriction measures would take effect. This method of accountability alone may correct for one year's or several years' overages; however, it does little to prevent an overage from occurring again unless it is chosen in conjunction with an in-season AM.

The updated framework procedure included in Amendment 17B (SAFMC 2010b) allows for the timely establishment and adjustment of ACTs (and ACLs) if the South Atlantic Council and NOAA Fisheries Service determine they are necessary. Therefore, if the South Atlantic Council chooses not to implement ACTs for red grouper through this amendment, ACTs may be easily established and modified in the future if needed.

The NS1 guidelines recommend a performance standard by which the efficacy of any system of ACLs and AMs can be measured and evaluated. According to the guidelines:

…if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness (74 FR 3178).

If an evaluation concludes that the ACL is being chronically exceeded for any one species or species group, and post-season AMs are repeatedly needed to correct for ACL overages, adjustments to management measures would be made.

Alternative 1 (No Action) would not establish new AMs for the commercial sector of the red grouper fishery. The AMs that were implemented through Amendment 17B, therefore, would continue to apply. However, an individual ACL for black grouper is being established through the Comprehensive ACL Amendment and **Action 6** of this amendment would establish an individual ACL for red grouper..

Alternative 3 (Preferred) would reduce the commercial sector ACL in the following season by the amount of the overage. The ACL would be reduced by the amount as that taken in excess the year before, and may shorten the season if the lower ACL is met earlier in the year. A shortened season may result in increased regulatory discards if no level of harvest is permitted after the ACL is reached. However, under **Alternative 2 (Preferred)**, fishermen would still be able to retain bag limit quantities of red grouper, which may reduce the number of regulatory discards that would otherwise result from a shortened season. Under this scenario **Alternative 3 (Preferred)** could be expected to provide a moderate biological benefit.

Appendix G evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided in the Magnuson-Stevens Fishery Conservation and Management Act. In summary, the actions in Amendment 24 could increase bycatch of red grouper if fishermen continue to encounter red grouper if the annual catch limit is reached and the fishery is closed to possession and retention. The estimated release mortality of red grouper is 20%. However, fishermen may fish in specific areas to avoid red grouper once, and if, the annual catch limit is reached. Recently implemented regulations including the requirements of dehooking devices, circle hooks, a recreational/commercial seasonal closure for shallow water groupers, reduction of recreational bag limits, and closing all shallow water groupers when a gag quota is met, could also help to reduce bycatch of red grouper.

There is likely to be no additional biological benefit to protected species from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between ESA-listed species and the fishery. Previous ESA consultations determined the snapper grouper fishery was not likely to adversely affect marine mammals or *Acropora* species. **Alternatives 2-3 (Preferreds)** are unlikely to alter fishing behavior in a way that would cause new adverse effects to these species. The biological benefits to sea turtles and smalltooth sawfish from **Alternatives 2-3 (Preferreds)** and the associated subalternatives are unclear. If they perpetuate the existing amount of fishing effort they are unlikely to change the level of interaction between sea turtles and smalltooth sawfish and the fishery as a whole. This scenario is likely to provide little additional biological benefits to sea turtles and smalltooth sawfish, if any. However, if these alternatives reduce the overall amount of effort in the fishery the risk of interaction with sea turtles and smalltooth sawfish will likely decrease, providing additional biological benefits to these species.

4.9.2. Economic Effects

Alternative 1 (No Action) would economically benefit the commercial sector the most in the short-term but the least in the long-term since lack of an AM could result in further overfishing. Both **Alternative 2 (Preferred)** and **Alternative 3 (Preferred)** would result in short-term profit reductions to the commercial sector. Over the long-term, however, these alternatives would provide better economic scenario for the commercial sector by addressing issues related to overfishing of the stock. With a relatively stable stock over time, future harvest would increase or at least would be stable. This stability could benefit the commercial sector financially by paving the way for more confident business planning with more predictable landings that could result in improvements in marketing and reliability of landings to dealers.

Reported commercial landings of red grouper for 2010 are higher than the currently preferred ACL alternative **(Table 4-32a)**. In this context, applications of AM under **Alternatives 2 (Preferred)** and **3 (Preferred),** may occur in the near future.

Table 4-32a. Red grouper commercial landings by month during the open season for 2010. Proposed commercial ACL = 284,680 lbs whole weight.

	Reported Monthly 2010 Landings (lbs whole weight)	Cumulative 2010 Landings (lbs whole weight)
January	0	0
February	0	0
March	0	0
April	0	0
May	85,057	85,057
June	55,486	140,543
July	35,893	176,436
August	32,205	208,641
September	24,857	233,498
October	41,625	275,123
November	31,272	306,395
December	23,620	330,015
Total	330,015	

4.9.3 Social Effects

The setting of AMs can have significant direct and indirect effects on the social environment as they usually impose some restriction on harvest, either during the current season or the next. The long-term effects should be beneficial as they provide protection from further negative impacts on the stock. While the negative effects are usually short-term, they may at times induce other indirect effects through changes in fishing behavior or business operations that could have long-term social effects.

The payback that is proposed in **Alternative 3** (**Preferred)** would further assist with rebuilding where the in-season closure in **Alternative 2** (**Preferred)** would not, on its own. However, when **Alternative 2 (Preferred)** and **3 (Preferred)** are combined, there is an in-season accountability measure that provides some protection from continued overages during the fishing season. So, with **Alternatives 2 (Preferred)** and **3 (Preferred)** combined, there should be sufficient protection with some beneficial social effects through the payback provision. While payback does incur short-term negative social impacts, the long-term benefits of stock protection should contribute to the overall benefits, as stock status should remain at sustainable levels. However, the payback AM is not likely to result in additional economic effects due to the ability to conduct in-season monitoring..

4.9.4 Administrative Effects

Alternative 2 (Preferred) and **Alternative 3 (Preferred)** would replace the current system of commercial AMs implemented through Amendment 17B (SAFMC 2010b). Harvest and possession of red grouper would be restricted to the bag limit once the commercial ACL is projected to be met, but purchase and sale would be prohibited. Because the current AM already requires in-season monitoring of commercial landings to determine if and when the ACL is met, no additional administrative cost or time burden would result from the proposed **Alternative 2 (Preferred)** modifications to the current AM in place. **Alternative 3 (Preferred)** is not a provision that is currently part of the commercial AM for red grouper. Therefore, if the ACL is exceeded some additional staff time would be required to determine the ACL reduction needed to correct for the overage, and to distribute public notice of the reduced quota. The administrative burden associated with implementing **Alternative 3 (Preferred)** would most likely be minimal. Additionally, the need for enforcement of commercial AMs is not likely to increase beyond the status quo since similar enforcement efforts are already required under the current system of AMs.

4.10 Action 10. Specify Recreational Accountability Measures (AMs)

Alternative 1 (No Action). Do not specify new, or modify existing, recreational AMs for red grouper. There currently are recreational AMs for a black grouper, gag, and red grouper complex.

Table 4-33. Current recreational regulations for red grouper.

Current Recreational Regulations	
Bag limit	Included in three grouper aggregate bag limit per person per day. Exclude the captain and crew on for-hire vessels from possessing a bag limit for groupers
Minimum size limit	20 inches total length
Seasonal closure	No fishing for and/or possession of the following species is allowed January through April: black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby, and coney.
ACL/AM	Establish a recreational ACL for gag, black grouper, and red grouper of 648,663 lbs gutted weight. If at least one of the species (gag, red grouper, or black grouper) *is overfished* and the sector ACL is projected to be met, prohibit the recreational harvest and retention of black grouper, gag, and red grouper. If the ACL is exceeded, independent of stock status, the Regional Administrator shall publish a notice to reduce the sector ACL in the following year by the amount of the overage. For red grouper compare the recreational ACL with recreational landings over a range of years. For 2010, use only 2010 landings. For 2011, use the average landings of 2010 and 2011. For 2012 and beyond, use the most recent three-year running average.

Alternative 2. Specify the recreational AM trigger.

Subalternative 2a. Do not specify a recreational AM trigger.

Subalternative 2b (Preferred). If the current year recreational landings exceed the recreational ACL in a given year.

Subalternative 2c. If the mean recreational landings for the past three years exceed the recreational ACL.

Subalternative 2d. If the modified mean recreational landings exceeds the recreational ACL. The modified mean is the most recent 5 years of available recreational landings data with highest and lowest landings estimates from consideration removed.

Subalternative 2e. If the lower bound of the 90% confidence interval estimate of the MRFSS landings' population mean plus headboat landings is greater than the recreational ACL.

Alternative 3. Specify the recreational in-season AM.

Subalternative 3a. Do not specify a recreational in-season AM.

Subalternative 3b (Preferred). The Regional Administrator shall publish a notice to close the recreational sector when the recreational ACL is projected to be met.

Alternative 4. Specify the recreational post-season AM.

Subalternative 4a. Do not specify a recreational post-season AM.

Subalternative 4b. For recreational post-season accountability measures, compare the recreational ACL with recreational landings over a range of years. For 2011, use only 2011 landings. For 2012, use the mean landings of 2011 and 2012. For 2013 and beyond, use the most recent three-year running mean.

Subalternative 4c. Monitor following year. If the recreational ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator would take action as necessary.

Subalternative 4d. Monitor following year and shorten season as necessary. If the recreational ACL is exceeded, the following year's landings would be monitored in-season for persistence in increased landings. The Regional Administrator will publish a notice to reduce the length of the recreational fishing season as necessary.

Subalternative 4e. Monitor following year and reduce bag limit as necessary. If the recreational ACL is exceeded, the following year's landings would be monitored for persistence in increased landings. The Regional Administrator will publish a notice to reduce the recreational bag limit as necessary.

Subalternative 4f. Shorten following season. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the length of the following recreational fishing year by the amount necessary to ensure landings do not exceed the recreational ACL for the following fishing season.

Subalternative 4g (Preferred). Payback. If the recreational ACL is exceeded, the Regional Administrator shall publish a notice to reduce the recreational ACL in the following season by the amount of the overage.

NOTE: Paybacks are not required when new projections are adopted that incorporate ACL overruns and the ACLs are adjusted in accordance with those projections.

4.10.1 Biological Effects

There are several types of AMs that may be applied in the red grouper fishery. In-season AMs are those that are triggered during the fishing season, typically before an ACL is exceeded or when it is projected to be met. Some examples of in-season AMs include quota closures, trip or bag limit changes, gear restrictions, or catch shares. Post-season AMs would be triggered if the ACL is exceeded and would typically be implemented the following fishing season. Post-season AMs could include seasonal closures, reduced trip or bag limits, or shortening of the fishing season implemented in the subsequent year. Ideally, a combination of in-season and post-season AMs would be used to first prevent the ACL or ACT from being exceeded, and then provide a mechanism to correct for an overage if one should occur. Implementing a post-season AM in addition to an in-season AM would reduce the risk of overfishing since there would be two layers of protection against unsustainable harvest rates. It is important to note that the new framework procedure for setting total allowable catch in the snapper grouper fishery in Amendment 17B (SAFMC 2010b), would allow for timely adjustments to be made to AMs if the South Atlantic Council and NOAA Fisheries Service determine a change is needed.

The efficacy of in-season AMs is largely reliant upon in-season monitoring of landings, which may be especially difficult for the recreational sector. The MRFSS and the newly implemented MRIP uses random survey methods and may not capture data on species that are infrequently encountered. Therefore, in-season tracking of red grouper landings in the recreational sector would be based on the MRFSS program and state landings reports. An additional obstacle to tracking recreational harvest in-season is that there is a 45-day lag time between when the fish are landed and when those landings are reported in the landings database at the end of a two-month wave. This lag time means that projections of when the ACL is expected to be met would need to be employed. Landings projections are not always 100% accurate, thus using such estimates could lead to an in-season AM being triggered prematurely, or not soon enough causing an ACL overage.

Alternative 1 (No Action) would not specify recreational AMs for red grouper. The AMs that were implemented through Amendment 17B, therefore, would continue to apply. However, an individual ACL for black grouper is being established through the Comprehensive ACL Amendment essentially negating the need for an aggregate gag/black grouper/red grouper ACL.

Management action could be necessary if future landings are projected to exceed the ACL. As for the commercial sector, the ACLs in Amendment 24 vary according to the selected rebuilding strategy. Recreational landings in 2010 are below the proposed recreational ACL range (**Table 4-34**); therefore, management measures currently in place appear to be sufficient to limit landings to below the ACL.

Table 4-34. Red grouper recreational landings in 2010 compared to the proposed recreational ACL.

	Reported 2010 Landings (lbs whole weight)	Range of Proposed ACLs in 2012 (lbs whole weight)	Proposed ACLs in 2012 for Preferred Alternatives (lbs whole weight)
Recreational[1,2]	98,419	253,000 - 381,150 (landings) 268,400 - 405,350 (landings and discards)	362,320 (landings)

[1]Source: Recreational ACL dataset (October 2011 version).
[2]Private recreational, charterboat, and headboat landings are 80,377 lbs, 8,533 lbs, and 9,509 lbs, respectively.

With the exception of **Subalternative 2a**, **Alternative 2** and its subalternatives would specify the AM trigger under different scenarios. Under **Subalternative 2b (Preferred)**, AMs would be triggered if the annual landings exceeded the ACL in a given year.

Subalternative 2c would examine the trend in the past three years of landings data to determine if AMs would be triggered. If in any year the ACL is reduced or increased, the sequence of future ACLs would begin again starting with a single year of landings compared to the ACL for that year, followed by a 2-year average of landings compared to the 2-year average ACLs in the next year, further followed by a 3-year average of landings compared to the 3-year average of ACLs for the third year, and so on. For example, for year 2011, 2011 landings would be used. For 2012, mean landings of 2011 and 2012 would be used. For 2013 and beyond, the most recent three-year running mean would be used to determine if the ACL is exceeded.

Using the average of three years landings could help address any anomalous highs and lows reflected in the landings data; however, if one of the three years was associated with an extremely large spike in landings, which may or may not be attributable to an actual increase in harvest or some sampling variability, that spike would greatly influence the 3-year average for several years in the future and potentially result in the unnecessary triggering of harvest restrictions. Therefore, the average could create a lag and mask what is actually happening in the landings.

Subalternative 2d is similar to **Subalternative 2c**, except that a review of the most recent 5-year series of landings data would be conducted to determine which of the five years were associated with the highest and lowest harvest levels. After the years of highest and lowest landings were determined, those two years' landings would be removed from the time series leaving three years of landings to be averaged. If the averaged total of the remaining three years' landings were greater than the ACL then the AMs would be triggered.

Subalternative 2e would trigger AMs if the lower 90% confidence interval (CI) estimate of MRFSS landings' population mean plus headboat landings is greater than the ACL. The application of the 90% confidence interval could be considered a more conservative parameter to use when estimating overage amounts.

Additionally, if years of high landings are indeed attributable to increased harvest due to spikes in recruitment or effort shifts rather than sampling effects, this method of implementing AMs may remove years of high landings inappropriately, and thus fail to trigger corrective action when it would have been needed. By using the lower bound of the 90% CI, the landings estimate is effectively being lowered the by the amount of uncertainty. This is the same as if the ACL was being increased by the amount of the uncertainty. However, the actual landings are just as likely to be higher than the estimate, but this isn't taken into consideration by using only the lower bound of the CI.

One of the benefits of employing the approaches in **Subalternatives 2c-2e** to implementing AMs is that it provides an opportunity for fishery managers to use a data set uninfluenced by anomalous highs and lows, which could be caused by statistical variability. Alternatively, it may be difficult to decide if such differences in recreational landings are due to statistical or sampling variances, or if they can be attributed to actual increased harvest. In the case of the latter, the modified mean approach (**Subalternative 2d**) may not be the most biologically advantageous compared to other alternatives considered that would remove high and low landings years. In cases where it cannot be determined that one year's high landings are definitively caused by statistical variation, it may be difficult to justify removing that year's landings from the time series of data, especially if there is a strong year class known to have entered the fishery at that time or if there have regulations implemented that cause an extreme effort shift.

Alternative 3 and its subalternatives examine the need for an in-season AM. **Subalternative 3b (Preferred)** would allow the RA to publish a notice to close the recreational sector when the ACL is projected to be met. In-season monitoring of recreational landings is difficult, however. Currently, there is a 45-day time lag in when recreational data become available at the end of a two-month wave. There would likely be some uncertainty associated with imposing in-season AMs for the recreational sector making post-season AMs more appropriate for the recreational sector.

With the exception of **Subalternative 4a**, which would not specify a post-season AM, **Alternative 4** and its subalternatives specify methodologies for post-season AM actions that would be taken if the ACL is exceeded. Under **Subalternative 4b**, ACLs would be compared with landings over a range of years to determine the magnitude of the ACL overage. For example, for 2011, only 2011 landings would be used. For 2012, the mean landings from 2011 and 2012 would be used, and for 2013 and beyond, the most recent three-year running mean would be used. If the ACL is exceeded, **Subalternatives 4c-4e** would monitor the following year's landings for persistence in increased landings. Under **Subalternative 4c**, the RA would take action as necessary to ensure an ACL was not exceeded in a year subsequent to an ACL overage. Under **Subalternative 4d** the RA would publish a notice to reduce the length of the fishing season as necessary, and under **Subalternative 4e**, the RA would publish a notice to reduce the bag limit as necessary. Under **Subalternative 4f**, if the ACL is exceeded, the RA would publish a notice to reduce the length of the following fishing year by the amount necessary to ensure landings do not exceed the recreational sector ACL for the following fishing season. In contrast, under **Subalternative 4g (Preferred)**, there would be a payback provision for exceeding an ACL, whereby the RA would publish a notice to reduce the recreational sector ACL in the following season by the amount of the overage. This is consistent with the approach the South Atlantic Council has taken in previous amendments to address species that are overfished and/or experiencing overfishing.

Subalternatives 4d and **4f** would ensure that the amount of the previous year's ACL overage would be accounted for in the subsequent year's protection via a shortened season, and thus would be biologically beneficial. The monitoring component of **Subalternatives 4c-4e** would allow for any anomalies or data reporting irregularities to be taken into account before the AMs would be effective, hence possibly adding a socio-economic benefit to the biological benefit of any management measures such as reducing the length of the following fishing season (**Subalternative 4f)**. There would be an opportunity to determine if a spike in landings is merely a factor of some statistical variability, or if it is due to truly high landings that persist into the following fishing season. Years of exceptionally high landings are not eliminated under these alternatives, rather they are monitored to assess whether spikes in landings can truly be considered outliers or if they are in fact years of increased harvest that need to be addressed through corrective action.

If catch continually exceeds the ACL, additional AMs may need to be implemented to reduce harvest pursuant to NS 1 guidelines for performance standards. Under the updated framework procedure implemented through Amendment 17B (SAFMC 2010b), the SSC would examine the social and economic impact analyses for a specific allocation, ACL, ACT, AM, quota, bag limit, or other fishing restriction. If the South Atlantic Council and its SSC determined that the management measures in place are not constraining catch to a target level, adjustments could be made through a future regulatory amendment.

There is likely to be no additional biological benefit to protected species from **Alternative 1 (No Action)** because it would perpetuate the existing level of risk for interactions between ESA-listed species and the fishery. Previous ESA consultations determined the snapper grouper fishery was not likely to adversely affect marine mammals or *Acropora* species. **Alternatives 2-4** and the associated subalternatives are unlikely to alter fishing behavior in a way that would cause new adverse effects to these species. The biological benefits to sea turtles and smalltooth sawfish from **Alternatives 2-4** and the associated subalternatives are unclear. If they perpetuate the existing amount of fishing effort they are unlikely to change the level of interaction between sea turtles and smalltooth sawfish and the fishery as a whole. This scenario is likely to provide little additional biological benefits to sea turtles and smalltooth sawfish, if any. However, if these alternatives reduce the overall amount of effort in the fishery the risk of interaction with sea turtles and smalltooth sawfish will likely decrease, providing additional biological benefits to these species.

4.10.2. Economic Effects

Alternative 1 (No Action) would economically benefit the recreational sector the most in the short-term but the least in the long-term since lack of an AM could result in further overfishing. To determine the aggregate black grouper, gag, and red grouper ACL implemented through Amendment 17B, the South Atlantic Council used historical landings for black grouper and red grouper. The red grouper landings used in Amendment 17B are lower than the proposed ACL. An AM trigger tied to ACL not based on the best available scientific information may trigger closures before the optimum yield, is fully reached, thus severely restricting the socioeconomic benefits that can be derived from the fishery.

Alternative 2 deals with specific AM triggers. **Subalternative 2a**, which does not specify an AM trigger, would economically benefit the recreational sector the most in the short-term but the least in the long-term when more restrictive measures become necessary to meet the rebuilding target. The short-term economic effects of the other subalternatives would vary according to the likelihood of triggering the AM. In some sense, the AM would less likely be triggered under **Subalternatives 2c** and **2d**, than under **Subalternatives 2b (Preferred)** and **2e** as a result of taking into account landings over a number of years. In this sense, **Subalternatives 2c and 2d** would likely provide less adverse short-term economic effects than the other subalternatives. **Subalternative 2d** would be particularly noteworthy because it would eliminate the highest and lowest landings. There is, of course, the possibility that **Subalternative 2c** would provide worse economic outcome than any of the other alternatives. This can happen when one year of very high landings would have a strong influence in triggering the AM for a number of years.

Between the two subalternatives of **Alternative 3**, **Subalternative 3a** would economically benefit the recreational sector more in the short-term than **Subalternative 3b (Preferred)** since it would impose no further restrictions. However, it would result in worse long-term economic situation, since lack of an AM could result in further overfishing of the stock that, in turn, would require more restrictive regulations. **Subalternative 3b (Preferred)** would not likely result in significant socioeconomic effects compared to **Alternative 1 (No Action)**.

Recreational landings of red grouper in 2010 were 98,419 lbs whole weight **(Table 4-34)** (Note: Amendment 16 implemented a 4-month closure of red grouper). The proposed recreational ACL is 362,320 lbs whole weight. Based on a comparison of 2010 landings and 2012 ACL, there is a low probability that the recreational ACL will be reached in the foreseeable future. In addition, the opportunity for an in-season closure currently exists as an ACL/in-season AM is currently in place for black grouper, gag, and red grouper.

Alternative 4 addresses the issue of implementing post-season AMs. **Subalternative 4a** would economically benefit the recreational sector more in the short-term since no further restrictions would be imposed. However, it would result in the worst long-term economic situation, since lack of an AM could result in moving further away from the rebuilding trajectory that, in turn, would require more restrictive regulations. The short- term economic effects of the other subalternatives would depend on the nature and extent of the restrictions imposed on the harvest of the species and/or on the opportunities to fish for the resource. Of the remaining subalternatives, **Subalternative 4c** would likely result in the least adverse economic effects on the recreational sector in the short term, although the actual effects would depend on the type of restrictions that would be imposed by the RA. **Subalternatives 4d** and **4e** would likely result in less adverse economic effects in the short term than **Subalternatives 4f** and **4g (Preferred)** to the extent that post-season AM may not be imposed depending on how persistent the upward trend in landings would be.

Subalternative 4d may yield larger adverse economic impacts than **Subalternative 4e** because it would totally eliminate fishing opportunities during part of the fishing year rather than mainly reduce the fishing experience for part of the fishing year. There is a good possibility that **Subalternatives 4f** and **4g (Preferred)** would result in the same fishing season length, although some other measures, like bag limit reduction, may be employed under **Subalternative 4g (Preferred)** to effect a longer season that would provide more fishing opportunities. Whichever of these two subalternatives can provide for more fishing opportunities may be considered better than the other for economic reasons. A payback provision is currently in place for black grouper, gag, and red grouper.

4.10.3 Social Effects

The general effects of closures and restrictions in the form of AMs are discussed in **Section 4.9.3**. **Alternative 1 (No Action)** does not implement any additional AMs for the recreational sector, and there would be no additional social impacts. There would likely be social benefits for this action, because proposed changes in **Action 6** would remove red grouper from the aggregate ACL.

Subalternatives in **Alternative 2** include options for establishing a trigger. It would be expected for short-term social impacts to be less significant under **Subalternatives 2a**, and **2c-2e** because these are less likely to trigger the AM. **Subalternative 2b (Preferred)** is the most restrictive and would lead to social impacts from AMs, but would produce long-term social benefits as the stock rebuilds and overfishing is prevented.

Alternative 3 includes subalternatives for an in-season recreational AM. **Subalternative 3a** would have fewer short-term social impacts but fewer long-term social benefits than **Subalternative 3b (Preferred)** by not implementing an in-season closure. This type of AM could shorten the season, which would limit recreational opportunities. However, an in-season closure would produce long-term broad social benefits by preventing overfishing of the red grouper stock.

The subalternatives under **Alternative 4** include options for post-season recreational AMs. As discussed in **Section 4.9.3**, the more restrictive the AMs, the more impact on the recreational sector in the short-term. **Subalternative 4a** would not implement a post-season AM and would not produce any additional impacts on the recreational sector. However, a lack of post-season AM may cause long-term broad social impacts if there is a decline in the red grouper stock.

Subalternatives 4b-4g (Preferred) present options to reduce harvest of red grouper if the ACL is exceeded, and each of these in some way would produce short-term impacts on recreational fishing opportunities through some management action, which could be shortened seasons, reduced bag limits, or other measures. The long-term social effects would be positive as long as the restrictions on recreational harvest through **Subalternatives 4b-4g (Preferred)** help to meet the rebuilding goals.

4.10.4 Administrative Effects

Action 10 would replace the current recreational AM where harvest and possession of red grouper is prohibited once the sector ACL is projected to be met if any of the other species in the aggregate ACL are overfished. Furthermore, **Action 10** would eliminate the use of the three-year running average of recreational landing to determine if the ACL has been exceeded in any given year. Using the three year average of recreational landings meant that a single year's anomalously high or low landings would strongly influence the outcome of the average for several years and could result in AMs being triggered when they are not needed and vice versa. Therefore, **Alternative 1 (No Action)** is considered the most administratively burdensome alternative of all the recreational AMs under consideration. In addition to triggering or not triggering AMs when they are most appropriate, **Alternative 1 (No Action)** would require more complex administrative work than is necessary to implement a successful recreational AM regime.

Alternative 3 specifies what would need to occur in order for corrective action to be taken in the form of an AM. **Subalternatives 3b (Preferred)-3e** would each require some additional cost and staff time associated with calculating either, the total annual landings, the mean landings over the past three years, the modified mean landings over the past five years, or the confidence interval estimate to determine if the recreational ACL has been exceeded. The work required to complete the calculations annually would likely be equal for each subalternative and would be minimal. In-season AMs **(Alternative 4)** for the recreational sector are the most administratively difficult to implement in a timely manner because of the time lags between when the landings are reported and when the data are processed, reviewed, and ready for use by fishery managers. In-season recreational AMs for red grouper would rely heavily on projections of when the ACL would be met during the fishing season, which would be associated with a high degree of uncertainty. The level of uncertainty attached to those in-season projections could result in the fishery being closed before it is necessary or being left open too long into the fishing season. For this reason it is advantageous to not only rely on in-season AMs but also implement post-season AMs that would be triggered if the ACL is exceeded.

Alternative 4 and its subalternatives, with the exception of **Subalternative 4a**, would implement different forms of post-season AMs for the recreational sector. **Subalternative 4b** would result in administrative impacts similar to those under the status quo situation where a three-year running average is also used to determine whether or not an ACL overage has occurred. By itself **Subalternative 4b** is not an AM but rather a method to determine whether or not an AM has been triggered. In order for **Subalternative 4b** to be chosen as a preferred alternative it should be chosen in conjunction with some other AM alternative. As stated previously, the use of a three-year running average in the recreational sector is the most administratively complex means of determining if an ACL has been exceeded, and may not be necessary given other less complex methods for determining overages are available.

Subalternative 4c would require monitoring landings in the year following a sector overage, in order to detect whether or not the increased landings are persistent or an anomaly. Because recreational landings would need to be tracked regardless of what AM alternatives are chosen there is not likely to be a significant difference between the administrative burden under **Subalternative 4c** and **Subalternatives 4d-4g (Preferred)**. **Subalternatives 4e** and **4f** would utilize the same monitoring method as **Subalternative 4c**, but each subalternative specifies the action to be taken if it is determined that increased landings are persistent through the next fishing season. Because **Subalternative 4c** also stipulates that some action would be taken "as necessary" the administrative impacts of all three subalternatives (**4d-4e**) would be very similar and would vary only in the type of corrective action taken. Administrative cost and time burdens under **Subalternatives 4f** and **4g (Preferred)** are likely to be very similar since they both would require the publication of a notice to inform recreational sector participants of either a reduced season, or a reduced ACL. In either case, the administrative impact would be minimal.

Chapter 5. Council's Choice for the Preferred Alternative

5.1 Re-define Maximum Sustainable Yield (MSY)

Re-defining MSY would not alter the current harvest or use of the red grouper resource. Specification of this biological reference point establishes a benchmark for management of the fishery; it does not entail a change to regulations unless a comparison of the status of the fishery with the benchmark indicates that management adjustments are necessary. As a benchmark, MSY would not limit how, when, where, or with what frequency participants in the fishery engage in harvesting red grouper. The South Atlantic Council is considering revising MSY because a stock assessment was completed for red grouper in 2010. Prior to that, MSY was specified as the yield produced by fishing at F_{MSY} or the F_{MSY} proxy (substitute), which was set at $F_{30\%SPR}$ but no actual poundage was specified. The latest stock assessment (SEDAR 19 2010) produced an estimate of F_{MSY} as well as the yield produced from fishing at F_{MSY}. Hence, the South Atlantic Council is proposing to adopt the updated MSY and change the specification process such that adjustments to the MSY can be made automatically based on the latest stock assessment or recommendation from the Scientific and Statistical Committee (SSC) as opposed to a full Fishery Management Plan (FMP) amendment or framework.

The Snapper Grouper Advisory Panel (AP) supported the South Atlantic Council's preferred alternative. The SSC did not provide a recommendation for this action.

The Council concluded that **Preferred Alternative 2** (MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy. MSY and F_{MSY} are recommended by the most recent SEDAR/SSC) best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.2 Re-define Minimum Stock Size Threshold (MSST)

The South Atlantic Council has typically set the MSST level at one minus the natural mortality (M) (or 0.5, whichever is greater) times the spawning stock biomass at MSY (SSB_{MSY}). However, when M is relatively small, such as 0.14 for red grouper, the current definition of MSST would trigger a rebuilding plan if biomass fell slightly below SSB_{MSY}. In this situation, natural variation in recruitment could cause stock biomass to frequently alternate between an overfished and rebuilt condition. This may lead to administrative, and potentially economic, adverse effects as the occurrence of unnecessary rebuilding plans/restrictive management measures would increase. To avoid this, the South Atlantic Council is redefining the MSST level in this amendment. **Preferred Alternative 3** would set the MSST at 75% of SSB_{MSY} and thus provide a larger buffer than the current one between the level at which the stock is considered to be at equilibrium (SSB_{MSY}) and the overfished level (MSST).

Many regions in the U.S. have been setting MSSTs at 50% of SSB_{MSY}, and one alternative in this amendment considers setting MSST at this level. If MSST is set at 50% of SSB_{MSY}, by the time a stock is found to be overfished, significant management measures may be required to rebuild the stock due to the low biomass levels.

It is noted that the latest stock assessment (SEDAR 19 2010) indicates the stock is above 75% of SSB_{MSY}. However, the assessment found the stock to be overfished under the previous biological benchmarks and, therefore, the South Atlantic Council must still implement a rebuilding plan to bring the population to the SSB_{MSY} level. The South Atlantic Council chose **Alternative 3 (Preferred)** as their preferred to be consistent with how they have approached setting of the MSSTs in other snapper grouper stocks with a low natural mortality. The Council changed the MSST definitions for snowy grouper and golden tilefish through Amendments 15A and 15B, respectively. They were changed to SSB_{MSY} (0.75), the same definition as the current preferred for red grouper in Amendment 24. The Council changed them for the same reasons they are considering for red grouper: the 1-M definition puts MSST very close to SSB_{MSY} for species with a relatively low M. SEDAR 4 (2004) estimated natural maturity for snowy grouper and golden tilefish at 0.12 and 0.08, respectively. M for red grouper is 0.14 (SEDAR 19 2010).

At their April 2011 meeting, the SSC provided the following recommendation regarding revisions to the MSST: The SSC saw no reason to reconsider the MSST values because red grouper had been previously rated as a Tier 1-assessed stock with a P* of 30% (and hence a 70% expected success rate at rebuilding).

With regard to the new MSST method derived by SEFSC (**Alternative 5**), the SSC did not feel it could evaluate the technique at this time. The SSC also indicated the technique should be considered in the future, but at present did not recommend using it in a generic sense or specifically in the case of red grouper. The SSC recommended delaying the application of the new approach until the SEFSC could provide further information.

The biological impacts of lowering the MSST could be adverse if biomass is lowered to levels below those expected through natural variations in recruitment before fishery managers are made aware of the overfished condition. However, since reauthorization of the Magnuson-Stevens Act, setting of a rebuilding plan may have become less important in specifying allowable harvest and conserving the stock. As stated in the SEFSC evaluation of the MSST issue contained in **Appendix D**:

"When specifying an appropriate buffer between the biomass limit and biomass target […], it may be worth considering that biomass controls are the second tier of a two-tiered system. With reauthorization of the Magnuson-Stevens Act came stricter requirements on fishing mortality (the first tier) through the use of annual catch limits and accountability measures. The intent of ACLs and AMs is to end overfishing for all managed stocks. Their use is expected to help accomplish management objectives, including rebuilding stocks that are marginally below an optimal level. Thus, formal rebuilding plans may be less critical for conservation than they were prior to the reauthorization, and perhaps they should be triggered only for those stocks that are more severely depleted."

As stated above, the SSC concurred with this point.

The South Atlantic Council's ability to retain fishing mortality rate to ensure overfishing is not occurring (i.e., keeping harvest below ACLs through the regulations and system of AMs) becomes more important in the conservation of the stock than the implementation of a rebuilding plan. As such, the South Atlantic Council believes the reduction in adverse administrative, and potentially economic effects, is justified as the possibility of biological harm to the stock from changing MSST is low due to the presence of ACLs and AMs for red grouper.

The Snapper Grouper AP recommended selecting **Alternative 1 (No Action)** as the preferred. Similarly, the majority of public comments that addressed this action also recommended **Alternative 1 (No Action)**.

The South Atlantic Council concluded that **Alternative 3 (Preferred)** (MSST=75% of SSB_{MSY}) best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper FMP, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.3 Establish a Rebuilding Schedule

The choice of rebuilding schedule typically affects how restrictive management regulations need to be: the shorter the rebuilding timeframe, the more restrictive the regulations and vice versa. The Magnuson-Stevens Act mandates that overfished stocks be rebuilt to SSB_{MSY} within ten years, hence the South Atlantic Council is adopting the maximum allowable timeframe to rebuild the red grouper stock (**Preferred Alternative 5**) in order to minimize negative socio-economic impacts that would result from additional restrictions on harvest.

The SSC recommended the South Atlantic Council select 10 years as their preferred rebuilding alternative. However, it must be noted that the SSC also recommended the strategy used to rebuild red grouper have a 70% probability of success within the 10-year timeframe, rather than the 50% probability of rebuilding success required by the Magnuson-Stevens Act (rebuilding strategy alternatives are considered in **Action 4**). The South Atlantic Council is thus adopting the SSC's recommended approach that would consider a higher probability of rebuilding success than required.

The Snapper Grouper AP supported the preferred alternative as did the majority of public comments addressing this action.

The South Atlantic Council concluded that **Alternative 5 (Preferred)** (rebuilding schedule=10 years) best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.4 Establish a Rebuilding Strategy and Acceptable Biological Catch (ABC)

The rebuilding strategy sets the pace at which fishing should occur to arrive at SSB_{MSY} within the timeframe specified in the rebuilding schedule. According to the economic analyses for this action,

Alternative 2 was found to be superior to all others. However, **Alternative 2** offers a higher fishing mortality rate than what would be appropriate if the stock was not overfished. During the Snapper Grouper Committee discussions, some South Atlantic Council members spoke in favor of selecting **Alternative 2** in light of the South Atlantic Council's choice to re-define MSST to a level that essentially negates the overfished determination for the red grouper stock (see **Section 5.3**). Therefore, they felt comfortable selecting a higher fishing mortality rate that would benefit fishermen. In addition, they stated that the 4-month spawning closure implemented in 2010 (that was not yet in place when the stock assessment was conducted) may have had enough of an effect on landings to justify selecting **Alternative 2**.

On the other hand, **Preferred Alternative 3** offered a lower fishing mortality rate that would maintain catches at a similar level to what they have been in recent years and is consistent with fishing at the level that would produce Optimum Yield (OY). This alternative has an 81% probability of stock recovery, above the SSC's recommended level. South Atlantic members who spoke in favor of this alternative stated that selecting the high fishing mortality rate under **Alternative 2** for a stock that is overfished and under a rebuilding plan is not prudent. Moreover, they pointed out that catch levels in recent years have been fairly in line with the estimated level of catch under either **Alternative 2** or **Preferred Alternative 3**.

The Snapper Grouper AP supported the South Atlantic Council's choice. The SSC did not have a recommendation for this action. The majority of comments submitted by the public supported **Alternative 2**.

The South Atlantic Council concluded that **Alternative 3 (Preferred)** (ABC = yield at 75%F_{MSY}) best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.5 Specify Sector Allocations

The South Atlantic Council's Allocation Committee met several times in 2008 to address allocation issues for fisheries in the South Atlantic region. The Allocation Committee explored ways to model the economics associated with fisheries but concluded that whereas fisheries managers have a fairly good handle on life histories and ecosystem interactions from the biological component, they still find themselves arguing over the differences between economic value and economic impact. Ultimately, the resources and expense of developing and applying modeling applications to address allocations was not deemed feasible and the South Atlantic Council chose to establish allocations based on balancing long-term catch history with recent catch history. The South Atlantic Council believes that this approach, now known as Boyles' Law, is the most fair and equitable way to allocate fishery resources and has chosen to apply it to many of its managed fisheries. Furthermore, the South Atlantic Council felt an additional benefit of this alternative was its inclusion of a transparent formula to specify allocations. Hence the South Atlantic Council chose **Subalternative 2e (Preferred)**, which will allocate 44% of the red grouper total ACL to the commercial sector and 56% to the recreational sector, as their preferred approach to establish allocations for red grouper.

Some South Atlantic Council members, however, have expressed their concern regarding Boyle's Law. They maintain that the current method used for calculating sector allocations needs revision. The South Atlantic Council's allocation formula uses 50% of the average historical time series plus 50% of the average of the recent (3 years) catch trend for each sector to calculate the allocations. Using only 3 years to calculate 50% of the allocation is not of long enough duration given the limitations of MRFSS data for use in short time series. This concern was echoed in at least one public comment addressing this action.

The SSC has not provided any input regarding Boyle's Law since its inception. However, the SSC's Socio-Economic Subpanel (SEP) requested that Boyle's Law be put on the agenda for discussion at their next meeting.

The Snapper Grouper AP and the majority of comments received from the public supported the South Atlantic Council's preferred alternative.

The South Atlantic Council concluded that **Subalternative 2e (Preferred)** best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.6 Specify Annual Catch Limits (ACL) and Optimum Yield (OY)

OY is a long-term average amount of desired yield from a stock, stock complex, or fishery. Setting OY equal to ABC would provide greater assurance that overfishing is prevented, the long-term average biomass is near or above B_{MSY}, and overfished stocks are rebuilt in as short a time as possible. ACL cannot exceed the ABC and may be set annually or on a multiyear plan basis. ACLs in coordination with AMs must prevent overfishing. The National Standard 1 guidelines specify that Councils can choose to account for management uncertainty by setting the ACL below the ABC. The South Atlantic Council has consistently chosen to set ACL equal to ABC (**Preferred Alternative 2**) and account for management uncertainty via setting ACTs where appropriate (see **Actions 7** and **8**). Similarly, the South Atlantic Council chose to set ACL equal to OY to prevent a situation in which the OY from a fishery was not being achieved.

Alternatives 5 and 6 (Preferreds) would remove the 3-species (gag, black grouper, and red grouper) aggregate ACL that was implemented through Amendment 17B. Amendment 16 implemented an individual ACL for gag and, if approved, the Comprehensive ACL Amendment will implement an individual ACL for black grouper. Hence an individual ACL must also be put in place for red grouper. In addition, the commercial and recreational AMs implemented for the 3-species aggregate in Amendment 17B would be replaced with AMs proposed in this amendment. The latter are consistent with the South Atlantic Council's approach for setting commercial and recreational AMs for other managed species through recent amendments (e.g., the Comprehensive ACL Amendment, and Snapper Grouper Amendments 18A and 18B)

At their November 2011 meeting, the SSC provide the following recommendation: ACL and ABC cannot equal OY since OY is a separate value that is calculated very differently from ABC. The SSC cautions that having ACL=ABC does not consider management uncertainty and will lead to overages.

There should be a trigger set at a level comparable to the management uncertainty that helps prevent overages from occurring.

The Snapper Grouper AP and the majority of public comments received on this amendment supported the South Atlantic Council's preferred alternatives under this action.

The South Atlantic Council concluded that **Sub-Alternatives 2, 5** and **6 (Preferreds)** best meet the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternatives also best meet the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.7 Specify a Commercial Sector Annual Catch Target (ACT)

Annual Catch Targets (ACT) refer to the amount of annual catch of a stock or stock complex that is the management target of the fishery, and accounts for management uncertainty in controlling the actual catch at or below the ACL. National Standard 1 guidelines state that setting of ACTs is left at the discretion of each Council and should be based on the level of management uncertainty in each fishery. For the red grouper commercial sector the South Atlantic Council concluded that, once NOAA Fisheries Service fully implements electronic reporting in 2012, the level of uncertainty will be minimal and does not warrant establishing a commercial ACT (**Preferred Alternative 1 (No Action)**). Quota monitoring in the commercial fishery and the AMs that the South Atlantic Council is proposing to implement through this amendment (**Actions 9** and **10**) should be sufficient to account for management uncertainty.

The SSC did not provide a recommendation for this action (but see **Section 5.8** below) while the Snapper Grouper AP and the majority of public comments supported **Preferred Alternative 1 (No Action)**.

The South Atlantic Council concluded that **Preferred Alternative 1 (No Action)** best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.8 Specify a Recreational Sector Annual Catch Target (ACT)

The South Atlantic Council reasoned that the level of management uncertainty for the recreational component of the red grouper fishery is currently high enough to warrant specification of a recreational ACT. Moreover, they reasoned that including the Proportional Standard Error (PSE) for the catch estimates into the formula to establish ACT would add a larger buffer for species that are not so common in the landings. For such species the PSEs are large, indicating higher uncertainty in the data. Hence using the PSE in the formula to set the ACT further accounts for uncertainty. On the contrary, when estimates for a species are robust, the PSEs are small, and consequently the buffer to account for uncertainty would be reduced accordingly. The South Atlantic Council chose this approach to specify ACTs for species included in the Comprehensive ACL Amendment and is being consistent in adopting **Alternative 4 (Preferred)** as their preferred alternative in this amendment.

An ACT can be considered a "soft target" because the South Atlantic Council's goal is to have recreational landings fluctuate around the ACT level. The South Atlantic Council would use the ACT to determine whether a change in management is needed. If the current or expected recreational catch is above the ACT, the South Atlantic Council could use bag/size limits and seasons to reduce the recreational catch. If catches are below the ACT, no change in management measures would be necessary. To ensure catches do not exceed the ACL, the South Atlantic Council is specifying Accountability Measures (**Action 10**) to close the recreational fishery when NOAA Fisheries Service projects the recreational catch will be met. This requires in-season availability of the headboat and MRFSS/MRIP data and a method to project the expected catches. Delays in either of these data sources could result in the ACL being exceeded.

At their November 2011 meeting, the SSC offered a word of caution: all PSEs will go up with the release of the Marine Recreational Information Program (MRIP) estimates. The South Atlantic Council may want to be a bit more risk averse. The SSC recommends attaching some level of management action to the ACT that helps slow landings and prevent overages.

The Snapper Grouper AP supported the South Atlantic Council's preferred alternative. The majority of public comments, however, did not support this choice stating that the preferred alternative of not setting an ACT for the commercial sector (**Action 7**) and setting one for recreational anglers effectively reduces their allocation by 25%.

The South Atlantic Council concluded that **Alternative 4 (Preferred)** best meets the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternative also best meets the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.9 Specify Commercial Sector Accountability Measures (AM)

Alternative 2 (Preferred), which would close the commercial sector when the ACL was met or projected to be met and limit harvest and possession to the recreational bag limit, would prevent the commercial sector from profiting from the harvest of red grouper in quantities exceeding the ACL, and thus provide a disincentive to target red grouper once the ACL has been reached and thus help to reduce discards. After the ACL has been met, then all harvest would be limited to the recreational bag limit. **Alternative 3 (Preferred)** would then correct for an ACL overage post-season if one were to occur during the fishing season by implementing a payback provision. The latter is consistent with how the South Atlantic Council has chosen to address overages for overfished species.

The SSC did not have a recommendation for this action while the Snapper Grouper AP stated their support for **Alternative 2 (Preferred)**. The majority of public comments supported the preferred alternatives.

The South Atlantic Council concluded that **Alternatives 2** and **3 (Preferreds)** best meet the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternatives also best meet the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

5.10 Specify Recreational Sector Accountability Measures (AM)

The South Atlantic Council considered various approaches to help ascertain ACL overages and thus trigger AMs in the recreational sector. Under **Subalternative 2b (Preferred)**, AMs would be triggered if the annual landings exceeded the ACL in a given year. **Subalternative 2c** would examine the trend in the past three years of landings data to determine if AMs would be triggered. **Subalternative 2d** would use a review of the most recent 5-year series of landings data to determine which of the five years were associated with the highest and lowest harvest levels. Those two years' landings would then be removed from the time series leaving three years of landings to be averaged. If the averaged total of the remaining three years' landings was greater than the ACL then the AMs would be triggered. **Subalternative 2e** would trigger AMs if the lower 90% confidence interval (CI) estimate of MRFSS landings' population mean plus headboat landings was greater than the ACL.

An evaluation of these approaches revealed problems with the use of averages and the use of the lower bound of the 90% CI. The averages do not necessarily help with the problem of uncertainty. If landings fluctuate around a certain point, then the average would smooth out the landings and reveal the actual trend. But in other instances (i.e., if the landings trend up or down over time) this is not the case. The average would instead create a lag and mask what was actually happening in the landings. By using the lower bound of the 90% CI, the landings estimate is effectively being lowered the by the amount of uncertainty. This is the same as if the ACL was being increased by the amount of the uncertainty. However, the actual landings are just as likely to be higher than the estimate, but this is not taken into consideration by using only the lower bound of the CI. Therefore, the South Atlantic Council chose as their preferred alternative to simply compare the annual landings to the ACL in a given year (**Preferred Subalternative 2b**). The Council concluded that this approach was the most accurate way to determine whether AMs should be put in place.

Because of the high level of uncertainty in the recreational landings, the South Atlantic Council chose to implement in-season AMs (**Preferred Subalternative 3b**). The South Atlantic Council is also proposing post-season AMs for the recreational sector. **Alternative 4** and its subalternatives specify methodologies for specifying post-season AMs that would be implemented if the ACL is exceeded. Of these, the South Atlantic Council chose **Subalternative 4g (Preferred)** as their preferred alternative. The latter would institute a payback in the following season by the amount of the overage if the recreational ACL was exceeded. The approach to setting AMs for the recreational sector under this action is consistent with how the South Atlantic Council has specified recreational AMs for other managed species.

The SSC did not provide a recommendation for this action.

The Snapper Grouper AP supported the South Atlantic Council's choice of **Subalternatives 2b** and **3b (Preferreds)**. However, the AP recommended **Subalternative 4e**, monitor landings during the year following an overage and reduce the bag limit as necessary, as the post-season AM for the recreational sector.

The majority of public comments supported **Alterantive 1 (No Action)** whereas one comment stated that the approach outlined in this action is to use the ACL as the target for in- season management actions, and not the ACT. The comment objects to the South Atlantic Council not using the ACT to trigger AMs and maintains that, in this context, the ACT fails to account for management uncertainty and, therefore, may not adequately end and prevent overfishing.

The South Atlantic Council concluded that **Subalternatives 2b**, **3b and 4g (Preferreds)** best meet the purpose and need to implement measures expected to prevent overfishing and achieve optimum yield (OY) while minimizing, to the extent practicable, adverse social and economic effects. The preferred alternatives also best meet the objectives of the Snapper Grouper Fishery Management Plan, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

Chapter 6. Cumulative Effects

6.1 Biological

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

The Council on Environmental Quality (CEQ) cumulative effects guidance states that this step is done through three activities. The three activities and the location in the document are as follows:

I. The direct and indirect effects of the proposed actions **(Section 4.0)**;
II. Which resources, ecosystems, and human communities are affected **(Section 3.0)**; and
III. Which effects are important from a cumulative effects perspective **(information revealed in this Cumulative Effects Analysis (CEA)**?

2. Establish the geographic scope of the analysis.

The immediate impact area would be the federal 200-mile limit of the Atlantic off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West, which is also the South Atlantic Fishery Management Council's area of jurisdiction. Red grouper, *Epinephelus morio*, is primarily a continental species, mostly found in broad shelf areas (Jory and Iversen 1989). Distributed in the Western Atlantic, from North Carolina to southeastern Brazil, including the eastern Gulf of Mexico and Bermuda, they can also occasionally be found as far north as Massachusetts (Heemstra and Randall 1993). Though the range for red grouper extends beyond the South Atlantic EEZ, the most measurable and substantial effects would be limited to the South Atlantic region.

3. Establish the timeframe for the analysis.

The temporal scope of impacts of past and present actions affecting red grouper, non-target species, habitat, and human communities is primarily focused on actions that have occurred after FMP implementation (SAFMC 1983). For the purposes of analyzing the impacts of actions contained in Amendment 24, landings data through 2010 are used. Using the most recent landings data, specifically 2005-2010, ensures that impacts of recently implemented management measures are incorporated as part of the baseline condition for determining impacts of this amendment in addition to and beyond the status quo.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern (the cumulative effects to the human communities are discussed in Section 4).

Listed are other past, present, and reasonably foreseeable actions occurring in the South Atlantic region. These actions, when added to the proposed management measures, may result in cumulative effects on the biophysical environment.

I. Fishery-related actions affecting red grouper.

A. Past

The reader is referred to **Table 6-1** of this document for past regulatory activity for snapper grouper species including red grouper. These include bag and size limits, spawning season closures, commercial quotas, gear prohibitions and limitations, area closures, and a commercial limited access system.

Amendment 16 to the FMP for the Snapper Grouper Fishery of the South Atlantic Region was partially approved by the Secretary of Commerce. Amendment 16 (SAFMC 2009a) includes provisions to extend the shallow water grouper spawning season closure, create a five month seasonal closure for vermilion snapper, require the use of dehooking gear if needed, reduce the aggregate bag limit from five to three grouper, and reduce the bag limit for black grouper and gag to one gag or black grouper combined within the aggregate bag limit. The expected effects of these measures include significant reductions in landings and overall mortality of several shallow water snapper grouper species including, gag, black grouper, red grouper, and vermilion snapper.

Amendment 17B to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (SAFMC 2010b) implemented a species group ACL and recreational AM for red grouper, black grouper, and gag, based on harvest levels expected to result from the implementation of Amendment 16 (SAFMC 2009a). The recreational AM for the species group, within which red grouper is included, would close the recreational fishery if the ACL is projected to be met and if any one of the species within the species group is overfished. If the recreational ACL is exceeded based on the most recent three-year running average of recreational landings, the ACL for the following fishing season would be reduced by the amount of the overage. Amendment 24 would specify an individual ACL for red grouper that would be divided among the commercial and recreational sectors pursuant to the preferred allocation alternative.

B. Present

In addition to snapper grouper fishery management issues being addressed in this amendment, several other snapper grouper amendments have been developed concurrently and are in the process of approval and implementation; however, only one amendment under development includes actions that would specifically affect red grouper. The Comprehensive ACL Amendment includes ACLs and AMs for federally managed species not undergoing overfishing in other FMPs including Snapper Grouper. Actions contained within the Comprehensive ACL Amendment include: (1) Removal of species from the snapper grouper fishery management unit; (2) designating ecosystem component species; (3) allocations; (4) management measures to limit recreational and commercial sectors to their ACLs; (5) AMs; and (5) any necessary modifications to the range of regulations.

C. Reasonably Foreseeable Future

Amendments 18A and 18B to the FMP for the Snapper Grouper Fishery of the South Atlantic Region, which are currently under development, would limit effort in the black sea bass and golden tilefish fisheries, change the golden tilefish fishing year, and improve the accuracy and timing of fisheries statistics. Fishing effort shifts that may result from effort limitations in the black sea bass and golden tilefish components of the snapper grouper fishery may increase fishing pressure on red grouper causing the commercial and recreational ACLs to be met earlier in the fishing season. However, because the ACL caps the overall number of fish that can be taken from the population, future management actions are unlikely to impact the long-term sustainability of the stock.

Regulatory Amendment 11 is currently under review. Regulatory Amendment 11 would remove the current deepwater closure beyond 240 ft for six deepwater snapper grouper species. Amendments 20A and 20B, currently under development, would address issues associated with the current ITQ system in place for wreckfish.

II. Non-Council and other non-fishery related actions, including natural events affecting red grouper.

In terms of natural disturbances, it is difficult to determine the effect of non-Council and non-fishery related actions on stocks of snapper grouper species. Annual variability in natural conditions such as water temperature, currents, food availability, predator abundance, etc. can affect the abundance of young fish, which survive the egg and larval stages each year to become juveniles (i.e., recruitment). This natural variability in year class strength is difficult to predict, as it is a function of many interactive and synergistic factors that cannot all be measured (Rothschild 1986). Furthermore, natural factors such as storms, red tide, cold-water upwelling, etc. can affect the survival of juvenile and adult fishes; however, it is very difficult to quantify the magnitude of mortality these factors may have on a stock. Alteration of preferred habitats for snapper grouper species could affect survival of fish at any stage in their life cycles. However, estimates of the abundance of fish, which utilize any number of preferred habitats, as well as, determining the impact habitat alteration may have on snapper grouper species, is problematic.

How global climate changes will affect the red grouper component of the snapper grouper fishery is unclear. Climate change can impact marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, sea level rise, increases in wave height and frequency, loss of sea ice, and increased risk of diseases in marine biota. Decreases in surface ocean pH due to absorption of anthropogenic CO_2 emissions may impact a wide range of organisms and ecosystems, particularly organism that absorb calcium from surface waters, such as corals and crustaceans (IPCC 2007, and references therein).

The BP/Deepwater Horizon oil spill event, which occurred in the Gulf of Mexico on April 20, 2010, is not expected to impact fisheries operating the South Atlantic. Oil from the spill site has not been detected in the South Atlantic region, and is not likely to pose a threat to the South Atlantic red grouper.

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.

The trends in condition of red grouper are documented through the Southeast Data, Assessment and Review (SEDAR process). The status of the red grouper stock is described in detail in **Section 3.2** of this document.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

Fish populations

Numeric values of overfishing and overfished thresholds have been updated in previous amendments for red grouper. These values includes maximum sustainable yield (MSY), the fishing mortality rate that produces MSY (F_{MSY}), the biomass or biomass proxy that supports MSY (B_{MSY}), the minimum stock size threshold below which a stock is considered to be overfished (MSST), the maximum fishing mortality threshold above which a stock is considered to be undergoing overfishing (MFMT), and optimum yield (OY). Amendment 24 will update these harvest management reference points. The applicable stock assessment source is SEDAR 19 (2010), which determined red grouper are overfished and undergoing overfishing.

7. Define a baseline condition for the resources, ecosystems, and human communities.

For a detailed discussion of the baseline conditions of red grouper the reader is referred to the 2010 stock assessment and stock information sources referenced in **Section 3.2** of this document.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities

See **Table 6-1**.

Table 6-1. The cause and effect relationship of fishing and regulatory actions within the time period of the Cumulative Effects Analysis (CEA).

Time period/dates	Cause	Observed and/or Expected Effects
August 1983	4" trawl mesh size to achieve a 12" TL commercial vermilion snapper minimum size limit.	Protected youngest spawning age classes.
Pre-January 12, 1989	Habitat destruction, growth overfishing of vermilion snapper.	Damage to snapper grouper habitat, decreased yield per recruit of vermilion snapper.
January 1989	Trawl prohibition to harvest fish.	Increase yield per recruit of vermilion snapper; eliminate trawl damage to live bottom habitat.
Pre-January 1, 1992	Overfishing of many reef species including vermilion snapper, and gag.	Spawning stock ratio of these species is estimated to be less than 30% indicating that they are overfished.
January 1992	<u>Prohibited gear</u>: fish traps south of Cape Canaveral, FL; entanglement nets; longline gear inside of 50 fathoms; powerheads and bangsticks in designated SMZs off SC. <u>Size/Bag limits</u>: 10" TL vermilion snapper (recreational only); 12" TL vermilion snapper (commercial only); 10 vermilion snapper/person/day; aggregate grouper bag limit of 5/person/day; and 20" TL gag, red, black, scamp, yellowfin, and yellowmouth grouper size limit.	Protected smaller spawning age classes of vermilion snapper.
Pre-June 27, 1994	Damage to *Oculina* habitat.	Noticeable decrease in numbers and species diversity in areas of *Oculina* off FL
July 1994	Prohibition of fishing for and retention of snapper grouper species (HAPC renamed OECA).	Initiated the recovery of snapper grouper species in OECA.
1992-1999	Declining trends in biomass and overfishing continue for a number of snapper grouper species including vermilion snapper and gag.	Spawning potential ratio for vermilion snapper and gag is less than 30% indicating that they are overfished.

Time period/dates	Cause	Observed and/or Expected Effects
February 24, 1999	Gag and black grouper: 24" total length (recreational and commercial); 2 gag or black grouper bag limit within 5 grouper aggregate; March-April commercial closure. Vermilion snapper: 11" total length (recreational). Aggregate bag limit of no more than 20 fish/person/day for all snapper grouper species without a bag limit.	F for gag vermilion snapper remains declines but is still above F_{MSY}.
October 23, 2006	Snapper grouper FMP Amendment 13C	Commercial vermilion snapper quota set at 1.1 million lbs gutted weight; recreational vermilion snapper size limit increased to 12" TL to prevent vermilion snapper overfishing.
Effective February 12, 2009	Snapper grouper FMP Amendment 14	Use marine protected areas (MPAs) as a management tool to promote the optimum size, age, and genetic structure of slow growing, long-lived deepwater snapper grouper species (e.g., speckled hind, snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish). Gag and vermilion snapper occur in some of these areas.
Effective March 20, 2008	Snapper grouper FMP Amendment 15A (SAFMC 2008a)	Establish rebuilding plans and SFA parameters for snowy grouper, black sea bass, and red porgy.
Effective Dates Dec 16, 2009, to Feb 16, 2010.	Snapper grouper FMP Amendment 15B	End double counting in the commercial and recreational reporting systems by prohibiting the sale of bag-limit caught snapper grouper, and minimize impacts on sea turtles and smalltooth sawfish.
Effective Date July 29, 2009	Snapper grouper FMP Amendment 16	Protect spawning aggregations and snapper grouper in spawning

Time period/dates	Cause	Observed and/or Expected Effects
		condition by increasing the length of the spawning season closure, decrease discard mortality by requiring the use of dehooking tools, reduce overall harvest of gag and vermilion snapper to end overfishing.
Effective Date January 4, 2010	Red Snapper Interim Rule	Prohibit commercial and recreational harvest of red snapper from January 4, 2010, to June 2, 2010 with a possible 186-day extension. Reduce overfishing of red snapper while long-term measures to end overfishing are addressed in Amendment 17A.
Effective Date December 4, 2010	Snapper Grouper FMP Amendment 17A.	SFA parameters for red snapper; ACLs and ACTs; management measures to limit recreational and commercial sectors to their ACTs; accountability measures. Establish rebuilding plan for red snapper.
Effective Date January 31, 2011	Snapper Grouper Amendment 17B	ACLs and ACTs; management measures to limit recreational and commercial sectors to their ACTs; AMs, for species undergoing overfishing.
Target 2012	Snapper Grouper FMP Amendment 18A and 18B (under development)	Prevent overexploitation in the black sea bass and golden tilefish fisheries; improve data collection timeliness and data quality.
Target 2011	Comprehensive ACL Amendment (under review)	ACLs ACTs, and AMs for species not experiencing overfishing; accountability measures; an action to remove species from the fishery management unit as appropriate; and management measures to limit recreational and commercial sectors to their ACTs.

Time period/dates	Cause	Observed and/or Expected Effects
Target 2011	Regulatory Amendment 11 (under review)	Re-addresses the deepwater area closure implemented in Amendment 17B
Effective Date July 15, 2011	Regulatory Amendment 9	Harvest management measures for black sea bass; commercial trip limits for gag, vermilion and greater amberjack
Target 2012	Amendment 20 (Wreckfish) (under development)	Review the current ITQ program and update the ITQ program as necessary to comply with MSA LAPP requirements.

9. Determine the magnitude and significance of cumulative effects.

Proposed management actions, as summarized in **Section 2** of this document, would update management reference points for red grouper, specify sector ACLs and AMs, and establish a rebuilding plan for the South Atlantic red grouper stock. Because management measures implemented through Amendment 16 restricted harvest of red grouper through the extension of the snapper grouper spawning season closure and the reduction of the aggregate grouper bag limit, it is unlikely further restrictions will be needed to end overfishing of the stock within the specified rebuilding timeframe. Therefore, cumulative impacts that may result from actions in this amendment are likely to be negligible. Detailed discussions of the magnitude and significance of the preferred alternatives appear in **Section 4** of this consolidated document.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects on the biophysical environment are expected to be negligible. Avoidance, minimization, and mitigation are not applicable.

11. Monitor the cumulative effects of the selected alternative and adopt management.

The effects of the proposed action are, and will continue to be, monitored through collection of data by NOAA Fisheries Service, states, stock assessments and stock assessment updates, life history studies, and other scientific observations.

6.2 Socioeconomic

The cumulative short-term economic and social effects of recent Snapper Grouper Amendment 17A (SAFMC 2010a) and Amendment 17B (SAFMC 2010b) and as well as Amendments 18A and 18B (under development) and the Comprehensive ACL Amendment (under review) are expected to be negative while the long-term economic and social outcome is expected to be positive. Recent amendments restrict aggregate quotas for all species, impose new trip limits and bag limits, implement accountability measures, and create area and seasonal closures. A number of commercial and recreational businesses are expected to close. A decrease in overall participation is also expected in the form of the number of individual vessels. It is logical to expect that the remaining vessels will switch from the most severely restricted fisheries to those with higher trip limits or aggregate quotas or bag limits, perhaps creating or exasperating derby fisheries. Season length for commercial and recreational fisheries will decrease further for some species.

The proposed actions in Amendment 24 may result in some short-term social impacts due to limitations on harvest, but are also expected to produce long-term social benefits as the red grouper stock is rebuilt. While there will not be immediate benefits, the intended result of the rebuilding strategy is a healthy sustainable red grouper stock that will provide more fishing opportunities, and income for commercial and for-hire fishermen. With restrictions and closures in other fisheries, stocks that will be rebuilt and open to harvest may help to lessen social and economic impacts from future amendments. Overall, the proposed actions may have short-term social impacts on snapper grouper fishermen but will result in long-term social benefits after the stock is rebuilt.

Chapter 7. List of Preparers

Table 7-1. List of Amendment 24 preparers.

Name	Agency/Division	Area of Amendment Responsibility
Myra Brouwer	SAFMC	IPT Lead/Fishery Scientist
Rick DeVictor	NMFS/SF	IPT Lead/Fishery Biologist
David Dale	NMFS/HC	EFH Specialist
Amanda Frick	NMFS/PR	Geographer
Andy Herndon	NMFS/PR	Biologist
Stephen Holiman	NMFS/SF	Economist
Tony Lamberte	NMFS/SF	Economist
Jack McGovern	NMFS/SF	Fishery Scientist
Kate Michie	NMFS/SF	Fishery Management Plan Coordinator
Larry Perruso	NMFS/EC	Economist
Monica Smit-Brunello	NOAA/GC	Attorney Advisor

NMFS = National Marine Fisheries Service, SAFMC = South Atlantic Fishery Management Council, SF = Sustainable Fisheries Division, PR = Protected Resources Division, SERO = Southeast Regional Office, HC = Habitat Conservation Division, GC = General Counsel, Eco=Economics

Table 7-2. List of Amendment 24 interdisciplinary plan team members.

Name	SAFMC	Title
Myra Brouwer	SAFMC	IPT Lead/Fishery Scientist
John Carmichael	SAFMC	SAFMC Data Program Managers
Anik Clemens	NMFS/SF	Technical Writer Editor
David Dale	NMFS/HC	EFH Specialist
Rick DeVictor	NMFS/SF	IPT Lead/Fishery Biologist
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Nick Farmer	NMFS/SF	Data Analyst
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David Keys	NMFS	Regional NEPA Coordinator
Tony Lamberte	NMFS/SF	Economist
Jennifer Lee	NMFS/PR	Fishery Biologist (Protected Resources)
Kari MacLauchlin	SAFMC	Social Scientist
Anna Martin	SAFMC	Coral Biologist
Gregg Waugh	SAFMC	Deputy Executive Director
Roger Pugliese	SAFMC	Sr. Fishery Biologist
Jack McGovern	NMFS/SF	Fishery Biologist
Kate Michie	NMFS/SF	Fishery Biologist
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NMFS = National Marine Fisheries Service, SAFMC = South Atlantic Fishery Management Council, SF = Sustainable Fisheries Division, PR = Protected Resources Division, SERO = Southeast Regional Office, HC = Habitat Conservation Division, GC = General Counsel, Eco=Economics

Chapter 8. List of Agencies, Organizations, and Persons To Whom Copies of the Environmental Assessment are Sent

Responsible Agency

Amendment 24:
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List of Agencies, Organizations, and Persons Consulted

SAFMC Law Enforcement Advisory Panel
SAFMC Snapper Grouper Advisory Panel
SAFMC Scientific and Statistical Committee
SAFMC Information and Education Advisory Panel
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Georgia Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Division of Marine Fisheries
North Carolina Sea Grant
South Carolina Sea Grant
Georgia Sea Grant
Florida Sea Grant
Atlantic States Marine Fisheries Commission
Gulf and South Atlantic Fisheries Development Foundation
Gulf of Mexico Fishery Management Council
National Marine Fisheries Service
- Washington Office
- Office of Ecology and Conservation
- Southeast Regional Office
- Southeast Fisheries Science Center

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APPENDIX A. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Rejected Alternative 1. Define a rebuilding strategy for red grouper that sets F_{OY} equal to 85% F_{MSY}. Under this strategy, the fishery would have at least a 50% chance of rebuilding to SSB_{MSY} by 2018 and 64% chance of rebuilding to SSB_{MSY} by 2020.

- The Optimum Yield at equilibrium would be 1,103,000 lbs whole weight (landed catch).
- The Overfishing Level is 669,000 lbs whole weight with dead discards and 617,000 lbs whole weight without dead discards.
- The Acceptable Biological Catch recommendation from the Scientific and Statistical Committee for 2011 is 665,000 lbs whole weight with dead discards and 622,000 lbs whole weight without dead discards.
- The Annual Catch Limit would be 668,000 lbs whole weight with dead discards and 643,000 lbs whole weight without dead discards.

Reason for elimination: The Annual Catch Limit specified in this alternative is greater than Scientific and Statistical Committee's recommendation for the Acceptable Biological Catch.

Rejected Alternative 2.

Table 2-9. Projection results if the fishing mortality rate is fixed at F = 85%$F_{MSY.}$ The maximum red grouper kill under this projection is 668,000 lbs whole weight.

Year	F(per year)	Probability of Rebuilt Stock	Maximum Allowable Kill		
			Landings	Discards	Total
2009	0.298	0	1,098,000	61,000	1,159,000
2010	0.298	0	985,000	70,000	1,055,000
2011 (Year 1)	0.188	0.01	643,000	45,000	688,000
2012	0.188	0.06	714,000	45,000	759,000
2013	0.188	0.14	781,000	46,000	827,000
2014	0.188	0.23	839,000	46,000	885,000
2015	0.188	0.33	888,000	46,000	934,000
2016	0.188	0.42	930,000	47,000	977,000
2017	0.188	0.49	964,000	47,000	1,011,000
2018	0.188	0.55	991,000	47,000	1,038,000
2019	0.188	0.6	1,014,000	47,000	1,061,000
2020	0.188	0.64	1,032,000	47,000	1,079,000

Alternative 1 (No Action). Retain the existing regulations for red grouper (Table X).

Table 2-15. Existing regulations and those proposed in Amendment 17B for red grouper.

Current Regulations		
	Commercial	Recreational
Bag limit		Three grouper aggregate bag limit

		per person per day. Exclude the captain and crew on for-hire vessels from possessing a bag limit for groupers
In-season closures	Gag commercial ACL of 352,940 lbs gutted weight. After the commercial ACL is met, all purchase and sale of the following species is prohibited and harvest and/or possession is limited to the bag limit: gag; black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby; and coney.	
Minimum size limit	20 inch total length	
Seasonal closure	No fishing for and/or possession of the following species is allowed January through April: black grouper; red grouper; scamp; red hind; rock hind; yellowmouth grouper; tiger grouper; yellowfin grouper; graysby, and coney.	
Regulations implemented by Amendment 17B		
	Commercial	Recreational
	In addition to the gag sector-ACLs, establish an ACL for gag, black grouper, and red grouper of 662,403 lbs gutted weight (commercial) and 648,663 lbs gutted weight (recreational). The table below shows how the aggregate ACL was calculated. Prohibit the commercial possession of shallow water groupers when the gag or the gag, black grouper, and red grouper when the ACL is projected to be met.	Establish a recreational ACL for gag, black grouper, and red grouper of 648,663 lbs gutted weight. If at least one of the species (gag, red grouper, or black grouper) *is overfished* and the sector ACL is projected to be met, prohibit the harvest and retention of the species or species group. If the ACL is exceeded, independent of stock status, the Regional Administrator shall publish a notice to reduce the sector ACL in the following year by the amount of the overage. For black grouper, black sea bass, gag, red grouper, and vermilion snapper, compare the recreational ACL with recreational landings over a range of years. For 2010, use only 2010 landings. For 2011, use the average landings of 2010 and 2011. For 2012 and beyond, use the most recent three-year running average.

Commercial

Alternative 2 (Preferred). After the commercial ACL is met, all purchase and sale of red grouper is prohibited and harvest and/or possession is limited to the bag limit.

Alternative 3 (Preferred). If the commercial sector ACL is exceeded, the Regional Administrator shall publish a notice to reduce the commercial sector ACL in the following season by the amount of the overage.

Recreational

Alternative 4 (Preferred). For post-season accountability measures, compare recreational ACL with recreational landings over a range of years. For 2011, use only 2011 landings. For 2012, use the average landings of 2011 and 2012. For 2013 and beyond, use the most recent three-year running average.

Alternative 5 (Preferred). The Regional Administrator shall publish a notice to close the recreational fishery when the ACL is projected to be met.

Alternative 6 (Preferred). Take corrective action if the recreational ACL has been exceeded.

> **Option 6a (Preferred).** If the recreational sector ACL is exceeded, the Regional Administrator shall publish a notice to reduce the recreational sector ACL in the following season by the amount of the overage.
>
> **Option 6b.** If the recreational sector ACL is exceeded, the Regional Administrator shall publish a notice to reduce the length of the following fishing year by the amount necessary to ensure landings do not exceed the recreational sector ACL for the following fishing year.

Reason for elimination: The Council decided to add this action to the Comprehensive ACL Amendment as that amendment is proposing establish ACLs and AMs for a shallow water grouper unit (which includes red grouper).

Appendix B. Glossary

Allowable Biological Catch (ABC): Maximum amount of fish stock than can be harvested without adversely affecting recruitment of other components of the stock. The ABC level is typically higher than the total allowable catch, leaving a buffer between the two.

ALS: Accumulative Landings System. NMFS database which contains commercial landings reported by dealers.

Biomass: Amount or mass of some organism, such as fish.

B_{MSY}: Biomass of population achieved in long-term by fishing at F_{MSY}.

Bycatch: Fish harvested in a fishery, but not sold or kept for personal use. Bycatch includes economic discards and regulatory discards, but not fish released alive under a recreational catch and release fishery management program.

Caribbean Fishery Management Council (CFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The CFMC develops fishery management plans for fisheries off the coast of the U.S. Virgin Islands and the Commonwealth of Puerto Rico.

Catch Per Unit Effort (CPUE): The amount of fish captured with an amount of effort. CPUE can be expressed as weight of fish captured per fishing trip, per hour spent at sea, or through other standardized measures.

Charter Boat: A fishing boat available for hire by recreational anglers, normally by a group of anglers for a short time period.

Cohort: Fish born in a given year. (See year class.)

Control Date: Date established for defining the pool of potential participants in a given management program. Control dates can establish a range of years during which a potential participant must have been active in a fishery to qualify for a quota share.

Constant Catch Rebuilding Strategy: A rebuilding strategy where the allowable biological catch of an overfished species is held constant until stock biomass reaches B_{MSY} at the end of the rebuilding period.

Constant F Rebuilding Strategy: A rebuilding strategy where the fishing mortality of an overfished species is held constant until stock biomass reached BMSY at the end of the rebuilding period.

Directed Fishery: Fishing directed at a certain species or species group.

Discards: Fish captured, but released at sea.

Discard Mortality Rate: The percent of total fish discarded that do not survive being captured and released at sea.

Derby: Fishery in which the TAC is fixed and participants in the fishery do not have individual quotas. The fishery is closed once the TAC is reached, and participants attempt to maximize their harvests as quickly as possible. Derby fisheries can result in capital stuffing and a race for fish.

Effort: The amount of time and fishing power (i.e., gear size, boat size, horsepower) used to harvest fish.

Exclusive Economic Zone (EEZ): Zone extending from the shoreline out to 200 nautical miles in which the country owning the shoreline has the exclusive right to conduct certain activities such as fishing. In the United States, the EEZ is split into state waters (typically from the shoreline out to 3 nautical miles) and federal waters (typically from 3 to 200 nautical miles).

Exploitation Rate: Amount of fish harvested from a stock relative to the size of the stock, often expressed as a percentage.

F: Fishing mortality.

Fecundity: A measurement of the egg-producing ability of fish at certain sizes and ages.

Fishery Dependent Data: Fishery data collected and reported by fishermen and dealers.

Fishery Independent Data: Fishery data collected and reported by scientists who catch the fish themselves.

Fishery Management Plan: Management plan for fisheries operating in the federal produced by regional fishery management councils and submitted to the Secretary of Commerce for approval.

Fishing Effort: Usually refers to the amount of fishing. May refer to the number of fishing vessels, amount of fishing gear (nets, traps, hooks), or total amount of time vessels and gear are actively engaged in fishing.

Fishing Mortality: A measurement of the rate at which fish are removed from a population by fishing. Fishing mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Fishing Power: Measure of the relative ability of a fishing vessel, its gear, and its crew to catch fishes, in reference to some standard vessel, given both vessels are under identical conditions.

$F_{30\%SPR}$: Fishing mortality that will produce a static SPR = 30%.

$F_{45\%SPR}$: Fishing mortality that will produce a static SPR = 45%.

F_{OY}: Fishing mortality that will produce OY under equilibrium conditions and a corresponding biomass of B_{OY}. Usually expressed as the yield at 85% of F_{MSY}, yield at 75% of F_{MSY}, or yield at 65% of F_{MSY}.

F_{MSY}: Fishing mortality that if applied constantly, would achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}

Fork Length (FL): The length of a fish as measured from the tip of its snout to the fork in its tail.

Gear restrictions: Limits placed on the type, amount, number, or techniques allowed for a given type of fishing gear.

Growth Overfishing: When fishing pressure on small fish prevents the fishery from producing the maximum poundage. Condition in which the total weight of the harvest from a fishery is improved when fishing effort is reduced, due to an increase in the average weight of fishes.

Gulf of Mexico Fishery Management Council (GFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The GFMC develops fishery management plans for fisheries off the coast of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida.

Head Boat: A fishing boat that charges individual fees per recreational angler onboard.

Highgrading: Form of selective sorting of fishes in which higher value, more marketable fishes are retained, and less marketable fishes, which could legally be retained are discarded.

Individual Fishing Quota (IFQ): Fishery management tool that allocates a certain portion of the TAC to individual vessels, fishermen, or other eligible recipients.

Longline: Fishing method using a horizontal mainline to which weights and baited hooks are attached at regular intervals. Gear is either fished on the bottom or in the water column.

Magnuson-Stevens Fishery Conservation and Management Act: Federal legislation responsible for establishing the fishery management councils and the mandatory and discretionary guidelines for federal fishery management plans.

Marine Recreational Fisheries Statistics Survey (MRFSS): Survey operated by NMFS in cooperation with states that collects marine recreational data.

Maximum Fishing Mortality Threshold (MFMT): The rate of fishing mortality above which a stock's capacity to produce MSY would be jeopardized.

Maximum Sustainable Yield (MSY): The largest long-term average catch that can be taken continuously (sustained) from a stock or stock complex under average environmental conditions.

Minimum Stock Size Threshold (MSST): The biomass level below which a stock would be considered overfished.

Modified F Rebuilding Strategy: A rebuilding strategy where fishing mortality is changed as stock biomass increases during the rebuilding period.

Multispecies fishery: Fishery in which more than one species is caught at the same time and location with a particular gear type.

National Marine Fisheries Service (NMFS): Federal agency within NOAA responsible for overseeing fisheries science and regulation.

National Oceanic and Atmospheric Administration: Agency within the Department of Commerce responsible for ocean and coastal management.

Natural Mortality (M): A measurement of the rate at which fish are removed from a population by natural causes. Natural mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Optimum Yield (OY): The amount of catch that will provide the greatest overall benefit to the nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems.

Overfished: A stock or stock complex is considered overfished when stock biomass falls below the minimum stock size threshold (MSST) (e.g., current biomass < MSST = overfished).

Overfishing: Overfishing occurs when a stock or stock complex is subjected to a rate of fishing mortality that exceeds the maximum fishing mortality threshold (e.g., current fishing mortality rate > MFMT = overfishing).

Quota: Percent or annual amount of fish that can be harvested.

Recruitment (R): Number or percentage of fish that survives from hatching to a specific size or age.

Recruitment Overfishing: The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year.

Scientific and Statistical Committee (SSC): Fishery management advisory body composed of federal, state, and academic scientists, which provides scientific advise to a fishery management council.

Selectivity: The ability of a type of gear to catch a certain size or species of fish.

South Atlantic Fisheries Management Council (SAFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The SAFMC develops fishery management plans for fisheries off North Carolina, South Carolina, Georgia, and the east coast of Florida.

Spawning Potential Ratio (Transitional SPR): Formerly used in overfished definition. The number of eggs that could be produced by an average recruit in a fished stock divided by the number of eggs that could be produced by an average recruit in an unfished stock. SPR can also be expressed as the spawning stock biomass per recruit (SSBR) of a fished stock divided by the SSBR of the stock before it was fished.

% Spawning Per Recruit (Static SPR): Formerly used in overfishing determination. The maximum spawning per recruit produced in a fished stock divided by the maximum spawning per recruit, which occurs under the conditions of no fishing. Commonly abbreviated as %SPR.

Spawning Stock Biomass (SSB): The total weight of those fish in a stock which are old enough to spawn.

Spawning Stock Biomass Per Recruit (SSBR): The spawning stock biomass divided by the number of recruits to the stock or how much spawning biomass an average recruit would be expected to produce.

Total Allowable Catch (TAC): The total amount of fish to be taken annually from a stock or stock complex. This may be a portion of the Allowable Biological Catch (ABC) that takes into consideration factors such as bycatch.

Total Length (TL): The length of a fish as measured from the tip of the snout to the tip of the tail.

Red Grouper Projections I

Prepared by the NOAA/NMFS Southeast Fisheries Science Center
Issued: 3 September 2010

1 Description of projections

This report describes projections requested in a memorandum, dated 13 July 2010, from Dr. Crabtree to Dr. Ponwith. Specifically, that memorandum requested projections of red grouper (southeast U.S. Atlantic) under fishing mortality rates $F_{45\%}$ and F_{rebuild}, where F_{rebuild} provides a 70% chance of recovery in seven years (by the end of 2017). It was also requested that projections be run long enough to provide saturation values.

Methods used in these projections are described in the SEDAR-19 report. Several levels of fishing mortality rate were projected:

- Scenario P1: $F = F_{45\%}$
- Scenario P2: $F = F_{\text{rebuild}}$, the maximum fishing rate that allows 0.7 probability of rebuilding to SSB_{MSY} by the end of 2017

Projected fishing mortality rate in 2009–2010, prior to the projection fishing mortality rate, was assumed equal to the current fishing mortality rate from the end of the assessment. The value of $F_{45\%}$ was not computed for the assessment report, but was computed for use in these projections. It is $F_{45\%} = 0.1055$.

For reference, values of other management quantities include MSY = 1110 (1000 lb), $F_{\text{MSY}} = 0.221$ (per yr), $\text{SSB}_{\text{MSY}} = 2592$ (mt).

2 Results

Results of the two projection scenarios are tabulated in Tables 4.1–4.2, and are shown graphically in Figures 4.1–4.2.

3 Comments on projections

As usual, projections should be interpreted in light of the model assumptions and key aspects of the data. Some major considerations are the following:

- In general, projections of fish stocks are highly uncertain, particularly in the long term (e.g., beyond 5–10 years).
- Although projections included many major sources of uncertainty, they did not include structural (model) uncertainty. That is, projection results are conditional on one set of functional forms used to describe population dynamics, selectivity, recruitment, etc.

- Fishery sectors were assumed to continue fishing at their estimated current proportions of total effort, using the estimated current selectivity patterns. New management regulations that alter those proportions or selectivities would likely affect projection results.

- The assessment's estimate of F_{current} (2006–2008) was applied in projection years 2009 and 2010. It is expected that the recently implemented four-month grouper closure would affect mortality rates, but for now the realized effect is unknown.

- The projections assumed that the estimated spawner-recruit relationship applies in the future and that past residuals represent future uncertainty in recruitment. If future recruitment is characterized by runs of large or small year classes, possibly due to environmental or ecological conditions, stock trajectories may be affected.

4 Tables and figures

Table 4.1. Projection results under scenario with fishing mortality rate fixed at $F = F_{45\%}$ (Scenario P1). F = fishing mortality rate (per year), Pr($\mathrm{SSB} > \mathrm{SSB}_{\mathrm{MSY}}$*) = proportion of stochastic projection replicates exceeding* $\mathrm{SSB}_{\mathrm{MSY}}$*, SSB = mid-year spawning stock (mt), R = recruits (1000 age-1 fish), D = discard mortalities (1000 fish or 1000* lb *whole weight), L = landings (1000 fish or 1000* lb *whole weight), and Sum L = cumulative landings (1000* lb*). For reference, estimated benchmarks are* $F_{\mathrm{MSY}} = 0.221$ *(per yr),* $\mathrm{SSB}_{\mathrm{MSY}} = 2592$ *(mt), and* $\mathrm{MSY} = 1110$ *(1000 lb). Expected values presented are from deterministic projections (klb = 1000 lb).*

Year	F(per yr)	Pr(SSB > $\mathrm{SSB}_{\mathrm{MSY}}$)	SSB(mt)	R(1000)	D(1000)	D(klb)	L(1000)	L(klb)	Sum L(klb)
2009	0.298	0	1888.74	399	32	61	107	1098	1098
2010	0.298	0	1800.36	396	35	70	94	985	2083
2011	0.106	0.01	1783.42	394	12	25	37	374	2457
2012	0.106	0.11	2166.93	394	13	26	44	442	2899
2013	0.106	0.33	2463.37	401	13	26	51	511	3410
2014	0.106	0.57	2745.22	406	13	27	56	575	3984
2015	0.106	0.76	3004.33	409	13	27	60	632	4617
2016	0.106	0.87	3237.78	412	13	27	64	684	5301
2017	0.106	0.94	3443.58	414	13	27	67	730	6031
2018	0.106	0.97	3622.04	415	13	28	69	770	6800
2019	0.106	0.98	3775.6	416	13	28	71	804	7604
2020	0.106	0.99	3906.65	417	13	28	73	833	8437
2021	0.106	0.99	4018.17	418	14	28	75	858	9295
2022	0.106	1	4113.04	419	14	28	76	879	10,173
2023	0.106	1	4193.05	419	14	28	77	897	11,070
2024	0.106	1	4259.54	419	14	28	78	911	11,981
2025	0.106	1	4314.75	420	14	28	78	924	12,905
2026	0.106	1	4360.52	420	14	28	79	934	13,839
2027	0.106	1	4398.42	420	14	28	79	942	14,781
2028	0.106	1	4429.77	420	14	28	80	949	15,730
2029	0.106	1	4455.67	421	14	28	80	955	16,685
2030	0.106	1	4477.05	421	14	28	80	960	17,645
2031	0.106	1	4494.68	421	14	28	80	964	18,608
2032	0.106	1	4509.22	421	14	28	81	967	19,575
2033	0.106	1	4521.19	421	14	28	81	969	20,545
2034	0.106	1	4531.04	421	14	28	81	972	21,516
2035	0.106	1	4539.15	421	14	28	81	973	22,490
2036	0.106	1	4545.82	421	14	28	81	975	23,465
2037	0.106	1	4551.31	421	14	28	81	976	24,441
2038	0.106	1	4555.83	421	14	28	81	977	25,418
2039	0.106	1	4559.54	421	14	28	81	978	26,396
2040	0.106	1	4562.6	421	14	28	81	979	27,375
2041	0.106	1	4565.1	421	14	28	81	979	28,354
2042	0.106	1	4567.17	421	14	28	81	980	29,334
2043	0.106	1	4568.86	421	14	28	81	980	30,314
2044	0.106	1	4570.26	421	14	28	81	980	31,294
2045	0.106	1	4571.4	421	14	28	81	981	32,275
2046	0.106	1	4572.34	421	14	28	81	981	33,256
2047	0.106	1	4573.12	421	14	28	81	981	34,237
2048	0.106	1	4573.75	421	14	28	81	981	35,218
2049	0.106	1	4574.28	421	14	28	81	981	36,199
2050	0.106	1	4574.7	421	14	28	81	981	37,181
2051	0.106	1	4575.06	421	14	28	81	981	38,162
2052	0.106	1	4575.35	421	14	28	81	982	39,144
2053	0.106	1	4575.59	421	14	28	81	982	40,125
2054	0.106	1	4575.78	421	14	28	81	982	41,107
2055	0.106	1	4575.94	421	14	28	81	982	42,089
2056	0.106	1	4576.07	421	14	28	81	982	43,070
2057	0.106	1	4576.18	421	14	28	81	982	44,052
2058	0.106	1	4576.27	421	14	28	81	982	45,034
2059	0.106	1	4576.35	421	14	28	81	982	46,015
2060	0.106	1	4576.41	421	14	28	81	982	46,997
2061	0.106	1	4576.45	421	14	28	81	982	47,979
2062	0.106	1	4576.5	421	14	28	81	982	48,961
2063	0.106	1	4576.53	421	14	28	81	982	49,943
2064	0.106	1	4576.56	421	14	28	81	982	50,924
2065	0.106	1	4576.58	421	14	28	81	982	51,906
2066	0.106	1	4576.6	421	14	28	81	982	52,888
2067	0.106	1	4576.61	421	14	28	81	982	53,870
2068	0.106	1	4576.63	421	14	28	81	982	54,852
2069	0.106	1	4576.64	421	14	28	81	982	55,834
2070	0.106	1	4576.64	421	14	28	81	982	56,815
2071	0.106	1	4576.65	421	14	28	81	982	57,797
2072	0.106	1	4576.66	421	14	28	81	982	58,779
2073	0.106	1	4576.66	421	14	28	81	982	59,761
2074	0.106	1	4576.67	421	14	28	81	982	60,743
2075	0.106	1	4576.67	421	14	28	81	982	61,724
2076	0.106	1	4576.67	421	14	28	81	982	62,706
2077	0.106	1	4576.67	421	14	28	81	982	63,688
2078	0.106	1	4576.67	421	14	28	81	982	64,670
2079	0.106	1	4576.68	421	14	28	81	982	65,652
2080	0.106	1	4576.68	421	14	28	81	982	66,634
2081	0.106	1	4576.68	421	14	28	81	982	67,615
2082	0.106	1	4576.68	421	14	28	81	982	68,597
2083	0.106	1	4576.68	421	14	28	81	982	69,579
2084	0.106	1	4576.68	421	14	28	81	982	70,561
2085	0.106	1	4576.68	421	14	28	81	982	71,543

Table 4.2. Projection results under scenario with fishing mortality rate fixed at $F = F_{\text{rebuild}}$ (Scenario P2). F = fishing mortality rate (per year), Pr($\text{SSB} > \text{SSB}_{\text{MSY}}$) = proportion of stochastic projection replicates exceeding SSB_{MSY}, SSB = mid-year spawning stock (mt), R = recruits (1000 age-1 fish), D = discard mortalities (1000 fish or 1000 lb whole weight), L = landings (1000 fish or 1000 lb whole weight), and Sum L = cumulative landings (1000 lb). For reference, estimated benchmarks are $F_{\text{MSY}} = 0.221$ (per yr), $\text{SSB}_{\text{MSY}} = 2592$ (mt), and $\text{MSY} = 1110$ (1000 lb). Expected values presented are from deterministic projections (klb = 1000 lb).

Year	F(per yr)	Pr(SSB > SSB_{MSY})	SSB(mt)	R(1000)	D(1000)	D(klb)	L(1000)	L(klb)	Sum L(klb)
2009	0.298	0	1888.74	399	32	61	107	1098	1098
2010	0.298	0	1800.36	396	35	70	94	985	2083
2011	0.157	0.01	1783.42	394	18	38	54	545	2628
2012	0.157	0.07	2062.19	394	19	38	63	619	3246
2013	0.157	0.2	2271.54	399	19	39	69	691	3937
2014	0.157	0.34	2462.71	403	19	39	75	755	4692
2015	0.157	0.48	2631.24	406	19	39	79	810	5502
2016	0.157	0.6	2777.02	408	19	40	82	858	6360
2017	0.157	0.7	2900.36	409	19	40	85	898	7258
2018	0.157	0.77	3003.09	411	19	40	87	932	8190
2019	0.157	0.82	3088.16	412	20	40	89	960	9150
2020	0.157	0.86	3158.13	412	20	40	90	983	10,133
2021	0.157	0.88	3215.62	413	20	40	92	1002	11,134
2022	0.157	0.9	3262.91	413	20	40	92	1017	12,151
2023	0.157	0.92	3301.47	414	20	40	93	1030	13,181
2024	0.157	0.92	3332.44	414	20	40	94	1040	14,221
2025	0.157	0.93	3357.32	414	20	40	94	1048	15,269
2026	0.157	0.94	3377.29	414	20	40	95	1054	16,323
2027	0.157	0.94	3393.31	415	20	40	95	1060	17,383
2028	0.157	0.94	3406.16	415	20	40	95	1064	18,447
2029	0.157	0.94	3416.45	415	20	40	95	1067	19,514
2030	0.157	0.95	3424.69	415	20	41	96	1070	20,584
2031	0.157	0.95	3431.28	415	20	41	96	1072	21,656
2032	0.157	0.95	3436.54	415	20	41	96	1074	22,730
2033	0.157	0.95	3440.75	415	20	41	96	1075	23,805
2034	0.157	0.95	3444.12	415	20	41	96	1076	24,882
2035	0.157	0.95	3446.81	415	20	41	96	1077	25,959
2036	0.157	0.95	3448.95	415	20	41	96	1078	27,037
2037	0.157	0.95	3450.66	415	20	41	96	1079	28,116
2038	0.157	0.95	3452.03	415	20	41	96	1079	29,195
2039	0.157	0.95	3453.12	415	20	41	96	1079	30,274
2040	0.157	0.95	3454	415	20	41	96	1080	31,354
2041	0.157	0.95	3454.69	415	20	41	96	1080	32,433
2042	0.157	0.95	3455.25	415	20	41	96	1080	33,513
2043	0.157	0.95	3455.69	415	20	41	96	1080	34,594
2044	0.157	0.95	3456.04	415	20	41	96	1080	35,674
2045	0.157	0.95	3456.33	415	20	41	96	1080	36,754
2046	0.157	0.95	3456.55	415	20	41	96	1080	37,835
2047	0.157	0.95	3456.73	415	20	41	96	1081	38,915
2048	0.157	0.95	3456.87	415	20	41	96	1081	39,996
2049	0.157	0.95	3456.99	415	20	41	96	1081	41,076
2050	0.157	0.95	3457.08	415	20	41	96	1081	42,157
2051	0.157	0.95	3457.15	415	20	41	96	1081	43,238
2052	0.157	0.95	3457.21	415	20	41	96	1081	44,318
2053	0.157	0.95	3457.26	415	20	41	96	1081	45,399
2054	0.157	0.95	3457.29	415	20	41	96	1081	46,480
2055	0.157	0.95	3457.32	415	20	41	96	1081	47,561
2056	0.157	0.95	3457.35	415	20	41	96	1081	48,641
2057	0.157	0.95	3457.37	415	20	41	96	1081	49,722
2058	0.157	0.95	3457.38	415	20	41	96	1081	50,803
2059	0.157	0.95	3457.39	415	20	41	96	1081	51,883
2060	0.157	0.95	3457.4	415	20	41	96	1081	52,964
2061	0.157	0.95	3457.41	415	20	41	96	1081	54,045
2062	0.157	0.95	3457.42	415	20	41	96	1081	55,126
2063	0.157	0.95	3457.42	415	20	41	96	1081	56,206
2064	0.157	0.95	3457.42	415	20	41	96	1081	57,287
2065	0.157	0.95	3457.43	415	20	41	96	1081	58,368
2066	0.157	0.95	3457.43	415	20	41	96	1081	59,449
2067	0.157	0.95	3457.43	415	20	41	96	1081	60,529
2068	0.157	0.95	3457.43	415	20	41	96	1081	61,610
2069	0.157	0.95	3457.43	415	20	41	96	1081	62,691
2070	0.157	0.95	3457.44	415	20	41	96	1081	63,772
2071	0.157	0.95	3457.44	415	20	41	96	1081	64,852
2072	0.157	0.95	3457.44	415	20	41	96	1081	65,933
2073	0.157	0.95	3457.44	415	20	41	96	1081	67,014
2074	0.157	0.95	3457.44	415	20	41	96	1081	68,095
2075	0.157	0.95	3457.44	415	20	41	96	1081	69,175
2076	0.157	0.95	3457.44	415	20	41	96	1081	70,256
2077	0.157	0.95	3457.44	415	20	41	96	1081	71,337
2078	0.157	0.95	3457.44	415	20	41	96	1081	72,418
2079	0.157	0.95	3457.44	415	20	41	96	1081	73,498
2080	0.157	0.95	3457.44	415	20	41	96	1081	74,579
2081	0.157	0.95	3457.44	415	20	41	96	1081	75,660
2082	0.157	0.95	3457.44	415	20	41	96	1081	76,741
2083	0.157	0.95	3457.44	415	20	41	96	1081	77,821
2084	0.157	0.95	3457.44	415	20	41	96	1081	78,902
2085	0.157	0.95	3457.44	415	20	41	96	1081	79,983

Figure 4.1. Projection results under scenario (P1) with fishing mortality rate fixed at $F = F_{45\%}$.

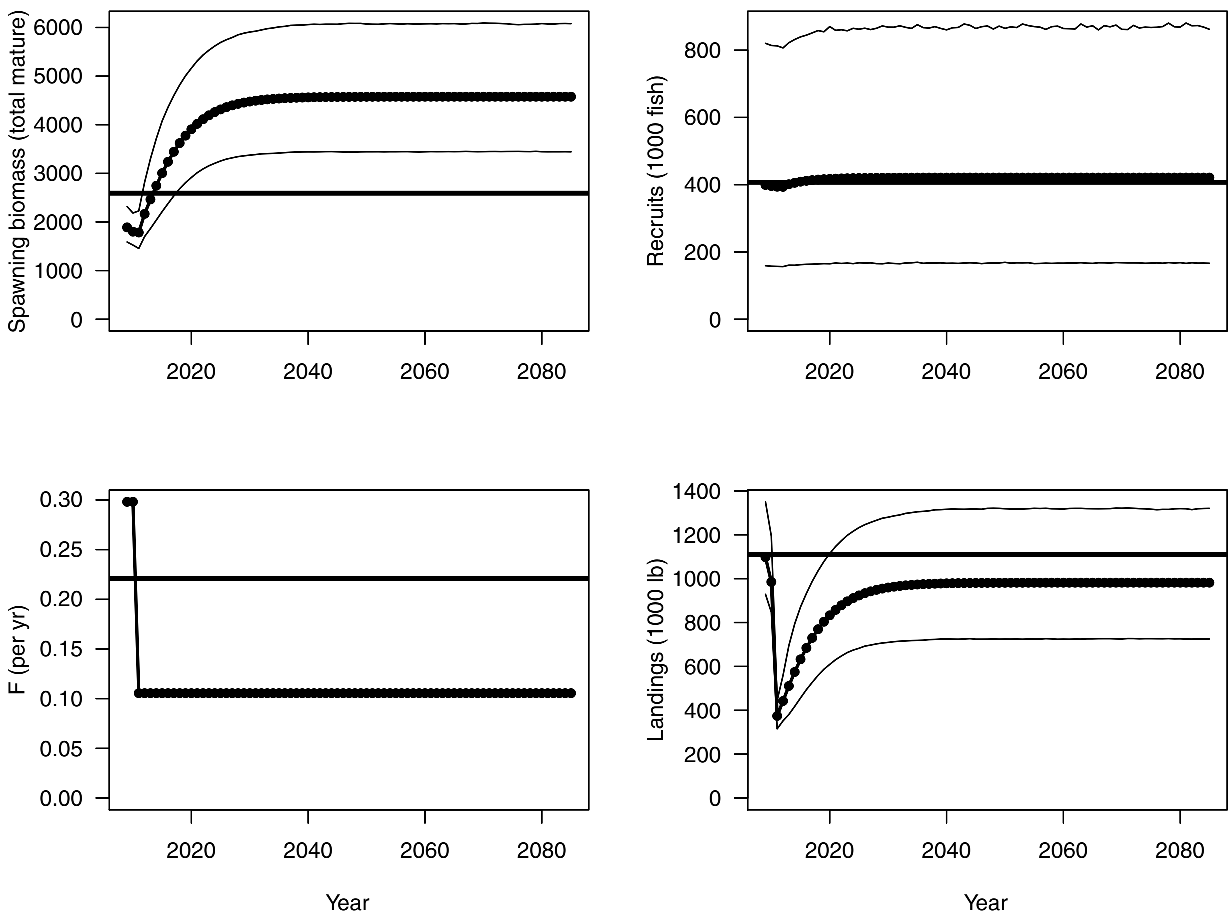
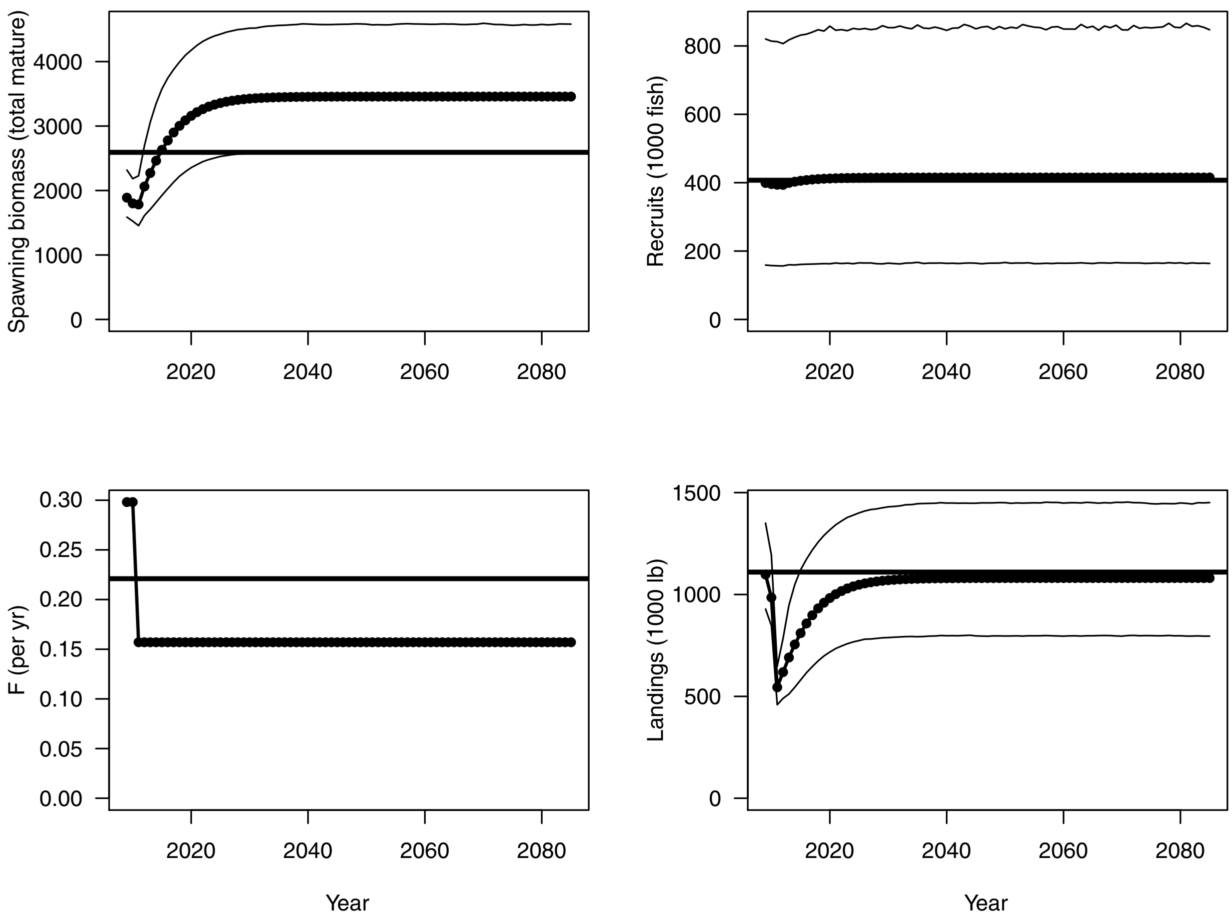


Figure 4.2. Projection results under scenario (P2) with fishing mortality rate fixed at $F = F_{\text{rebuild}}$.



Red Grouper Projections II

Prepared by the NOAA/NMFS Southeast Fisheries Science Center, Beaufort Laboratory
Issued: 11 February 2011

1 Description of projections

This report describes projections requested in a memorandum, dated 18 January 2011, from Dr. Crabtree to Dr. Ponwith. The memorandum requested projections of red grouper (southeast U.S. Atlantic) under fishing mortality rate F_{rebuild}, where F_{rebuild} provides a 70% chance of recovery in eight years (by the end of 2018).

A previous memorandum requested similar projections but with a recovery time of seven years (results described in the report titled, Red Grouper Projections I). Those projections were extended in duration for long enough to provide saturation values. These current projections do the same.

Methods used in these projections are described in the SEDAR-19 report. Projected fishing mortality rate in 2009–2010, prior to the projection fishing mortality rate, was assumed equal to the current fishing mortality rate from the end of the assessment.

For reference, values of management quantities include MSY = 1110 (1000 lb), $F_{\text{MSY}} = 0.221$ (per yr), $\text{SSB}_{\text{MSY}} = 2592$ (mt). In the assessment report, MSST was set to $(1 - M)\text{SSB}_{\text{MSY}}$. If instead it were set to $0.5\text{SSB}_{\text{MSY}}$, the value would be MSST = 1296 (mt).

2 Results

Results are tabulated in Table 4.1 and are shown graphically in Figure 4.1.

3 Comments on projections

As usual, projections should be interpreted in light of the model assumptions and key aspects of the data. Some major considerations are the following:

- In general, projections of fish stocks are highly uncertain, particularly in the long term (e.g., beyond 5–10 years).
- Although projections included many major sources of uncertainty, they did not include structural (model) uncertainty. That is, projection results are conditional on one set of functional forms used to describe population dynamics, selectivity, recruitment, etc.
- Fishery sectors were assumed to continue fishing at their estimated current proportions of total effort, using the estimated current selectivity patterns. New management regulations that alter those proportions or selectivities would likely affect projection results.

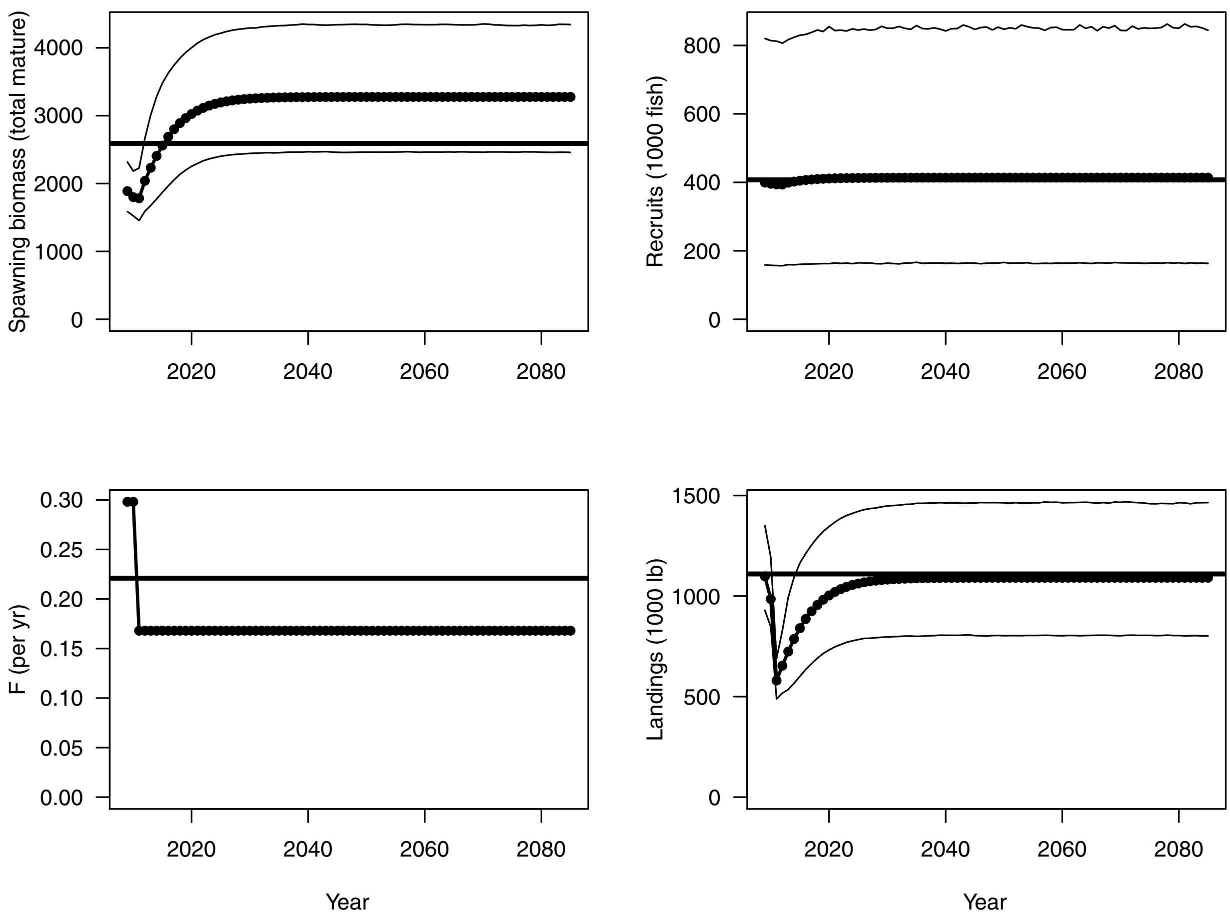
- The assessment's estimate of F_{current} (2006–2008) was applied in projection years 2009 and 2010. It is expected that the recently implemented four-month grouper closure would affect mortality rates, but for now the realized effect is unknown.
- The projections assumed that the estimated spawner-recruit relationship applies in the future and that past residuals represent future uncertainty in recruitment. If future recruitment is characterized by runs of large or small year classes, possibly due to environmental or ecological conditions, stock trajectories may be affected.

4 Tables and figures

Table 4.1. Projection results under scenario with fishing mortality rate fixed at $F = F_{\mathrm{rebuild}}$. F = fishing mortality rate (per year), Pr(SSB > $\mathrm{SSB}_{\mathrm{MSY}}$) = proportion of stochastic projection replicates exceeding $\mathrm{SSB}_{\mathrm{MSY}}$, SSB = mid-year spawning stock (mt), R = recruits (1000 age-1 fish), D = discard mortalities (1000 fish or 1000 lb whole weight), L = landings (1000 fish or 1000 lb whole weight), and Sum L = cumulative landings (1000 lb). For reference, estimated benchmarks are $F_{\mathrm{MSY}} = 0.221$ (per yr), $\mathrm{SSB}_{\mathrm{MSY}} = 2592$ (mt), and MSY = 1110 (1000 lb). Expected values presented are from deterministic projections (klb = 1000 lb).

Year	F(per yr)	Pr(SSB > $\mathrm{SSB}_{\mathrm{MSY}}$)	SSB(mt)	R(1000)	D(1000)	D(klb)	L(1000)	L(klb)	Sum L(klb)
2009	0.298	0	1888.74	399	32	61	107	1098	1098
2010	0.298	0	1800.36	396	35	70	94	985	2083
2011	0.168	0.01	1783.42	394	20	40	58	580	2663
2012	0.168	0.07	2040.6	394	20	41	66	654	3317
2013	0.168	0.17	2232.97	399	20	41	73	724	4041
2014	0.168	0.3	2407.2	402	20	41	78	787	4828
2015	0.168	0.42	2559.48	405	20	42	82	840	5668
2016	0.168	0.54	2690.09	407	21	42	86	886	6554
2017	0.168	0.63	2799.67	408	21	42	88	924	7478
2018	0.168	0.7	2890.18	410	21	42	90	956	8434
2019	0.168	0.75	2964.55	410	21	43	92	982	9416
2020	0.168	0.79	3025.27	411	21	43	93	1003	10,419
2021	0.168	0.82	3074.82	412	21	43	94	1020	11,439
2022	0.168	0.84	3115.31	412	21	43	95	1034	12,473
2023	0.168	0.86	3148.12	413	21	43	96	1046	13,519
2024	0.168	0.87	3174.3	413	21	43	96	1055	14,574
2025	0.168	0.88	3195.19	413	21	43	97	1062	15,637
2026	0.168	0.89	3211.87	413	21	43	97	1068	16,705
2027	0.168	0.89	3225.16	413	21	43	97	1073	17,778
2028	0.168	0.89	3235.76	413	21	43	98	1077	18,855
2029	0.168	0.9	3244.2	413	21	43	98	1080	19,934
2030	0.168	0.9	3250.92	414	21	43	98	1082	21,016
2031	0.168	0.9	3256.26	414	21	43	98	1084	22,100
2032	0.168	0.9	3260.51	414	21	43	98	1085	23,185
2033	0.168	0.9	3263.89	414	21	43	98	1086	24,272
2034	0.168	0.9	3266.57	414	21	43	98	1087	25,359
2035	0.168	0.9	3268.7	414	21	43	98	1088	26,448
2036	0.168	0.91	3270.4	414	21	43	98	1089	27,536
2037	0.168	0.91	3271.74	414	21	43	98	1089	28,626
2038	0.168	0.91	3272.81	414	21	43	98	1090	29,715
2039	0.168	0.91	3273.65	414	21	43	98	1090	30,805
2040	0.168	0.91	3274.33	414	21	43	98	1090	31,895
2041	0.168	0.91	3274.86	414	21	43	98	1090	32,986
2042	0.168	0.91	3275.29	414	21	43	98	1090	34,076
2043	0.168	0.91	3275.62	414	21	43	98	1091	35,167
2044	0.168	0.91	3275.89	414	21	43	98	1091	36,257
2045	0.168	0.91	3276.1	414	21	43	98	1091	37,348
2046	0.168	0.91	3276.27	414	21	43	98	1091	38,439
2047	0.168	0.91	3276.4	414	21	43	98	1091	39,530
2048	0.168	0.91	3276.51	414	21	43	98	1091	40,621
2049	0.168	0.91	3276.59	414	21	43	98	1091	41,712
2050	0.168	0.91	3276.66	414	21	43	98	1091	42,803
2051	0.168	0.91	3276.71	414	21	43	98	1091	43,894
2052	0.168	0.91	3276.75	414	21	43	98	1091	44,984
2053	0.168	0.91	3276.79	414	21	43	98	1091	46,075
2054	0.168	0.91	3276.81	414	21	43	98	1091	47,167
2055	0.168	0.91	3276.83	414	21	43	98	1091	48,258
2056	0.168	0.91	3276.85	414	21	43	98	1091	49,349
2057	0.168	0.91	3276.86	414	21	43	98	1091	50,440
2058	0.168	0.91	3276.88	414	21	43	98	1091	51,531
2059	0.168	0.91	3276.88	414	21	43	98	1091	52,622
2060	0.168	0.91	3276.89	414	21	43	98	1091	53,713
2061	0.168	0.91	3276.9	414	21	43	98	1091	54,804
2062	0.168	0.91	3276.9	414	21	43	98	1091	55,895
2063	0.168	0.91	3276.9	414	21	43	98	1091	56,986
2064	0.168	0.91	3276.91	414	21	43	98	1091	58,077
2065	0.168	0.91	3276.91	414	21	43	98	1091	59,168
2066	0.168	0.91	3276.91	414	21	43	98	1091	60,259
2067	0.168	0.91	3276.91	414	21	43	98	1091	61,350
2068	0.168	0.91	3276.91	414	21	43	98	1091	62,441
2069	0.168	0.91	3276.91	414	21	43	98	1091	63,532
2070	0.168	0.91	3276.91	414	21	43	98	1091	64,623
2071	0.168	0.91	3276.91	414	21	43	98	1091	65,714
2072	0.168	0.91	3276.91	414	21	43	98	1091	66,805
2073	0.168	0.91	3276.91	414	21	43	98	1091	67,896
2074	0.168	0.91	3276.91	414	21	43	98	1091	68,987
2075	0.168	0.91	3276.91	414	21	43	98	1091	70,078
2076	0.168	0.91	3276.91	414	21	43	98	1091	71,169
2077	0.168	0.91	3276.92	414	21	43	98	1091	72,260
2078	0.168	0.91	3276.92	414	21	43	98	1091	73,352
2079	0.168	0.91	3276.92	414	21	43	98	1091	74,443
2080	0.168	0.91	3276.92	414	21	43	98	1091	75,534
2081	0.168	0.91	3276.92	414	21	43	98	1091	76,625
2082	0.168	0.91	3276.92	414	21	43	98	1091	77,716
2083	0.168	0.91	3276.92	414	21	43	98	1091	78,807
2084	0.168	0.91	3276.92	414	21	43	98	1091	79,898
2085	0.168	0.91	3276.92	414	21	43	98	1091	80,989

Figure 4.1. Projection results under scenario with fishing mortality rate fixed at $F = F_{\text{rebuild}}$.



Discussion of Alternative Minimum Stock Size Threshold for use in SEDAR Stock Assessments

NMFS Southeast Fisheries Science Center

28 February 2011

BACKGROUND

This report is the SEFSC's second and final contribution to the request (18 January 2011) from SERO titled "Data Analyses Request for Amendment 24 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region," addressing the portion of that request relevant to minimum stock size threshold (MSST) as defined in the National Standard 1 Guidelines. As agreed upon by SEFSC and SERO, this report discusses the NS1 definition and provides alternative MSST approaches, following discussions among scientists throughout the SEFSC (Beaufort, Miami, and Panama City).

Minimum Stock Size Threshold is used in assessments to determine stock status. If an assessment estimates current spawning biomass to be below MSST, the stock is considered overfished and a rebuilding plan is triggered. For SEDAR stock assessments, MSST has typically been related to natural mortality (M) and spawning biomass at maximum sustainable yield (S_{MSY}) according to the relationship,

$$\mathrm{MSST} = cS_{MSY}, \text{ where } c = \max(1/2, 1-M). \tag{1}$$

This relationship was suggested by Restrepo et al. (1998) as part of a limit control rule that could serve as a default in the absence of more detailed analyses. The rationale for relating MSST to M was that "one would expect a stock fished at F_{MSY} to fluctuate around S_{MSY} on a scale related to *M* (small fluctuations for low *M* and large fluctuations for high *M*)."

The Restrepo et al. guidance was crafted more than a decade ago. Since then, the NS1 Guidelines have been revised. The current Guidelines state:

> The MSST or reasonable proxy must be expressed in terms of spawning biomass or other measure of reproductive potential. To the extent possible, the MSST should equal whichever of the following is greater: One-half the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years, if the stock or stock complex were exploited at the MFMT specified under paragraph (e)(2)(ii)(A)(1) of this section. Should the estimated size of the stock or stock complex in a given year fall below this threshold, the stock or stock complex is considered overfished.

The above definition is nearly identical to that in the previous NS1 Guidelines. Nonetheless, the current Guidelines have drawn renewed attention to MSST. Here we describe practical and technical shortcomings of the above definition of MSST. We then discuss several alternative approaches. Ultimately, the definition of MSST is a management decision, but the SSCs could make recommendations regarding scientific aspects of the decision.

PRACTICAL AND TECHNICAL SHORTCOMINGS

The current NS1 Guidelines suggest ("to the extent possible") a two-part definition, where MSST would be the greater of the two parts. The first part, one-half S_{MSY}, is a simple calculation. In fact, other regions currently use that definition of MSST. However, the second part ("the minimum stock size at which rebuilding …") is not a simple calculation. It implies the use of projection methods, raising several practical and technical considerations (described below). To our knowledge, no other region computes MSST by projection.

Projections to define MSST, as defined in the NS1 Guidelines, would require an optimization procedure. Although technically feasible, such projections raise questions of practicality. They would create an additional layer of analysis, requiring time and effort investments to develop and implement the necessary computer code during each assessment. Adding analyses to SEDAR is not a trivial consideration, as the process already consumes enormous resources. If the projection method were an improvement over existing approaches, the additional commitment of time and effort might be justified, but in our view, such projections would offer no improvement. Furthermore, the projections could only be run after the assessment model was fitted, such that determination of stock status would be a follow-up analysis. With simpler definitions of MSST, a determination is immediately available as output of the assessment model itself.

Computing MSST by projection raises two technical issues. First, S_{MSY} is an asymptotic concept. That is, if deterministic projections apply fishing at the level of F_{MSY}, spawning biomass eventually approaches S_{MSY}, but never actually achieves it. In the long term (number of years depends on the stock), spawning biomass will reach levels arbitrarily close to S_{MSY}, but will only reach it if granted some level of tolerance. In the short term (10 years as in the prescribed projections), population dynamics may still be transient and carrying momentum. In any case, it would be necessary to set a tolerance level for reaching S_{MSY}. How close is close enough? Within 1%? Within 10%? For deterministic projections, the tolerance level would need to be defined. Alternatively, the projections could be stochastic (e.g., variable recruitment), such that a stock fished exactly at F_{MSY} would be expected to fluctuate around S_{MSY}. In this case, spawning biomass would reach S_{MSY} in a probabilistic sense. However, this interpretation would simply reframe the question—what level of probability is appropriate?

The second technical issue is that analysts would need to choose an initial age structure for the projection. We can think of several possibilities, but have difficulty recommending any of them. The population could be initialized using the estimate of age structure from the terminal year of the assessment. However, that estimated age structure is never in equilibrium, but instead reflects transient population dynamics. Thus, this approach would define the threshold as a transient concept, in stark contrast to the more typical equilibrium benchmarks, including the other component of this particular definition of MSST (one-half S_{MSY}). Furthermore, the projections as prescribed in the NS1 Guidelines would vary the initial stock size to find the minimum that meets the rebuilding criterion, yet that minimum stock size may not be consistent with the assessment's terminal-year estimate of age structure. For example, a truncated age structure might not be consistent with larger stock sizes, and conversely, a healthy age structure might not be consistent with lower stock sizes.

Another approach to initial age structure would be to use the equilibrium structure associated with MSY, but again, this age structure might not be consistent with the minimum stock size that meets the rebuilding criterion. Yet another approach would be to adjust the equilibrium age structure along with stock size, perhaps by applying various levels of fishing mortality. Other, perhaps innumerable, approaches could be constructed for initializing the age structure in these projections. It is not obvious whether any approach would be most logical, but it seems clear that the choice would have substantial effect on any MSST computed by projection.

ALTERNATIVE APPROACHES

The sentiment behind the NS1 Guidelines definition seems reasonable, namely that the more productive stocks have a lower threshold for being declared overfished. Indeed, that concept underlies the use of natural mortality in the Restrepo et al. definition. In SEDAR applications of Restrepo et al., many of the stocks are long-lived, and their correspondingly low values of M puts the biomass limit (MSST) very close to the biomass target (S_{MSY}). This feature may not have been envisioned when the Restrepo et al. advice was established. A larger buffer between MSST and S_{MSY} could be accomplished simply by generalizing equation (1) as follows,

$$\text{MSST} = cS_{MSY}, \text{ where } c = \max[a, (1-M)b] \,. \qquad (2)$$

In equation (2), c would fall in the range [a, b]. The lower bound should not be below a=0.5, and the upper bound might appropriately be set at b=0.75. Equation (1) is a special case of equation (2) that occurs when a=0.5 and b=1.0.

The Restrepo et al. approach [equation (1) or (2)] is premised on a single value of M. In contrast, SEDAR stock assessments typically allow M to vary through time or, more commonly, across age or size. This difference between technical guidance and SEDAR implementation poses a practical consideration, although in our view, not a fundamental flaw. For computation of MSST, SEDAR assessments have applied a single value of M taken to be representative of the stock (e.g., average adult mortality, or M that would provide equivalent cumulative survival to the oldest age as would age-based mortality).

An alternative approach to adjust MSST for stock productivity would be to relate MSST to steepness (r), rather than natural mortality,

$$\text{MSST} = cS_{MSY}, \text{ where } c = b - (b-a)(r-0.2)/0.8 \,. \qquad (3)$$

Because steepness scales between 0.2 and 1.0, the above definition would put c on the range [a,b], closer to the upper bound when steepness is high (more productive stock). Again, a reasonable range might be [a=0.5, b=0.75]. This definition has intuitive appeal, but we note that steepness can be difficult to estimate with accuracy. Furthermore, not all assessment models utilize the parameter of steepness.

Yet another approach would be to choose a constant value of c. For greatest simplicity, a single value could be applied to all stocks within a Fishery Management Plan. Alternatively, a single value could be applied to multiple stocks grouped by relevant criteria. Species might be grouped according to life-history characteristics or through such means as susceptibility and productivity analysis. Generic simulation analyses might guide appropriate choices of c for each group, with higher values assigned to those groups where low stock size carries more risk.

When specifying an appropriate buffer between the biomass limit and biomass target (e.g., defining a, b, and c above), it may be worth considering that biomass controls are the second tier of a two-tiered system. With reauthorization of the Magnuson-Stevens Act came stricter requirements on fishing mortality (the first tier) through the use of annual catch limits and accountability measures. The intent of ACLs and AMs is to end overfishing for all managed stocks. Their use is expected to help accomplish management objectives, including rebuilding stocks that are marginally below an optimal level. Thus, formal rebuilding plans may be less critical for conservation than they were prior to the reauthorization, and perhaps they should be triggered only for those stocks that are more severely depleted.

We note that an NRC review of rebuilding plans has been requested, and presumably MSST would be addressed by such a review. Afterward, MSST might be an appropriate topic for a SEDAR procedural workshop. The Restrepo et al. approach was intended as a "default for defining status determination criteria in the absence of more detailed analyses." Perhaps the time has come to do those detailed analyses.

SUMMARY OF COMMENTS ON AMENDMENT 24 TO THE SNAPPER GROUPER FMP FROM SCOPING ACTIVITIES

April 2011

The Council solicited comments on Amendment 24 to the Snapper Grouper FMP during a scoping comment period during January and February 2011. The Council and NMFS received 1,437 comments, though the majority of comments were "form" letters. In addition, five people spoke at the scoping meetings on Amendment 24. This document serves to summarize the comments received by action item.

Maximum Sustainable Yield

- ❑ Supports Alternative 1 (no action) (form letters)
- ❑ Supports Alternative 2 (updating MSY per assessment) (1 comment)

Minimum Stock Size Threshold

- ❑ Supports Alternative 1 (no action) (form letters)

Rebuilding Strategy

- ❑ Supports Alternative 2 (1 comment)
  (F_{OY}=$F_{REBUILD}$ w/ 70% probability of success)
- ❑ Supports constant F strategy, not constant catch
  (1 comment)
  (currently all alternatives)

Annual Catch Limit

- ❑ Supports ACL=90%TAC (form letters)
- ❑ Supports adding all SWG together, not just gag closing everything (1 comment). Should have either SWG ACL/AM or red grouper ACL/AM, not both

Allocations

- Supports Alternative 2e (current preferred)
  - (1 comment; form letters)
    - 45% comm./55% rec.
- Supports 2 sector allocations (current preferred)
  - (1 comment)
    - keep private boat/charter/headboat all together
- Does not support using landings (1 comment)
  Should use economic value as key criteria

Management Measures

- 1,000 lb trip limit w/ 100 lb bycatch allowance
- 700 lb trip limit (first 75%), then 200 lbs (remaining 25%)
- Remove Jan-April closure
- Remove size limit and circle hook mandate as raises release mortality
- Raise bag limit to 4 fish/person/day

Appendix F. Essential Fish Habitat and Move to Ecosystem Based Management

South Atlantic Fishery Management Council Habitat Conservation, Ecosystem Coordination and Collaboration

The Council, using the Essential Fish Habitat Plan as the cornerstone, adopted a strategy to facilitate the move to an ecosystem-based approach to fisheries management in the region. This approach required a greater understanding of the South Atlantic ecosystem and the complex relationships among humans, marine life and the environment including essential fish habitat. To accomplish this, a process was undertaken to facilitate the evolution of the Habitat Plan into a Fishery Ecosystem Plan (FEP), thereby providing more comprehensive understanding of the biological, social and economic impacts of management necessary to initiate the transition from single species management to ecosystem-based management in the region.

Moving to Ecosystem-Based Management

The Council adopted broad goals for Ecosystem-Based Management to include maintaining or improving ecosystem structure and function; maintain or improving economic, social and cultural benefits from resources; and maintaining or improving biological, economic and cultural diversity. Development of a regional FEP (SAFMC 2009a) provided an opportunity to expand scope of the original Council Habitat Plan and compile and review available habitat, biological, social, and economic fishery and resource information for fisheries in the South Atlantic ecosystem. The South Atlantic Council views habitat conservation at the core of the move to EBM in the region. Therefore, development of the FEP was a natural next step in the evolution and expands and significantly updates the SAFMC Habitat Plan (SAFMC 1998a) incorporating comprehensive details of all managed species (SAFMC, South Atlantic States, ASMFC, and NOAA Fisheries Highly Migratory Species and Protected Species) including their biology, food web dynamics, and economic and social characteristics of the fisheries and habitats essential to their survival. The FEP therefore serves as a source document presents more complete and detailed information describing the South Atlantic ecosystem and the impact of the fisheries on the environment. This FEP updates information on designated Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern; expands descriptions of biology and status of managed species; presents information that will support ecosystem considerations for managed species; and describes the social and economic characteristics of the fisheries in the region. In addition, it expands the discussion and description of existing research programs and needs to identify biological, social, and economic research needed to fully address ecosystem-based management in the region. In is anticipated that the FEP will provide a greater degree of guidance by fishery, habitat, or major ecosystem consideration of bycatch reduction, prey-predator interactions, maintaining biodiversity, and spatial management needs. This FEP serves as a living source document of biological, economic, and social information for all Fishery Management Plans (FMP). Future Environmental Assessments and Environmental Impact Statements associated with subsequent amendments to Council FMPs will draw from or cite by reference the FEP.

The Fishery Ecosystem Plan for the South Atlantic Region encompasses the following volume structure:
FEP Volume I - Introduction and Overview of FEP for the South Atlantic Region
FEP Volume II - South Atlantic Habitats and Species
FEP Volume III - South Atlantic Human and Institutional Environment
FEP Volume IV - Threats to South Atlantic Ecosystem and Recommendations

FEP Volume V - South Atlantic Research Programs and Data Needs
FEP Volume VI - References and Appendices

Comprehensive Ecosystem-Based Amendment (CE-BA) 1 (SAFMC 2009b) is supported by this FEP and updates EFH and EFH-HAPC information and addresses the Final EFH Rule (e.g., GIS presented for all EFH and EFH-HAPCs). Management actions implemented in the CE-BA establish deepwater Coral HAPCs to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine, deepwater coral ecosystems in the world.

Ecosystem Approach to Deepwater Ecosystem Management

The South Atlantic Council manages coral, coral reefs and live/hard bottom habitat, including deepwater corals, through the Fishery Management Plan for Coral, Coral Reefs and Live/Hard Bottom Habitat of the South Atlantic Region (Coral FMP). Mechanisms exist in the FMP, as amended, to further protect deepwater coral and live/hard bottom habitats. The SAFMC's Habitat and Environmental Protection Advisory Panel and Coral Advisory Panel have supported proactive efforts to identify and protect deepwater coral ecosystems in the South Atlantic region. Management actions in Comprehensive Ecosystem-Based Amendment (CE-BA 1) (SAFMC 2009b)established deepwater coral HAPCs (C-HAPCs) to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine deepwater coral ecosystems in the world. In addition, CE-BA 1 established areas within the CHAPC which provide for traditional fishing in limited areas which do not impact deepwater coral habitat. CE-BA 1, supported by the FEP, also addresses non-regulatory updates for existing EFH and EFH- HAPC information and addresses the spatial requirements of the Final EFH Rule (i.e., GIS presented for all EFH and EFH-HAPCs).

Building from a Habitat to an Ecosystem Network to Support the Evolution

Starting with our Habitat and Environmental Protection Advisory Panel, the Council expanded and fostered a comprehensive Habitat network in our region to develop the Habitat Plan of the South Atlantic Region completed in 1998 to support the EFH rule. Building on the core regional collaborations, the Council facilitated an expansion to a Habitat and Ecosystem network to support the development of the FEP and CE-BA as well as coordinate with partners on other regional efforts.

These efforts include participation as a member and on the Board of the Southeast Coastal Regional Ocean Observing Association (SECOORA) to guide and direct priority needs for observation and modeling to support fisheries oceanography and integration into stock assessment process through SEDAR. Cooperation through SECOORA is envisioned to facilitate the following:

- Refining current or water column designations of EFH and EFH-HAPCs (e.g., Gulf Stream and Florida Current)
- Providing oceanographic models linking benthic, pelagic habitats and food webs
- Providing oceanographic input parameters for ecosystem models
- Integration of OOS information into Fish Stock Assessment process in the SA region
- Facilitating OOS system collection of fish and fishery data and other research necessary to support the Council's use of area-based management tools in the SA Region including but not limited to EFH, EFH-HAPCs, Marine Protected Areas, Deepwater Coral Habitat Areas of Particular Concern, Special Management Zones and Allowable Gear Areas.
- Integration of OOS program capabilities and research Needs into the South Atlantic Fishery Ecosystem Plan

- Collaboration with SECOORA to integrate OOS products on the Council's Habitat and Ecosystem Internet Mapping System to facilitate model and tool development
- Expanding IMS and Arc Services will provide permissioned researchers access to data or products including those collected/developed by SA OOS partners

In addition, the Council serves on the National Habitat Board and, as a member of the Southeast Aquatic Resource Partnership (SARP), has highlighted the collaboration by including the Southeast Aquatic Habitat Plan and associated watershed conservation restoration targets into the FEP. Many of the habitat, water quality, and water quantity conservation needs identified in the threats and recommendations Volume of the FEP are directly addressed by on-the-ground projects supported by SARP. This cooperation results in funding fish habitat restoration and conservation intended to increase the viability of fish populations and fishing opportunity which also meets the needs to conserve and manage Essential Fish Habitat for Council managed species or habitat important to their prey.

Initially discussed as a South Atlantic Eco-regional Compact, the Council has also cooperated with South Atlantic States in the formation of a Governor's South Atlantic Alliance (SAA). This will also provide regional guidance and resources that will address State and Council broader habitat and ecosystem conservation goals. The SAA was initiated in 2006. An Executive Planning Team (EPT), by the end of 2007, had created a framework for the Governors South Atlantic Alliance. The formal agreement between the four states (NC, SC, GA, and FL) was executed in May 2009. The Agreement specifies that the Alliance will prepare a "Governors South Atlantic Alliance Action Plan" which will be reviewed annually for progress and updated every five years for relevance of content. Alliance mission and purpose is to promote collaboration among the four states, and with the support and interaction of federal agencies, academe, regional organizations, non-governmental organizations, and the private sector, to sustain and enhance the region's coastal and marine resources. The Alliance proposes to regionally implement science-based actions and policies that balance coastal and marine ecosystems capacities to support both human and natural systems. An Action Plan was approved by the Governors and an Implementation Plan is under development.

One of the more recent collaborations is the Council participation as Steering Committee member for the newly establish South Atlantic Landscape Conservation Cooperative (SALCC). Landscape Conservation Cooperatives (LCCs) are applied conservation science partnerships focused on a defined geographic area that informs on-the-ground strategic conservation efforts at landscape scales. LCC partners include DOI agencies, other federal agencies, states, tribes, non-governmental organizations, universities and others. The newly formed Department of Interior Southeast Climate Services Center (CSC) has the LCCs in the region as their primary clients. One of the initial charges of the CSCs is to downscale climate models for use at finer scales.

Building Tools to support EBM in the South Atlantic Region

The Council has developed a Habitat and Ecosystem Section of the website http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx and, in cooperation with the Florida Wildlife Research Institute (FWRI), developed a Habitat and Ecosystem Internet Map Server (IMS) http://www.safmc.net/EcosystemManagement/EcosystemBoundaries/MappingandGISData/tabid/62/Default.aspx. The IMS was developed to support Council and regional partners' efforts in the transition to EBM. Other regional partners include NMFS Habitat Conservation, South Atlantic States, local management authorities, other Federal partners, universities, conservation organizations, and recreational and commercial fishermen. As technology and spatial information needs evolve, the distribution and use of GIS demands greater capabilities.   The Council has continued its collaboration with FWRI in the now evolution to Web Services initially for for Essential Fish Habitat (http://ocean.floridamarine.org/SAFMC_EFH/) and Fishery Regulations (http://ocean.floridamarine.org/SAFMC_Regulations/) and is refining permissioned services for Fishery Independent and Habitat Research and developing one for Ocean Energy activities in the region (e.g., wind, wave and current).

Ecosystem Based Action, Future Challenges and Needs

The Council has implemented ecosystem-based principles through several existing fishery management actions including establishment of deepwater Marine Protected Areas for the Snapper Grouper fishery, proactive harvest control rules on species (e.g., dolphin and wahoo) which are not overfished, implementing extensive gear area closures which in most cases eliminate the impact of fishing gear on Essential Fish Habitat and use of other spatial management including Special Management Zones. Pursuant to the development of the Comprehensive Ecosystem-Based Amendment, the Council is taking an ecosystem approach to protect deepwater ecosystems while providing for traditional fisheries for the Golden Crab and Royal Red shrimp in areas where they do not impact deepwater coral habitat. The stakeholder based process taps in on an extensive regional Habitat and Ecosystem network. Support tools facilitate Council deliberations and with the help of regional partners, are being refined to address long-term ecosystem management needs.

One of the greatest challenges to the long-term move to EBM in the region is funding high priority research, including but not limited to, comprehensive benthic mapping and ecosystem model and management tool development. In addition, collecting detailed information on fishing fleet dynamics including defining fishing operation areas by species, species complex and season, as well as catch relative to habitat is critical for assessment of fishery, community, and habitat impacts and for Council use of place based management measures. Additional resources need to be dedicated to expand regional coordination of modeling, mapping, characterization of species use of habitats, and full funding of regional fishery independent surveys (e.g., MARMAP, SEAMAP and SEFIS) which are linking directly to addressing high priority management needs. Development of ecosystem information systems to support Council management should build on existing tools (e.g., Regional Habitat and Ecosystem GIS and Arc Services) and provide resources to regional cooperating partners for expansion to address long-term Council needs.

The FEP and CE-BA 1 complement, but do not replace, existing FMPs. In addition, the FEP serves as source document to the CE-BAs. NOAA should support and build on regional coordination efforts of the Council as it transitions to a broader management approach. Resources need to be provided to collect information necessary to update and refine our FEP and support future fishery actions including but not limited to completing one of the highest priority needs to support EBM, the completion of mapping of near-shore, mid-shelf, shelf edge and deepwater habitats in the South Atlantic region. In developing future FEPs, the Council will draw on SAFEs (Stock Assessment and Fishery Evaluation reports) which NMFS is required to provide the Council for all FMPs implemented under the Magnuson-Stevens Act. The FEP, serving as the source document for CE-BAs, could also meet NMFS SAFE requirements if information is provided to the Council to update necessary sections.

EFH and EFH-HAPC Designations Translated to Cooperative Habitat Policy Development and Protection The Council actively comments on non-fishing projects or policies that may impact fish habitat. Appendix A of the Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region (SAFMC 1998b) outlines the Council's comment and policy development process and the establishment of a four-state Habitat Advisory Panel. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. AP members bring projects to the Council's attention, draft comment letters, and attend public meetings. With guidance from the Advisory Panel, the Council has developed and approved policies on:

1. Energy exploration, development, transportation and hydropower re-licensing;
2. Beach dredging and filling and large-scale coastal engineering;
3. Protection and enhancement of submerged aquatic vegetation;
4. Alterations to riverine, estuarine and nearshore flows; and
5. Marine aquaculture.
6. Marine Ecosystems and Non-Native and Invasive Species
7. Estuarine Ecosystems and Non-Native and Invasive Species

NOAA Fisheries, State and other Federal agencies apply EFH and EFH-HAPC designations and protection policies in the day-to-day permit review process. In addition to the workshop process described above the revision and updating of existing habitat policies and the development of new policies is being coordinated with core agency representatives on the Habitat and Coral Advisory Panels. Existing policies are included at the end of this Appendix.

South Atlantic Bight Ecopath Model

The Council worked cooperatively the University of British Columbia and the Sea Around Us project to develop a straw-man and preliminary food web models (Ecopath with Ecosim) to characterize the ecological relationships of South Atlantic species, including those managed by the Council. This effort was envisioned to help the Council and cooperators in identifying available information and data gaps while providing insight into ecosystem function. More importantly, the model development process provides a vehicle to identify research necessary to better define populations, fisheries and their interrelationships. While individual efforts are still underway in the South Atlantic (e.g., Biscayne Bay) only with significant investment of new resources through other programs will a comprehensive regional model be further developed.

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern

Following is a summary of the current South Atlantic Council's EFH and EFH-HAPCs. Information supporting their designation is being updated (pursuant to the EFH Final Rule) in the Council's Fishery Ecosystem Plan and Comprehensive Ecosystem Amendment:

Snapper Grouper FMP

Essential fish habitat for snapper-grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper-grouper species, essential fish habitat includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom.

Areas which meet the criteria for EFH-HAPCs for species in the snapper-grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). In addition, the Council through CEBA 2 (SAFMC 2011) is proposing the deepwater snapper grouper MPAs and golden tilefish and blueline tilefish habitat as EFH-HAPCs under the Snapper Grouper FMP as follows:

EFH-HAPCs for golden tilefish to include irregular bottom comprised of troughs and terraces inter-mingled with sand, mud, or shell hash bottom. Mud-clay bottoms in depths of 150-300 meters are HAPC. Golden tilefish are generally found in 80-540 meters, but most commonly found in 200-meter depths.

EFH-HAPC for blueline tilefish to include irregular bottom habitats along the shelf edge in 45-65 meters depth; shelf break; or upper slope along the 100-fathom contour (150-225 meters); hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs in the South Atlantic Bight; and the Georgetown Hole (Charleston Lumps) off Georgetown, SC.

EFH-HAPCs for the snapper grouper complex to include the following deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14; Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA and East Hump MPA.

Shrimp FMP

For penaeid shrimp, Essential Fish Habitat includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non-vegetated flats. This applies from North Carolina through the Florida Keys.

For rock shrimp, essential fish habitat consists of offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and 55 meters. This applies for all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida which provide major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida Shelf and may transport them inshore in spring. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse rock shrimp larvae.

Essential fish habitat for royal red shrimp include the upper regions of the continental slope from 180 meters (590 feet) to about 730 meters (2,395 feet), with concentrations found at depths of between 250 meters (820 feet) and 475 meters (1,558 feet) over blue/black mud, sand, muddy sand, or white calcareous mud. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse royal red shrimp larvae.

Areas which meet the criteria for EFH-HAPCs for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas), and state-identified overwintering areas.

Coastal Migratory Pelagics FMP

Essential fish habitat for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf stream shoreward, including *Sargassum*. In addition, all coastal inlets, all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas).

For Cobia essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.
For king and Spanish mackerel and cobia essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights.

Areas which meet the criteria for EFH-HAPCs include sandy shoals of Capes Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the Gulf stream; The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The “Wall” off of the Florida Keys; Pelagic *Sargassum*; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the ELMR Program. Estuaries meeting this criteria for Spanish mackerel include Bogue Sound and New River, North Carolina; Bogue Sound, North Carolina (Adults May-September salinity >30 ppt); and New River, North Carolina (Adults May-October salinity >30 ppt). For Cobia they include Broad River, South Carolina; and Broad River, South Carolina (Adults & juveniles May-July salinity >25ppt).

Golden Crab FMP

Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987). There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs at this time. As information becomes available, the Council will evaluate such data and identify HAPCs as appropriate through the framework

Spiny Lobster FMP

Essential fish habitat for spiny lobster includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities (*Laurencia*); and mangrove habitat (prop roots). In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse spiny lobster larvae.

Areas which meet the criteria for EFH-HAPCs for spiny lobster include Florida Bay, Biscayne Bay, Card Sound, and coral/hard bottom habitat from Jupiter Inlet, Florida through the Dry Tortugas, Florida.

Coral, Coral Reefs, and Live/Hard Bottom Habitats FMP

Essential fish habitat for corals (stony corals, octocorals, and black corals) must incorporate habitat for over 200 species. EFH for corals include the following:

A. Essential fish habitat for hermatypic stony corals includes rough, hard, exposed, stable substrate from Palm Beach County south through the Florida reef tract in subtidal to 30 m depth, subtropical (15°-35° C), oligotrophic waters with high (30-35$^{o}/_{oo}$) salinity and turbidity levels sufficiently low enough to provide algal symbionts adequate sunlight penetration for photosynthesis. Ahermatypic stony corals are not light restricted and their essential fish habitat includes defined hard substrate in subtidal to outer shelf depths throughout the management area.

B. Essential fish habitat for *Antipatharia* (black corals) includes rough, hard, exposed, stable substrate, offshore in high (30-35$^{o}/_{oo}$) salinity waters in depths exceeding 18 meters (54 feet), not restricted by light penetration on the outer shelf throughout the management area.

C. Essential fish habitat for octocorals excepting the order Pennatulacea (sea pens and sea pansies) includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinity and light penetration throughout the management area.

D. Essential fish habitat for Pennatulacea (sea pens and sea pansies) includes muddy, silty bottoms in subtidal to outer shelf depths within a wide range of salinity and light penetration.

Areas which meet the criteria for EFH-HAPCs for coral, coral reefs, and live/hard bottom include: The 10-Fathom Ledge, Big Rock, and The Point (North Carolina); Hurl Rocks and The Charleston Bump (South Carolina); Gray's Reef National Marine Sanctuary (Georgia); The *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; Oculina Banks off the east coast of Florida from Ft. Pierce to Cape Canaveral; nearshore (0-4 meters; 0-12 feet) hard bottom off the east coast of Florida from Cape Canaveral to Broward County); offshore (5-30 meter; 15-90 feet) hard bottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary. In addition, the Council through CEBA 2 (SAFMC 2011) is proposing the Deepwater Coral HAPCs as EFH-HAPCs under the Coral FMP as follows:

Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, Pourtalés Terrace Coral HAPC.

Dolphin and Wahoo FMP

EFH for dolphin and wahoo is the Gulf Stream, Charleston Gyre, Florida Current, and pelagic *Sargassum*. This EFH definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (SAFMC, 1998b) (dolphin was included within the Coastal Migratory Pelagics FMP).

Areas which meet the criteria for EFH-HAPCs for dolphin and wahoo in the Atlantic include The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and The Georgetown Hole (South Carolina); The Point off Jupiter Inlet (Florida); The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; and Pelagic *Sargassum*. This EFH-HAPC definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (dolphin was included within the Coastal Migratory Pelagics FMP).

Pelagic *Sargassum* Habitat FMP

The Council through CEBA 2 (SAFMC 2011) is proposing to designate the top 10 meters of the water column in the South Atlantic EEZ bounded by the Gulfstream, as EFH for pelagic Sargassum.

Actions Implemented That Protect EFH and EFH-HAPCs

Snapper Grouper FMP

- Prohibited the use of the following gears to protect habitat: bottom longlines in the EEZ inside of 50 fathoms or anywhere south of St. Lucie Inlet Florida, fish traps, bottom tending (roller-rig) trawls on live bottom habitat, and entanglement gear.

- Established the *Oculina* Experimental Closed Area where the harvest or possession of all species in the snapper grouper complex is prohibited

Shrimp FMP

- Prohibition of rock shrimp trawling in a designated area around the *Oculina* Bank,
- Mandatory use of bycatch reduction devices in the penaeid shrimp fishery,
- Mandatory Vessel Monitoring System (VMS) in the Rock Shrimp Fishery.
- A mechanism that provides for the concurrent closure of the EEZ to penaeid shrimping if environmental conditions in state waters are such that the overwintering spawning stock is severely depleted.

Pelagic Sargassum Habitat FMP

- Prohibited all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).
- Prohibited all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.
- Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.
- Established an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.
- Required that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

Coastal Migratory Pelagics FMP

- Prohibited of the use of drift gill nets in the coastal migratory pelagic fishery;

Golden Crab FMP

- In the northern zone golden crab traps can only be deployed in waters deeper than 900 feet; in the middle and southern zones traps can only be deployed in waters deeper than 700 feet.
  Northern zone - north of the 28°N. latitude to the North Carolina/Virginia border;
  Middle zone - 28°N. latitude to 25°N. latitude; and
  Southern zone - south of 25°N. latitude to the border between the South Atlantic and Gulf of Mexico Fishery Management Councils.

Coral, Coral Reefs and Live/Hard Bottom FMP

- Established an optimum yield of zero and prohibiting all harvest or possession of these resources which serve as essential fish habitat to many managed species.
- Designated of the *Oculina* Bank Habitat Area of Particular Concern
- Expanded the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30' N. latitude, to the south by 27°30' N. latitude, and to the east by the 100 fathom (600 feet) depth contour.
- Established the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina*

HAPC #1 is bounded on the north by 28°30'N. latitude, on the south by 28°29'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude, and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. latitude, on the south by 28°16'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude.

- Prohibited the use of all bottom tending fishing gear and fishing vessels from anchoring or using grapples in the *Oculina* Bank HAPC.
- Established a framework procedure to modify or establish Coral HAPCs.
- Established the following six deepwater CHAPCs: Cape Lookout Lophelia Banks, Cape Fear Lophelia Banks, Stetson Reefs, Savannah and East Florida Lithoherms, and Miami Terrace (Stetson-Miami Terrace), Pourtales Terrace, and Blake Ridge Diapir Methane Seep.
- Within the deepwater CHAPCs, the possession of coral species and the use of all bottom damaging gear is prohibited including bottom longline, trawl (bottom and mid-water), dredge, pot or trap, or the use of an anchor, anchor and chain, or grapple and chain by all fishing vessels.

South Atlantic Council Policies for Protection and Restoration of Essential Fish Habitat.

SAFMC Habitat and Environmental Protection Policy

In recognizing that species are dependent on the quantity and quality of their essential habitats, it is the policy of the SAFMC to protect, restore, and develop habitats upon which fisheries species depend; to increase the extent of their distribution and abundance; and to improve their productive capacity for the benefit of present and future generations. For purposes of this policy, "habitat" is defined as the physical, chemical, and biological parameters that are necessary for continued productivity of the species that is being managed. The objectives of the SAFMC policy will be accomplished through the recommendation of no net loss or significant environmental degradation of existing habitat. A long-term objective is to support and promote a net-gain of fisheries habitat through the restoration and rehabilitation of the productive capacity of habitats that have been degraded, and the creation and development of productive habitats where increased fishery production is probable. The SAFMC will pursue these goals at state, Federal, and local levels. The Council shall assume an aggressive role in the protection and enhancement of habitats important to fishery species, and shall actively enter Federal, decision- making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

SAFMC EFH Policy Statements

In addition to implementing regulations to protect habitat from fishing related degradation, the Council in cooperation with NOAA Fisheries, actively comments on non-fishing projects or policies that may impact fish habitat. The Council adopted a habitat policy and procedure document that established a four-state Habitat Advisory Panel and adopted a comment and policy development process. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. With guidance from the Advisory Panel, the Council has developed and approved the following habitat policy statements which are available on the Habitat and Ecosystem section of the Council website:

Protection and Restoration of EFH from Marine Aquaculture
http://www.safmc.net/Portals/0/HabitatPolicies/SAFMCAquaPolicyFinalJune07.pdf
Protection and Enhancement of Marine Submerged Aquatic Vegetation
http://www.safmc.net/Portals/0/HabitatPolicies/SAFMCSAVPol.pdf
Protection and Restoration of EFH from Beach Dredging and Filling

http://www.safmc.net/Portals/0/HabitatPolicies/BeachPolicy.pdf

Protection and Restoration of EFH from Energy Exploration, Development, Transportation and Hydropower Re-Licensing

http://www.safmc.net/Portals/0/HabitatPolicies/SAFMCEnergyPolicyFinal05.pdf

Protection and Restoration of EFH from Alterations to Riverine, Estuarine and Nearshore Flows

http://www.safmc.net/Portals/0/HabitatPolicies/FlowsPolicy.pdf

Policies for the Protection of South Atlantic Estuarine Ecosystems from Non-Native and Invasive Species

http://www.safmc.net/LinkClick.aspx?fileticket=Qn%2baT%2blNjZM%3d&tabid=245

Policies for the Protection of South Atlantic Marine Ecosystems from No-Native and Invasive Species

http://www.safmc.net/LinkClick.aspx?fileticket=bNFKO%2fIcvHQ%3d&tabid=245

Appendix G. Bycatch Practicability Analysis

1. Population Effects for Bycatch Species

Background

The red grouper stock in the south Atlantic was assessed through the Southeast, Data, Assessment, and Review process in 2010. The assessment indicates the stock is experiencing overfishing and is overfished. The proposed actions in Amendment 24 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 24) includes the specification of the following: rebuilding plan; maximum sustainable yield; optimum yield; annual catch limits; annual catch targets; accountability measures; and allocations among sectors.

Red grouper is part of a multi-species fishery. Other species that are most likely to co-occur with red grouper in the landings databases include the following: gag, gray triggerfish, greater amberjack, red snapper, scamp, and vermilion snapper (SERO 2011).

During 2006-2008, the commercial sector accounted for 41% of the landings for red grouper, the recreational sector 59%. Landings for both sectors increased through 2008 (**Figure G-1**); however, a substantial decrease in 2010 landings was reported for commercial and recreational landings, which may be in response to the management measures enacted through Amendment 16 in July 2009. After confidential data are removed, 2010 commercial landings were 307,381 lbs whole weight (http://www.st.nmfs.noaa.gov/pls/webpls/MF_ANNUAL_LANDINGS.RESULTS). Non-confidential recreational landings for 2010 red grouper are 82,300 lbs whole weight (http://www.st.nmfs.noaa.gov/pls/webpls/MR_CATCH_TIME_SERIES.RESULTS).

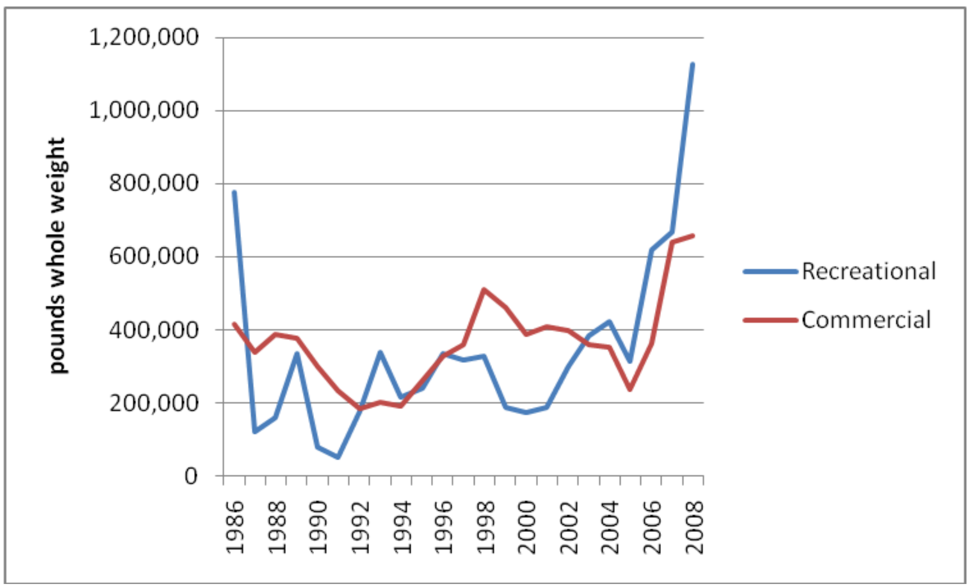


Figure G-1. Reported landings of red grouper between 1986 and 2008 in the South Atlantic waters. Source: SEDAR 19 Assessment

The commercial sector landed the majority of scamp and vermilion snapper, while the recreational sector landed the majority of greater amberjack and red snapper (**Table G-1**).

Table G-1. Percentage of landings among the commercial, for-hire, private recreational sectors during 2005-2010.

Taxon	Commercial	For Hire	Private Recreational
gag	55%	13%	32%
gray triggerfish	44%	23%	33%
greater amberjack	48%	27%	24%
red snapper	26%	28%	46%
scamp	70%	18%	12%
speckled hind	52%	46%	2%
vermilion snapper	65%	28%	7%

Source: SEFSC ACL Dataset dated September 2011

Commercial Fishery

During 2005 to 2010, approximately 20% of snapper grouper permitted vessels from the Gulf of Mexico and South Atlantic were randomly selected to fill out supplementary logbooks. The average number of trips per year during 2005 to 2010 was 14,372 (**Table G-2**). Fishermen spent an average of 1.68 days at sea per trip.

Table G-2. Snapper grouper fishery effort for South Atlantic.

YEAR	Trips	Days	Days per Trip
2005	13,766	22,846	1.66
2006	13,264	23,324	1.76
2007	14,886	24,510	1.65
2008	14,781	25,023	1.69
2009	15,888	26,580	1.67
2010	13,649	22,143	1.62
Mean	14,372	24,071	1.68

Source: NMFS SEFSC Logbook Program.

For species in snapper grouper fishery management unit (FMU), the number of commercial trips that reported discards was greatest for yellowtail snapper, red porgy, vermilion snapper, scamp, and black sea bass (**Table G-3**). **Table G-3** indicates many other species not included in the snapper grouper FMU including mackerel species, sharks, dolphin, and others are discarded by fishermen with federal commercial snapper grouper permits.

Table G-3. The 70 most commonly discarded species during 2005-2009 for the South Atlantic. Snapper grouper species are shaded in gray. Note: Represents total of unexpanded data during 2005-2009. 2010 data not available.

Species	Number of trips reported discarding the species	Number discarded
red porgy, unc	1,449	128,197
vermilion snapper	1,272	89,156
black sea bass, unc	896	69,027
knobbed porgy	503	27,924
yellowtail snapper	2,058	21,420
rough skin dogfish	85	14,807
red snapper	634	11,340
scamp	969	8,703
king mackerel	1,415	7,917
mangrove snapper	416	7,230
spottail pinfish	113	7,194
smooth dogfish	43	5,456
Atlantic sharpnose	204	5,055
menhaden	50	4,880
little tunny	140	4,189
greater amberjack	361	4,163
gag	618	4,045
grunts	181	3,517
dogfish shark	54	3,435
bluefish	77	3,092
red grouper	559	3,045
white grunt	168	2,695
gray triggerfish	233	2,508
scups or porgies, unc	73	2,495
blue runner	303	2,332
triggerfish	168	2,274
blacktip shark	161	2,098
amberjack	262	1,818
sandbar shark	129	1,810
black grouper	381	1,723
tomtate	22	1,703
tiger shark	115	1,506
mutton snapper	296	1,347
dolphin	214	1,270
unc, finfish for food	86	1,167
Atlantic bonito	218	1,049
speckled hind	122	817

Species	Number of trips reported discarding the species	Number discarded
remora	270	815
snappers, unc	36	681
barracuda	75	668
Spanish mackerel	106	651
ballyhoo	18	600
lane snapper	73	582
groupers	67	396
chubs	8	364
caribbean sharpnose	13	361
stingrays	29	335
hake	35	333
rays, unc	46	324
snowy grouper	59	319
margate	17	313
cobia	182	304
needlefish	72	299
cero	98	288
lesser amberjack	12	282
sand tilefish	35	264
spinner shark	33	245
hammerhead shark	69	218
almaco jack	20	203
sheepshead	21	201
sea catfish	69	188
rudderfish	33	181
black margate	3	161
yellowfin tuna	36	161
banded rudderfish	14	159
mahogany snapper	13	133
rock sea bass	11	131
squirrelfish	18	131
silky shark	13	114
Atlantic spadefish	21	107

Recreational Fishery

For the recreational fishery, estimates of the number of recreational discards are available from MRFSS and the NMFS headboat survey. The MRFSS system classifies recreational catch into three categories:

- Type A - Fishes that were caught, landed whole and available for identification and enumeration by the interviewers.
- Type B - Fishes that were caught but were either not kept or not available for identification:
    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
    - Type B2 - Fishes that were caught and released alive.

For species most affected by the actions in Amendment 24, the number of fish released alive, as reported by charterboat and private recreational fishermen, was greatest for red snapper (**Table G-4**).

Table G-4. Estimated number of fish most affected by the actions in Amendment 24 released alive (B2) in numbers in the South Atlantic during 2005-2010 as reported by charterboat and private recreational fishermen.

Species	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009		Year: 2010	
	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE	TYPE B2	PSE
gag	112,352	13.1	117,752	13	315,966	12.7	185,597	10.5	109,998	12.4	98,545	14.7
gray triggerfish	182,794	12.1	165,872	15.7	216,609	10.5	189,478	11.1	176,643	14.3	110,240	12.8
red grouper	182,798	11	103,459	11.3	26,372	26	50,526	17.2	94,072	15.2	94,606	17.4
red snapper	125,739	13.3	134,692	18.5	455,405	12.8	403,244	10.5	210,279	12.4	93,654	17.5
scamp	6.348	30.7	7,073	26.8	20,296	41.9	7,327	23.9	7,745	45.9	6,128	37.7
speckled hind	5,121	50.4	596	77.3	0	0	5,519	46.6	None reported		69	63.7
vermilion snapper	140,356	13.2	102,219	34.3	293,433	12.9	246,103	14.2	226,125	11.6	131,392	24.2

Source: Marine Recreational Fisheries Statistics Survey Data Query Assessed November 20, 2011

The number of released fish for other species managed by the South Atlantic Council, as reported by charterboat and private recreational fishermen, varied by species (**Table G-5**).

Table G-5. Estimated number of fish released (B2) fish in numbers for the South Atlantic during 2005-2009.
Source: MRFSS Web Site http://www.st.nmfs.noaa.gov/st1/recreational/overview/overview.html.

	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009		Year: 2010	
Species	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**
BARRACUDAS												
BARRACUDAS	126,721	10.8	180,157	8.7	268,282	9.5	239,534	9.6	204,545	9.8	153,535	9
-- Species Group Subtotal --	126,721	10.8	180,157	8.7	268,282	9.5	239,534	9.6	204,545	9.8	153,535	9
BLUEFISH												
BLUEFISH	3,004,781	6.1	3,707,415	5.7	4,539,620	6	3,440,594	5	2,337,256	5.4	4,226,412	5
-- Species Group Subtotal --	3,004,781	6.1	3,707,415	5.7	4,539,620	6	3,440,594	5	2,337,256	5.4	4,226,412	5
CARTILAGINOUS FISHES												
DOGFISH SHARKS	151,502	28.1	91,248	17.4	132,366	42.2	129,161	22.3	92,811	24.9	158,920	15
OTHER SHARKS	2,888,895	5.1	2,770,853	6.8	3,128,079	4.5	2,925,490	4.4	2,638,748	5.5	2,891,631	6
SKATES/RAYS	1,387,330	6.9	1,059,210	6.7	1,183,040	5.3	1,070,743	6.2	1,431,617	10.8	1,132,737	6
-- Species Group Subtotal --	4,427,727	4.1	3,921,311	5.1	4,443,485	3.7	4,125,394	3.6	4,163,176	5.1	4,183,288	4
CATFISHES												
FRESHWATER CATFISHES	64,895	28.1	40,805	30.2	20,552	25.6	45,502	28	12,530	35.4	23,634	33
SALTWATER CATFISHES	1,775,623	6.2	1,362,776	5.8	2,473,885	7.1	1,912,040	6.5	1,016,001	6.6	1,903,731	6
-- Species Group Subtotal --	1,840,518	6	1,403,581	5.7	2,494,437	7	1,957,542	6.3	1,028,531	6.6	1,927,365	6
CODS AND HAKES												
OTHER CODS/HAKES	34,531	40.3	5,889	37	9,605	31	7,405	69.3	32,350	39.9	12,729	44
-- Species Group Subtotal --	34,531	40.3	5,889	37	9,605	31	7,405	69.3	32,350	39.9	12,729	44
DOLPHINS												
DOLPHINS	218,931	16.1	231,853	10.8	254,568	17.1	200,879	11.8	75,493	14	95,769	13
-- Species Group Subtotal --	218,931	16.1	231,853	10.8	254,568	17.1	200,879	11.8	75,493	14	95,769	13
DRUMS												
ATLANTIC CROAKER	2,153,037	6.6	3,439,549	6.4	2,540,696	7	2,372,758	5.9	3,113,213	5.5	2,469,631	6

Species	Year: 2005 RELEASED ALIVE (TYPE B2)	PSE	Year: 2006 RELEASED ALIVE (TYPE B2)	PSE	Year: 2007 RELEASED ALIVE (TYPE B2)	PSE	Year: 2008 RELEASED ALIVE (TYPE B2)	PSE	Year: 2009 RELEASED ALIVE (TYPE B2)	PSE	Year: 2010 RELEASED ALIVE (TYPE B2)	PSE
BLACK DRUM	190,110	11.4	312,415	9.7	820,032	10.2	640,413	7.7	293,214	8.8	369,539	9
KINGFISHES	2,226,960	6.8	3,582,622	7.7	3,309,945	5.9	2,902,539	6.1	2,710,822	6.8	2,861,064	6
OTHER DRUM	581,461	11	834,383	8.8	1,049,974	10.9	1,173,266	9.5	900,754	12.3	241,704	16
RED DRUM	2,412,470	5.8	2,111,089	5.6	2,070,575	5.6	2,333,096	6.1	1,979,705	5.6	2,932,869	5
SAND SEATROUT	0	0	9,401	72	11,324	45.8	27,367	42.5	110,534	48.4	11,380	50
SILVER PERCH	480,503	13.2	726,915	11.5	584,828	12.1	491,659	15.6	595,518	15.6	434,418	14
SPOT	1,728,002	9.9	3,851,795	9.6	1,732,440	9.9	1,713,571	7.6	1,798,841	8.8	1,219,043	9
SPOTTED SEATROUT	5,336,913	5.3	4,988,541	4.7	6,114,718	5	4,715,679	5.5	3,782,693	5.4	5,193,793	5
WEAKFISH	438,519	11	538,799	11.4	346,898	14	265,383	14.1	189,614	21.8	289,290	17
-- Species Group Subtotal --	15,547,975	2.8	20,395,509	2.9	18,581,430	2.6	16,635,731	2.5	15,474,908	2.7	16,022,731	3
EELS												
EELS	51,553	26.3	62,029	25.8	43,847	16.3	41,653	19	27,700	17.3	39,006	19
-- Species Group Subtotal --	51,553	26.3	62,029	25.8	43,847	16.3	41,653	19	27,700	17.3	39,006	19
FLOUNDERS												
GULF FLOUNDER	4,932	64	10,047	58.5	32,472	49.1	6,181	51.8	964	100	4,362	54
OTHER FLOUNDERS	1,214,700	6.3	1,201,665	5.6	1,689,592	5.8	1,900,658	5.9	1,577,521	6.8	2,161,196	5
SOUTHERN FLOUNDER	131,274	17.9	257,712	13.7	190,340	13	125,290	14.8	104,871	23.9	6,485	32
SUMMER FLOUNDER	83,320	22.4	139,805	20.5	10,815	38.6	5,715	38	35,632	27.3	27,741	38
-- Species Group Subtotal --	1,434,226	5.7	1,609,229	5	1,923,219	5.4	2,037,844	5.6	1,718,988	6.4	2,199,784	5
GRUNTS												
OTHER GRUNTS	905,462	8.2	790,470	8.4	1,561,407	8.3	903,581	7.7	1,219,001	8.5	1,034,807	19
PIGFISH	743,829	7.8	553,384	9.6	868,092	10.3	821,930	8.4	841,230	10.1	1,062,295	7
WHITE GRUNT	195,770	14.8	274,926	15	241,875	11.3	434,040	14.5	148,501	24.3	43,267	16
-- Species Group Subtotal --	1,845,061	5.3	1,618,780	5.8	2,671,374	6	2,159,551	5.4	2,208,732	6.3	2,140,369	10
HERRINGS												
HERRINGS	1,243,180	17.4	2,640,817	12.5	1,203,718	16.9	512,502	31.7	1,698,306	15.3	2,121,775	14

	Year: 2005		Year: 2006		Year: 2007		Year: 2008		Year: 2009		Year: 2010	
Species	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**	**RELEASED ALIVE (TYPE B2)**	**PSE**
-- Species Group Subtotal --	1,243,180	17.4	2,640,817	12.5	1,203,718	16.9	512,502	31.7	1,698,306	15.3	2,121,775	14
JACKS												
BLUE RUNNER	661,888	9.6	822,370	9.2	1,159,991	11.7	796,058	11.1	705,910	24.5	499,651	10
CREVALLE JACK	1,362,086	6.7	1,264,018	6.5	1,634,661	6	1,097,877	7	1,139,832	7.9	1,032,042	8
FLORIDA POMPANO	693,755	12.5	1,007,541	20.1	605,621	12	696,269	10.7	345,791	21.5	347,629	12
GREATER AMBERJACK	16,687	25.1	19,234	19.6	30,752	20.8	80,931	19.8	71,802	16.1	26,242	23
OTHER JACKS	332,217	17.4	180,298	14	326,798	15.8	433,050	12.2	352,874	16	243,164	18
-- Species Group Subtotal --	3,066,633	5	3,293,461	7.1	3,757,823	5.1	3,104,185	4.8	2,616,209	8.3	2,148,728	6
MULLETS												
MULLETS	1,384,536	13.7	1,801,720	11.3	2,263,848	9.4	1,091,237	10.7	1,367,241	11.1	2,641,902	24
-- Species Group Subtotal --	1,384,536	13.7	1,801,720	11.3	2,263,848	9.4	1,091,237	10.7	1,367,241	11.1	2,641,902	24
OTHER FISHES												
OTHER FISHES	2,965,704	4.8	2,882,611	4.7	4,518,284	3.7	2,828,534	4.2	2,751,240	5.7	2,871,776	7
-- Species Group Subtotal --	2,965,704	4.8	2,882,611	4.7	4,518,284	3.7	2,828,534	4.2	2,751,240	5.7	2,871,776	7
PORGIES												
OTHER PORGIES	72,379	20.1	150,357	20.4	139,040	21.4	116,266	19.5	65,856	19.2	92,406	28
PINFISHES	3,917,568	5.8	5,056,606	6.2	4,960,818	5.1	5,040,941	6	3,588,516	5.8	5,080,786	5
RED PORGY	27,514	19.2	16,636	15.8	30,085	19	44,154	30	18,089	55.8	5,525	30
SCUP	1,620	46.5	7,721	44	5,729	30.6	9,755	36	3,293	25.3	1,417	29
SHEEPSHEAD	436,207	9.6	437,836	9.3	603,767	10.7	773,720	8	520,600	9.1	536,490	9
-- Species Group Subtotal --	4,455,288	5.2	5,669,156	5.6	5,739,439	4.5	5,984,836	5.2	4,196,354	5.1	5,716,624	5
PUFFERS												
PUFFERS	425,264	7.7	635,341	8.5	1,152,418	6.6	1,341,422	6.7	912,983	7.6	573,280	11
-- Species Group Subtotal --	425,264	7.7	635,341	8.5	1,152,418	6.6	1,341,422	6.7	912,983	7.6	573,280	11
SEA BASSES												
BLACK SEA BASS	2,483,947	5.5	2,967,099	5.6	3,764,105	7.3	2,940,795	6.2	2,716,240	6.2	3,270,077	6

Species	Year: 2005 RELEASED ALIVE (TYPE B2)	PSE	Year: 2006 RELEASED ALIVE (TYPE B2)	PSE	Year: 2007 RELEASED ALIVE (TYPE B2)	PSE	Year: 2008 RELEASED ALIVE (TYPE B2)	PSE	Year: 2009 RELEASED ALIVE (TYPE B2)	PSE	Year: 2010 RELEASED ALIVE (TYPE B2)	PSE
EPINEPHELUS GROUPERS	254,936	9.1	165,261	9.1	107,240	17.6	97,808	11.9	128,065	11.9	118,264	15
MYCTEROPERCA GROUPERS	145,222	11	152,123	10.7	302,398	11.2	252,309	8.9	142,865	10.6	121,698	13
OTHER SEA BASSES	324,893	11.5	797,375	11.3	910,942	8.7	801,710	9.1	499,275	10.4	217,610	15
-- Species Group Subtotal --	3,208,998	4.5	4,081,858	4.6	5,084,685	5.7	4,092,622	4.8	3,486,445	5.1	3,727,649	5
SEAROBINS												
SEAROBINS	158,366	12.1	300,921	21.5	432,617	11.1	333,166	14.5	123,415	10.5	139,435	10
-- Species Group Subtotal --	158,366	12.1	300,921	21.5	432,617	11.1	333,166	14.5	123,415	10.5	139,435	10
SNAPPERS												
GRAY SNAPPER	1,228,211	7.8	1,457,251	5.9	2,936,755	6	1,839,406	6.5	1,725,889	7.4	585,571	10
LANE SNAPPER	111,276	22.7	137,572	16.8	330,770	14.1	227,775	18.4	157,594	16.6	74,057	22
OTHER SNAPPERS	242,324	10.6	280,948	10.1	426,284	10.4	557,020	10	314,681	10.1	155,776	12
RED SNAPPER	125,739	13.3	134,692	18.5	455,405	12.8	403,244	10.5	210,279	12.4	93,654	18
VERMILION SNAPPER	140,356	13.2	102,219	34.3	293,433	12.9	246,103	14.2	226,125	11.6	131,392	24
YELLOWTAIL SNAPPER	258,606	17.7	344,982	11.7	402,201	12.5	319,239	11.1	221,836	22.6	117,970	14
-- Species Group Subtotal --	2,106,512	5.5	2,457,664	4.5	4,844,848	4.3	3,592,787	4.3	2,856,404	5.2	1,158,420	7
TEMPERATE BASSES												
STRIPED BASS	136,536	16.3	85,438	19.4	50,735	18.2	86,858	19.6	93,353	21	74,856	19
WHITE PERCH	0	0	46,904	38.1	7,339	56.8	1,397	58.5	0	0	5,353	63
-- Species Group Subtotal --	136,536	16.3	132,342	18.4	58,074	17.5	88,255	19.4	93,353	21	80,209	18
TOADFISHES												
TOADFISHES	477,955	8.3	479,125	9.4	435,924	7.7	691,142	8	405,848	8.2	480,589	8
-- Species Group Subtotal --	477,955	8.3	479,125	9.4	435,924	7.7	691,142	8	405,848	8.2	480,589	8
TRIGGERFISHES/FILEFISHES												
TRIGGERFISHES/FILEFISHES	239,995	10.7	210,123	14.6	228,262	10.1	199,476	10.7	181,503	14	133,118	13

Species	Year: 2005 RELEASED ALIVE (TYPE B2)	PSE	Year: 2006 RELEASED ALIVE (TYPE B2)	PSE	Year: 2007 RELEASED ALIVE (TYPE B2)	PSE	Year: 2008 RELEASED ALIVE (TYPE B2)	PSE	Year: 2009 RELEASED ALIVE (TYPE B2)	PSE	Year: 2010 RELEASED ALIVE (TYPE B2)	PSE
-- Species Group Subtotal --	239,995	10.7	210,123	14.6	228,262	10.1	199,476	10.7	181,503	14	133,118	13
TUNAS AND MACKERELS												
ATLANTIC MACKEREL	67,658	81.9										
KING MACKEREL	207,618	13.7	195,618	9.8	303,008	9.4	166,716	9.7	127,316	13.4	82,557	14
LITTLE TUNNY/ATLANTIC BONITO	288,459	8.5	476,296	7	780,193	8.4	511,878	7.6	585,015	8.3	369,128	8
OTHER TUNAS/MACKERELS	66,422	24.6	43,933	13.7	58,912	16.3	121,352	17.4	93,887	17	48,253	15
SPANISH MACKEREL	704,569	12.9	321,860	11.9	586,722	9.4	994,693	10.4	466,681	9.4	659,992	10
-- Species Group Subtotal --	1,334,726	8.5	1,037,707	5.3	1,728,835	5.3	1,794,639	6.3	1,272,899	5.4	1,159,930	7
WRASSES												
OTHER WRASSES	2,966	53.3	2,079	50.4	10,386	41.8	13,203	51.5	2,977	42.4	9,296	36
TAUTOG	2,885	100	5,185	52	2,905	60.9	1,755	58.9	1,922	62.6	2,907	44
-- Species Group Subtotal --	5,851	56.2	7,264	39.8	13,291	35.3	14,958	46	4,899	35.6	12,203	29
-- Grand Total --	49,741,568	1.4	58,765,863	1.6	66,691,933	1.3	56,515,888	1.3	49,238,778	1.5	53,966,626	2

For species most affected by the actions in Amendment 24, the number of released fish, as reported by headboat operators, was greatest for gray triggerfish (**Table G-6**).

Table G-6. Number of fish most affected by the actions in Amendment 24 released fish in numbers for the South Atlantic during 2005-2010 as reported headboat operators.

Species	# trips reporting discards	released	sum
gag	11,845	rel_dead	387
		rel_live	25,059
gray triggerfish	19,193	rel_dead	441
		rel_live	32,954
red grouper	10,546	rel_dead	382
		rel_live	41,680
red snapper	11,281	rel_dead	3,604
		rel_live	250,600
scamp	5,730	rel_dead	327
		rel_live	18,968
speckled hind	533	rel_dead	3
		rel_live	299
vermilion snapper	14,443	rel_dead	22,109
		rel_live	503,194

Source: NMFS Headboat survey

The number of discarded species, for other fish managed by the South Atlantic Council, as reported by headboat operators, varied by species (**Table G-7**).

Table G-7. The 25 most commonly discarded species from headboats in South Atlantic. Total fish reported released alive or dead on sampled headboat trips during 2005-2010. Data are not expanded to all trips.

Species	# trips reporting discards	released	sum
black sea bass	22,221	rel_dead	26,188
		rel_live	1,095,014
vermilion snapper	14,443	rel_dead	22,109
		rel_live	503,197
tomtate	10,227	rel_dead	43,916
		rel_live	302,959
red snapper	11,281	rel_dead	3,604
		rel_live	250,600
white grunt	16,578	rel_dead	3,761
		rel_live	125,624
red porgy	4,768	rel_dead	2,490

Species	# trips reporting discards	released	sum
		rel_live	123,025
yellowtail snapper	13,719	rel_dead	505
		rel_live	102,353
pinfish	3,850	rel_dead	6,115
		rel_live	92,772
red grouper	10,546	rel_dead	382
		rel_live	41,680
spottail pinfish	4,383	rel_dead	257
		rel_live	41,236
gray triggerfish	19,193	rel_dead	411
		rel_live	32,954
gag	11,845	rel_dead	387
		rel_live	25,059
lane snapper	9,389	rel_dead	654
		rel_live	19,631
gray snapper	13,280	rel_dead	162
		rel_live	19,006
scamp	5,730	rel_dead	327
		rel_live	18,968
bank sea bass	3,695	rel_dead	822
		rel_live	166,601
mutton snapper	12,244	rel_dead	575
		rel_live	16,206
squirrelfish	4,041	rel_dead	168
		rel_live	12,428
blue runner	5,917	rel_dead	298
		rel_live	10,894
little tunny	5,927	rel_dead	580
		rel_live	10,300
greater amberjack	5,386	rel_dead	116
		rel_live	9,723
scup	1,498	rel_dead	974
		rel_live	8,884
king mackerel	13,918	rel_dead	246
		rel_live	8,566
smooth dogfish	1,066	rel_dead	39
		rel_live	8,479

Source: NMFS Headboat survey.

Finfish Bycatch Mortality

Release mortality rates are unknown for most snapper grouper species. Recent SEDAR assessments include estimates of release mortality rates based on published studies. Stock assessment reports can be found at http://www.sefsc.noaa.gov/sedar/. Release mortality rates for species most affected by the actions in Amendment 24 that have had SEDAR assessments vary by species **(Table G-8)**.

Table G-8. Release mortality rates as reported by the SEDAR assessments.

	release mortality rates		
Species	**commercial**	**recreational**	**source**
gag	40%	25%	SEDAR 10
red grouper	20%	20%	SEDAR 19
red snapper	48%	39% private rec. 41% for-hire	SEDAR 24
vermilion snapper	41%	38%	SEDAR 17

Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Tables G-3 through G-7 list the species that are most commonly discarded by commercial and recreational fishermen.

The purpose of Amendment 24 is to implement a rebuilding plan for red grouper. The allowable fishing mortality rate will be specified throughout the rebuilding timeframe.

Snapper Grouper Amendment 14 implemented deepwater MPAs that contain many species, including blueline tilefish, speckled hind, and warsaw grouper. Snapper Grouper Amendment 16 required the use of dehooking devices, which could help reduce release mortality of snapper grouper species. Dehooking devices can allow fishermen to remove hooks with greater ease and more quickly from snapper grouper species without removing the fish from the water. If a fish does need to be removed from the water, dehookers could still reduce handling time in removing hooks, thus increasing survival (Cooke *et al.* 2001). Furthermore, Snapper Grouper Amendment 17A required circle hooks for snapper-grouper species north of 28 degrees latitude, which is also expected to reduce bycatch mortality of snapper grouper species. Recent amendments have reduced the recreational bag limit of snowy grouper to one per vessel per day and implemented a 100 pound gutted weight commercial trip limt for snowy grouper. Such measures could be expected to decrease the incentive to fish in areas where snowy groupers are encountered. Snapper Grouper Amendment 18A, which is being developed by the South Atlantic Council, is considering measures that could reduce bycatch of black sea bass including: endorsements that could limit number of inviduals who can fish black sea bass pots; a limit on the number of black sea bass pots that can be fished; and a possible requirement that black sea bass pots be returned to shore at the end of a trip.

2. Ecological Effects Due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. Actions proposed in Amendment 24 could increase bycatch of red grouper if fishermen continue to encounter red grouper if the annual catch limit is reached and the fishery is closed to possession and retention. Many of the species in the snapper grouper fishery management unit have spatial and temporal coincidence and the benefits could be shared among them. The estimated release mortality of red grouper is 20%. However, fishermen may fish in specific areas to avoid red grouper if the annual catch limit is reached.

3. Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

Actions proposed in Amendment 24 could increase bycatch of red grouper if fishermen continue to encounter red grouper if the annual catch limit is reached and the fishery is closed to possession and retention. The estimated release mortality of red grouper is 20%. However, fishermen may fish in specific areas to avoid red grouper once if the annual catch limit is reached. Many of the species in the snapper grouper fishery management unit have spatial and temporal coincidence and the benefits could be shared among them. Ecological changes in the community structure of reef ecosystems through the proposed actions could be expected to occur. These ecological changes could affect the nature and magnitude of bycatch over time.

4. Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper grouper fishery, only the black sea bass pot is considered to pose an entanglement risk to marine mammals. The southeast U.S. Atlantic black sea bass pot fishery is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2010 proposed List of Fisheries classifies as a Category II (74 FR 27739; June 11, 2009). Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals. For the snapper grouper fishery, the best available data on protected species interactions are from the Southeast Fisheries Science

Center (SEFSC) Supplementary Discard Data Program (SDDP) initiated in July of 2001 and sub-samples 20% of the vessels with an active permit. Since August 2001, only three interactions with marine mammals have been documented; each was taken by handline gear and each released alive (McCarthy SEFSC database). The bottom longline/hook-and-line component of the South Atlantic snapper grouper fishery remains a Category III under the LOF.

Although the black sea bass pot fishery can pose an entanglement risk to large whales due to their distribution and occurrence, sperm, fin, sei, and blue whales are unlikely to overlap with the black sea bass pot fishery operated within the snapper grouper fishery since it is executed primarily off North Carolina and South Carolina in waters ranging from 70-120 feet deep (21.3-36.6 meters). There are no known interactions between the black sea bass pot fishery and large whales. NOAA Fisheries Service's biological opinion on the continued operation of the South Atlantic snapper grouper fishery determined the possible adverse effects resulting from the fishery are extremely unlikely. Thus, the continued operation of the snapper grouper fishery in the southeast U.S. Atlantic EEZ is not likely to adversely affect sperm, fin, sei, and blue whales (NMFS 2006).

North Atlantic right and humpback whales may overlap both spatially and temporally with the black sea bass pot fishery. Recent revisions to the Atlantic Large Whale Take Reduction Plan have folded the Atlantic mixed species trap/pot fisheries into the plan (72 FR 193; October 5, 2007). The new requirements will help further reduce the likelihood of North Atlantic right and humpback whale entanglement in black sea bass pot gear.

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North Carolina and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region, they are found mainly off the Florida Keys (unpublished USFWS data). Interaction with fisheries has not been reported as a concern for either of these species.

Fishing effort reductions have the potential to reduce the amount of interactions between the fishery and marine mammals and birds. Although, the Bermuda petrel and roseate tern occur within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery. Thus, it is believed that the snapper grouper fishery is not likely to negatively affect the Bermuda petrel and the roseate tern.

5. Changes in Fishing, Processing, Disposal, and Marketing Costs

Actions in Amendment 24 would be expected to affect the cost of fishing operations. It is likely that all four states (NC, SC, GA, and FL) would be affected by the regulations. Additionally, factors such as waterfront property values, availability of less expensive imports, etc. may affect economic decisions made by recreational and commercial fishermen. Amendment 18A (under development) proposes to enhance current data collection programs. This might provide more insight in calculating the changes in fishing, processing, disposal and marketing costs.

6. Changes in Fishing Practices and Behavior of Fishermen

Actions proposed in Amendment 24 could result in a modification of fishing practices by commercial and recreational fishermen, thereby affecting the magnitude of discards. However, it is difficult to quantify any of the measures in terms of reducing discards until the magnitude of bycatch has been monitored over several years.

7. Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

Research and monitoring is needed to understand the effectiveness of proposed management measure in reducing bycatch. Additional work is needed to determine the effectiveness of measures in Amendment 24, recently implemented amendments, and by future actions being proposed by the South Atlantic Council to reduce bycatch. Amendment 18A is being developed, which proposes to enhance current data collection programs. Some observer information has recently been provided by MARFIN and Cooperative Research Programs but more is needed. Approximately 20% of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. The use of electronic logbooks could be enhanced to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Additional administrative and enforcement efforts will be needed to implement and enforce these regulations. NOAA Fisheries Service established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast US waters, addressing both immediate (e.g., red snapper) and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

8. Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

Preferred management measures, including those that are likely to increase or decrease discards could result in social and/or economic impacts as discussed in **Section 4**.

9. Changes in the Distribution of Benefits and Costs

The economic effects of all the management measures, including those most likely to reduce bycatch, are described in **Section 4**.

10. Social Effects

The social effects of all the management measures, including those most likely to reduce bycatch, are described in **Section 4**.

11. Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, the actions in Amendment 24 could increase bycatch of red grouper if fishermen continue to encounter red grouper if the annual catch limit is reached and the fishery is closed to possession and retention. The estimated release mortality of red grouper is 20%. However, fishermen may fish in specific areas to avoid red grouper once if the annual catch limit is reached. Recently implemented regulations including the requirements of dehooking devices, circle hooks, a recreational/commercial seasonal closure for shallow water groupers, reduction of recreational bag limits, and closing all shallow water groupers when a gag quota is met, could also help to reduce bycatch of red grouper.

Updated Economic Analysis of Proposed Management Alternatives in Amendment 24 for the Commercial Snapper-Grouper Fishery

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Updated Economic Analysis of Proposed Management Alternatives in Amendment 24 for the Commercial Snapper-Grouper Fishery

Introduction

The red grouper (*Epinephelus morio*) resource within the jurisdiction of the South Atlantic Fishery Management Council (Council) has been determined to be experiencing overfishing and to be overfished (SEDAR 19 2010). A four month spawning season closure for red grouper as well as black grouper, gag, and other shallow water groupers was implemented by the NOAA Fisheries Service on July 29, 2009. The closure may be sufficient to limit landings to below the annual catch limit. However, due to the current status of the red grouper stock the Council and the NOAA Fisheries Service are required by law to implement a rebuilding plan. The primary purpose of Amendment 24 to the Fishery Management Plan for the Snapper Grouper Fishery (Amendment 24) is to implement the rebuilding plan for red grouper. The measurement actions proposed in Amendment 24 will fulfill this requirement and include a range of alternatives covering maximum sustainable yields, minimum stock size thresholds, rebuilding schedules, rebuilding strategies and acceptable biological catch levels, allocations, and annual catch limits and optimum yields.

This report describes the results of a simulation model that calculated the expected economic effects of the proposed management alternatives in Amendment 24 for the commercial snapper-grouper fishery from North Carolina through the Atlantic side of the Florida Keys. This report includes an evaluation of proposed actions involving alternative rebuilding schedules, rebuilding plans, and allocations. Results are presented as projected simulations based on trip-level logbook data from 2005-2009.

Method of Analyzing Economic Effects of Proposed Management Alternatives

Fishers with permits to fish in federal waters for species in the snapper-grouper complex have been required since 1993 to submit trip reports of their landings by species. These logbook trip reports from 2005-2009 constitute the source of data used in this analysis.

The simulation model uses logbook trip reports to predict the short-term economic effects of proposed management alternatives.[1] The modeling framework hypothetically imposes proposed regulations on individual fishing trips as reported to the logbook database, and then calculates their effects on trip catches, revenues, and costs. Trip-level results are totaled by year for 2005-2009, and the five-year average of simulated results is interpreted as the expected annual outcome of proposed regulations. The five-year

[1] The simulation model is described in more detail in Waters, James R. July 2008. An Economic Model to Analyze Management Alternatives Proposed for the Commercial Fishery in Amendment 16 to the Snapper-Grouper Fishery Management Plan. NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, 14p.

average is used so that short-term anomalies that may have affected fishing success in any one year will be averaged out. The simulated average annual fishing income net of trip costs (excluding labor) for the proposed alternatives is compared to the No-Action Alternative to estimate the expected economic effects on commercial fishers. This net income calculation will henceforth be referred to as *net operating revenues*.

Net operating revenues for trip *j* in year *t* were calculated as trip revenues from all species minus predicted trip costs, which include fuel, oil, bait, ice, and other supplies, and exclude labor and fixed costs. Therefore, net operating revenues represent the return to captain and crew, fixed factors of production, and the boat owner. Net operating revenues were adjusted to constant 2010 dollars with the consumer price index for all items and all urban consumers.

The simulation model examines the effects of proposed management alternatives on trip revenues and trip costs. If trip revenues remain greater than trip costs plus opportunity cost of labor after accounting for the likely effects of proposed restrictions, then the trip is recorded as taken in the simulation model, and the economic effect of the proposed restriction is measured as the loss in revenues associated with the expected reduction in landings per trip. On the other hand, if the proposed alternatives would cause trip revenues to fall below the sum of trip costs and opportunity cost for labor after accounting for the likely effects of proposed restrictions on trip-level harvests, then the trip is recorded as not taken in the simulation model, and losses are measured as a reduction in net operating revenues, which included the loss in revenues from all species minus the savings of trip costs not incurred.

This method of analysis has advantages and disadvantages. The advantages are that logbook data are reported by fishers, and are available in sufficient detail to analyze and compare the proposed alternatives. The disadvantages are that logbook data reflect fishing patterns and strategies given regulations that will no longer necessarily apply, and the model only predicts short-run behavior of fishers. In reality, fishers will likely modify their fishing patterns and strategies to minimize the effects of new regulations, but the simulation model does not account for these changes. Furthermore, long-run projections by the model are driven by changes in biological and regulatory parameters such as biomass projections and proposed annual catch limits. Therefore, the model can only approximate the true, but unknown, outcomes of proposed regulations. Nevertheless, the approach provides useful insights about the relative magnitudes of change due to proposed alternatives and the distribution of effects among subgroups within the fishery.

The No-Action Alternative for Action 4

The objective of this analysis is to predict the change in economic effects associated with implementation of Amendment 24. It accomplishes this objective by comparing the predicted outcomes of simulations given proposed regulations for Amendment 24 with the predicted outcome of simulations for the No-Action Alternative. For purposes of this analysis, the No-Action Alternative for Action 4 (alternative rebuilding paths) is defined by the predicted outcomes of rules specified in Amendments 13C, 15A, 16, 17A, 17B, Regulatory Amendment 10, and the Comprehensive ACL Amendment in conjunction with the preferred alternatives in Actions 5-7 of Amendment 24. The preferred alternatives from Actions 5-7 are a 44% commercial allocation (Action 5, Alternative 2, Subalternative 2e), proposed commercial and recreational ACLs equal to their respective ABCs (Action 6, Alternative 2), and no commercial sector ACT (Action 7, Alternative 1).

The effects of proposed regulations in Amendment 24 are compared to the simulated effects of Amendments 13C, 15A, 16, 17A, 17B, and the Comprehensive ACL Amendment (along with preferred alternatives from Amendment 24) rather than to observed fishery landings and revenues because historical data for 2005-2009 do not reflect the effects of regulations recently implemented by these amendments. Amendment 13C to the Snapper-Grouper Fishery Management Plan was implemented in October 2006, and Amendment 15A was implemented in March 2008. Both amendments primarily regulate the harvest of deep water groupers, tilefish, and black sea bass. Amendment 16 was implemented at the end of July 2009 and imposes limits on the harvest of vermilion snapper, gag, and other shallow water groupers along with seasonal closures. Amendment 17A prohibits the harvest and possession of red snapper while Regulatory Amendment 10 rescinded proposed area closures. Amendment 17B established ACLs and AMs for nine major snapper-grouper species and established deepwater closures for deepwater snapper-grouper species. The Comprehensive ACL Amendment establishes ACLs and AMs for snapper-grouper species not listed as undergoing overfishing as well as dolphin, wahoo, and golden crab.

Figure 1 illustrates the projected net operating revenues using simulated fishery landings for the regulatory period (2011-2020) that comprise the No-Action Alternative for the proposed rebuilding plans in Action 4 of Amendment 24. In the simulations for Action 4 we set the commercial allocation to 44% of the ABC. This rule represents the preferred alternatives in Actions 5-7. Table 1 shows the net present value of future cash flows of net operating revenues under the No-Action Alternative for Action 4 of Amendment 24 with alternative discount rates assumed for time horizons of seven and ten years.

Figure 1. Projected net operating revenues (millions of 2010 dollars) for the regulatory period (2011-2020) that comprise the No-Action Alternative for Action 4 of Amendment 24.

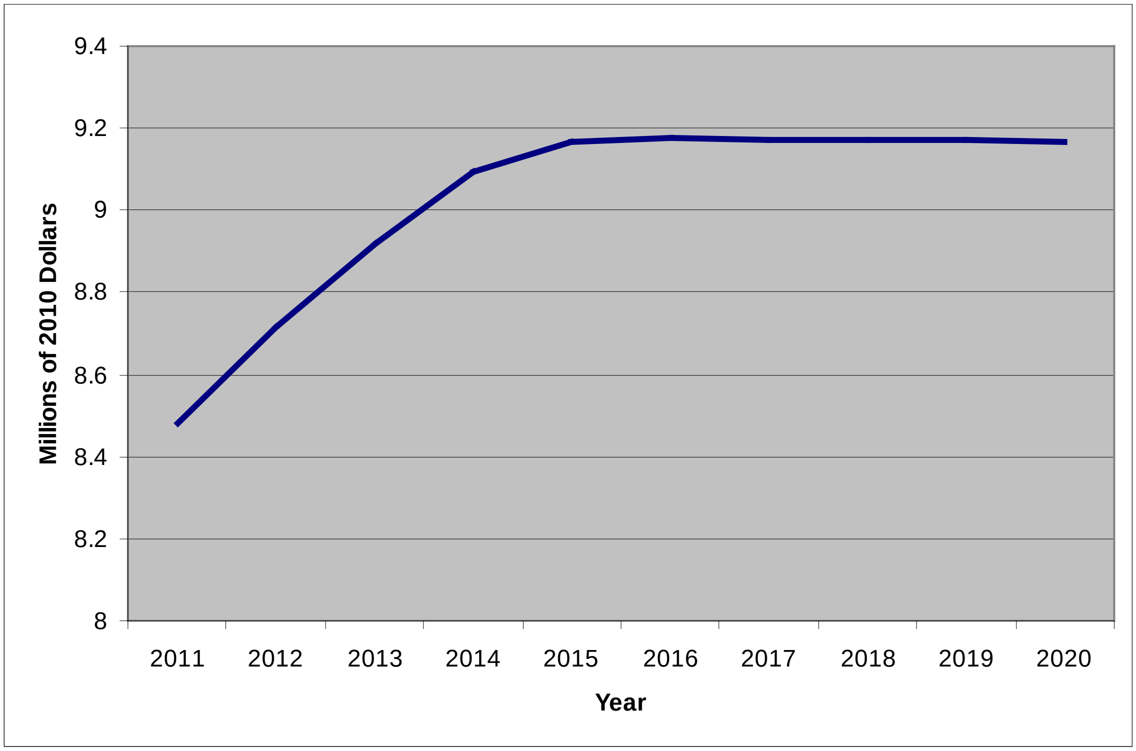

Table 1. Projected net present value (NPV) of future flows of net operating revenues (NOR) (millions of 2010 dollars) that comprise the No-Action Alternative for Action 4 of Amendment 24 with alternative discount rates assumed for time horizons of seven and ten years.

Time Horizon	NPV of Future Flows of NOR under Alternative Discount Rates (millions of 2010 dollars)			
	0%	3%	7%	
7 Years	$62.72	$55.74	$48.12	
10 Years	$90.23	$76.83	$63.10	

Economic Effects of Proposed Management Measures for Red Grouper in Action 4

Table 2 lists the management alternatives associated with Action 4 that are proposed in Amendment 24. Alternative 1 is the No-Action Alternative and reflects regulations currently in place for the snapper-grouper fishery along with preferred alternatives in Actions 5-7 from Amendment 24. Alternatives 2-6 all would implement a rebuilding plan for red grouper. The Council is considering a range of rebuilding strategies that define the maximum fishing mortality rate throughout the rebuilding timeframe. Each alternative is associated with a projected yield stream with a 70% probability of rebuilding success within the allotted rebuilding time periods (i.e, seven, eight, or ten years).

Table 2. Rebuilding strategy alternatives proposed in Action 4 of Amendment 24 for the management of commercial fishing activity for red grouper. Reproduced from Draft Amendment 24 (June 2011).

Alternatives	Rebuilding strategy (F_{OY} Equal To) Scenario	F rate	ABC (lbs whole weight) *Landings and Discards*	ABC (lbs whole weight) *Landings*
Alternative 1 (No Action)	$F_{45\%SPR}$	0.106	399,000 (2011) 468,000 (2012) 537,000 (2013) 602,000 (2014)	374,000 (2011) 442,000 (2012) 511,000 (2013) 575,000 (2014)
Alternative 2	$F_{REBUILD}$ (10 years)	0.181	665,000 (2011) 737,000 (2012) 806,000 (2013) 866,000 (2014)	622,000 (2011) 693,000 (2012) 762,000 (2013) 822,000 (2014)
Alternative 3 (Preferred)	$75\%F_{MSY}$	0.166	613,000 (2011) 687,000 (2012) 759,000 (2013) 821,000 (2014)	573,000 (2011) 647,000 (2012) 718,000 (2013) 780,000 (2014)
Alternative 4	$65\%F_{MSY}$	0.144	535,000 (2011) 610,000 (2012) 683,000 (2013) 749,000 (2014)	501,000 (2011) 575,000 (2012) 648,000 (2013) 713,000 (2014)
Alternative 5	$F_{REBUILD}$ (7 years)	0.157	583,000 (2011) 657,000 (2012) 730,000 (2013) 794,000 (2014)	545,000 (2011) 619,000 (2012) 691,000 (2013) 755,000 (2014)
Alternative 6	$F_{REBUILD}$ (8 years)	0.168	620,000 (2011) 695,000 (2012) 765,000 (2013) 828,000 (2014)	580,000 (2011) 654,000 (2012) 724,000 (2013) 787,000 (2014)

The results from the economic analysis for Action 4 are summarized in Tables 3-5. The net present values of changes in net operating revenues (NOR) to the commercial sector associated with the rebuilding strategy alternatives proposed in Action 4 are presented in

Table 3. Table 3 organizes these changes into two separate time horizons, seven and ten years, for a range of discount rates from zero to seven percent. The choice of the appropriate discount rate does not change the relative ranking of the alternatives but will change the magnitude of the net present value of future NOR streams. The projected NOR streams of the red grouper rebuilding strategies (i.e. Alternatives 2-6) created by the proposed ACLs and projected biomass figures were discounted over a period of seven and ten years to populate Table 3.

The analysis suggests that from an industry-wide perspective Alternative 2 is economically superior to the other rebuilding strategy alternatives presented in Action 4. Alternatives 6 and 3 provide the second and third highest economic benefits, respectively. In Table 3 if we assume a discount rate of seven percent then Alternative 2 is expected to generate an additional $1,116,000 over the first seven years of the rebuilding schedule relative to the No-Action Alternative with an additional $380,000 generated in years eight through ten. Over a time horizon of ten years with an assumed discount rate of seven percent Alternative 2 is expected to generate at least $200,000 more than the next two best alternatives, which are Alternatives 6 and 3. Preferred Alternative 3 is expected to generate an additional $990,000 over the first seven years of the rebuilding schedule relative to the No-Action Alternative with an additional $310,000 generated in years eight through ten assuming a discount rate of seven percent. The least favorable alternative to the commercial fleet is Alternative 4 which will result in a gain of about $660,000 relative to the No-Action Alternative in the first seven years of the rebuilding plan assuming a discount rate of seven percent (Table 3).

The anticipated economic effects of the projected increase in red grouper landings are relatively small compared to the size of the snapper-grouper fishery as a whole. Over ten years, the predicted increase in NOR due to red grouper landings relative to all landings on trips that catch at least one pound of snapper-grouper species ranges from 1.4% (Alternative 4) to 2.4% (Alternative 2) assuming a discount rate of seven percent. Another interesting trend from Table 3 is that the relative increase in NOR during years eight through ten is much larger than that for the first seven years of each of the rebuilding plans. This phenomenon is driven by the projected increase in biomass during the latter years of the rebuilding schedule while the ACLs are held constant after year four. This is a preliminary conclusion at best as the simulation model is best suited for short-term predictions.

Table 3. Net present value of changes in net operating revenues (NOR) to the commercial sector associated with the rebuilding strategy alternatives in Action 4 over time horizons of seven and ten years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and using different discount rates. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy and Discount Rate	**7-Year Horizon**					**10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Change in NOR	$1.51	$1.28	$0.86	$1.15	$1.32	$2.21	$1.85	$1.23	$1.66	$1.92
% Change in NOR	2.4%	2.0%	1.4%	1.8%	2.1%	2.4%	2.1%	1.4%	1.8%	2.1%
Rebuilding Strategy and Discount Rate	**7-Year Horizon**					**10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Change in NOR	$1.35	$1.14	$0.76	$1.02	$1.18	$1.88	$1.58	$1.05	$1.42	$1.63
% Change in NOR	2.4%	2.0%	1.4%	1.8%	2.1%	2.4%	2.1%	1.4%	1.8%	2.1%
Rebuilding Strategy and Discount Rate	**7-Year Horizon**					**10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	$1.16	$0.99	$0.66	$0.89	$1.02	$1.54	$1.30	$0.87	$1.17	$1.34
% Change in NOR	2.4%	2.1%	1.4%	1.8%	2.1%	2.4%	2.1%	1.4%	1.8%	2.1%

The changes in the net present values of NOR by state of landing to the commercial sector associated with the various rebuilding alternatives in Action 4 are presented in Table 4. Table 4 organizes these changes into three separate time horizons: seven, eight, and ten years, with an assumed discount rate of seven percent. The projected NOR streams of all the proposed rebuilding strategies (i.e Alternatives 2-6) created by the proposed ACLs and projected biomass figures were discounted over a period of ten years while NOR streams associated with Alternatives 5 and 6 were also discounted over a period of seven and eight years, respectively.

Table 4. Net present value of changes in net operating revenues (NOR) by state of landing to the commercial sector associated with the rebuilding strategy alternatives in Action 4 over time horizons of seven, eight, and ten years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and a discount rate of 7%. Dollar amounts are in thousand 2010 dollars.

Rebuilding Strategy and Discount Rate	**North Carolina – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**North Carolina - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$608	$774	$1,052	$896	$607	$810	$920
% Change in NOR	N/A	N/A	N/A	4.6%	5.3%	6.0%	5.1%	3.5%	4.6%	5.3%
Rebuilding Strategy and Discount Rate	**South Carolina – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**South Carolina - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$269	$350	$474	$398	$268	$351	$411
% Change in NOR	N/A	N/A	N/A	3.1%	3.6%	4.1%	3.5%	2.3%	3.1%	3.6%
Rebuilding Strategy and Discount Rate	**Georgia/NE Florida – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Georgia/NE Florida - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$(20)	$(31)	$(40)	$(38)	$(40)	$(41)	$(41)
% Change in NOR	N/A	N/A	N/A	-0.4%	-0.6%	-0.7%	-0.6%	-0.7%	-0.7%	-0.7%
Rebuilding Strategy and Discount Rate	**Central and South Florida – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Central and South Florida - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$17	$20	$32	$26	$20	$21	$31
% Change in NOR	N/A	N/A	N/A	0.1%	0.2%	0.2%	0.2%	0.1%	0.1%	0.2%

Rebuilding Strategy and Discount Rate	**Florida Keys – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Florida Keys - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$16	$20	$23	$18	$12	$13	$23
% Change in NOR	N/A	N/A	N/A	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%

The information at the state-level provides more insight into which rebuilding strategy would be preferable. In the state-level analysis each rebuilding alternative is evaluated within its proposed time frame. Alternatives 2-4 are evaluated over a period of ten years while alternatives 5 and 6 are evaluated over a time horizon of seven and eight years, respectively. Alternatives 5 and 6 are also discounted over ten years for comparison among alternatives. The change in NOR reported in the table should not be compared across alternatives when the time frames are different although a comparison of the benefits of each rebuilding plan over the ten year horizon is valid. The percentage change is comparable across rebuilding alternatives for different time periods as this statistic is a relative measure of the change in NOR associated with each alternative and a comparable baseline estimate under the same time horizon.

Again, Alternative 2 is economically superior to the other alternatives due to the amount of additional NOR that is expected to be generated in a particular time horizon. Also, in all cases fishers who land their catch in North Carolina are expected to benefit the greatest relative to fishers in other states. Only fishers in Georgia and northeast Florida are expected to lose a relatively small amount of NOR (not more than $40,000). This reinforces that Alternative 2 is not only globally (i.e. industry-wide) superior from an economic perspective but also regionally superior. The predicted benefits of Alternative 2 are greater than those of all the other alternatives as well. This is strong evidence from an economic perspective about the superiority of Alternative 2 to the other alternatives. Preferred Alternative 3 ranks third behind Alternatives 2 and 6. Finally, fishers in Georgia and Florida are predicted to only receive relatively minor benefits from the proposed rebuilding plans. The most generated by these fishers would be $32,000 by central south Florida boats under Alternative 2.

The changes in the net present values of NOR by primary gear type to the commercial sector associated with the rebuilding strategy alternatives proposed in Action 4 are presented in Table 5. We define the primary gear for a trip as that which produced a plurality of revenues on a trip. The vertical line sector includes all hook and line gear including handlines, electric and bandit gears, and troll lines. The diving sector includes both spears and powerhead gear. Fishers primarily using other gears are projected to not be affected by the red grouper legislation. Table 5 organizes these changes into three separate time horizons, seven, eight, and ten years, with an assumed discount rate of seven percent. The projected NOR streams of all the proposed rebuilding strategies (i.e

Alternatives 2-6) created by the proposed ACLs and projected biomass figures were discounted over a period of ten years while NOR streams associated with Alternatives 5 and 6 were also discounted over a period of seven and eight years, respectively.

Table 5 suggests that most of the benefits from the rebuilding strategy alternatives will accrue to the vertical line fishers, especially those who utilize hook-and-line and bandit gears. Assuming a discount rate of seven percent, Alternative 2 creates the most benefits totaling $1,516,000 to the vertical line sector and $21,000 to the diving sector over a period of ten years. The rankings of the other alternatives are the same as the previous analyses above. Alternatives 3 and 6 are the next best alternatives, followed by Alternative 5. Alternative 4 accrues the least benefits.

Table 5. Net present value of changes in net operating revenues (NOR) by primary gear to the commercial sector associated with the rebuilding strategy alternatives in Action 4 over time horizons of seven, eight, and ten years, assuming ACL=ABC, 44% commercial allocation, no commercial sector ACT, and a discount rate of 7%. Dollar amounts are in thousand 2010 dollars.

Rebuilding Strategy and Discount Rate	**Vertical Lines – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Vertical Lines - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$871	$1,110	$1,516	$1,276	$851	$1,142	$1,317
% Change in NOR	N/A	N/A	N/A	2.3%	2.7%	3.1%	2.6%	1.7%	2.3%	2.7%
Rebuilding Strategy and Discount Rate	**Diving – 7 (Alt 5)- or 8 (Alt 6)-Year Horizon**					**Diving - 10-Year Horizon**				
	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
Change in NOR	N/A	N/A	N/A	$13	$17	$21	$19	$12	$18	$20
% Change in NOR	N/A	N/A	N/A	0.5%	0.6%	0.6%	0.5%	0.3%	0.5%	0.6%

The No-Action Alternative for Action 5

The No-Action Alternative for Action 5 (alternative sector allocations) is also defined by the predicted outcomes of rules specified in Amendments 13C, 15A, 16, 17A, 17B, Regulatory Amendment 10, and the Comprehensive ACL Amendment. The preferred alternatives from Actions 4, 6, and 7 of Amendment 24 are incorporated into the analysis.

Figure 2 illustrates the projected net operating revenues using simulated fishery landings for the regulatory period (2011-2020) that comprise the No-Action Alternative for the proposed allocation plans in Action 5 of Amendment 24. In the simulations for Action 5 we set the combined commercial and recreational allocations equal to the ABC s that are specified by Alternative 3 in Action 4 (75%F_{MSY}). This rule represents the preferred alternatives in Actions 4, 6, and 7. The “No Action” allocation rate was calculated at 44% to the commercial sector, which was based on historical data from the Accumulated Landings Database and was the rate used in Amendment 17B economic analyses. Additionally, for ease of comparison the preferred rebuilding strategy in Action 4 (Preferred Alternative 3) was assumed for the No Action alternative. Table 6 shows the net present value of future cash flows of net operating revenues under the No-Action Alternative for Action 5 of Amendment 24 with alternative discount rates assumed for time horizons of seven, eight, and ten years.

Figure 2. Projected net operating revenues (millions of 2010 dollars) for the regulatory period (2011-2020) that comprise the No-Action Alternative for Action 5 of Amendment 24.

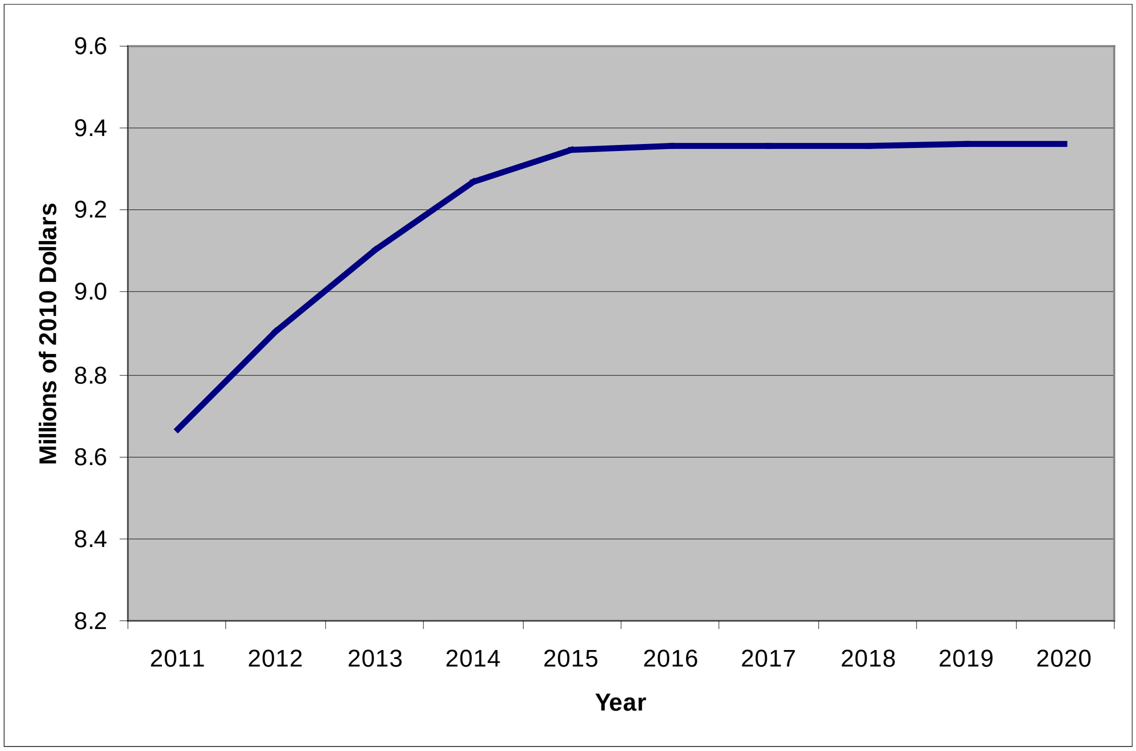

Table 6. Projected net present value (NPV) of future flows of net operating revenues (NOR)(millions of 2010 dollars) that comprise the No-Action Alternative for Action 5 of Amendment 24 with alternative discount rates assumed for a time horizons of ten years.

Time Horizon	NPV of Future Flows of NOR under Alternative Discount Rates (millions of 2010 dollars)			
	0%	3%	7%	
10 Years	$92.08	$78.41	$64.40	

The management alternatives associated with Action 5 that are proposed in Amendment 24 are listed below. Alternative 1 is the No-Action Alternative and reflects regulations currently in place for the snapper-grouper fishery along with preferred alternatives in Actions 4, 6, and 7 from Amendment 24. The no-action allocation which was the implied allocation used in the analysis for Amendment 17B is 44% of red grouper landings to the commercial sector.

Action 5: Allocations

Alternative 1 (No action). Do not establish a sector allocation of the red grouper annual catch limit (ACL).

Alternative 2 (Preferred). Specify allocations for the commercial and recreational sectors based on criteria as outlined in one of the following options below.

> **Subalternative 2a**. Commercial = 52% and recreational = 48% (Established by using catch history from 1986-2008).
>
> **Subalternative 2b**. Commercial = 54% and recreational = 46% (Established by using catch history from 1986-1998).
>
> **Subalternative 2c**. Commercial = 49% and recreational = 51% (Established by using catch history from 1999-2008).
>
> **Subalternative 2d**. Commercial = 41% and recreational = 59% (Established by using catch history from 2006-2008).
>
> **Subalternative 2e (Preferred)**. Commercial = 44% and recreational = 56% (Established by using 50% of catch history from 1991-2008 + 50% of catch history from 2006-2008).

Economic Effects of Proposed Management Measures for Red Grouper in Action 5

The results from the economic analysis for Action 5 are summarized in Table 7. The net present values of changes in NOR to the commercial sector associated with the allocation alternatives proposed in Action 5 are presented in Table 7. Table 7 compares these changes assuming the preferred rebuilding strategy (Alternative 3) proposed in Action 4 for various discount rates. The projected NOR streams created by the proposed ACLs and projected biomass figures derived from the preferred rebuilding strategy were discounted over a period of ten years.

When the different allocation ratios are analyzed, it should be no surprise that predicted changes in the net present value of future NOR streams get larger as the commercial allocation increases; however, determining an optimal allocation rate is outside the scope of this analysis. Since the preferred option of Subalternative 2e equals the historical allocation rate from 2005-2009, the simulation model does not predict any effects by adopting a 44% commercial allocation ratio. Alternative 3 from Action 4 results in streams of NOR equaling $64,401,000 over ten years assuming a discount rate of 7% (Table 6).

Table 7. Net present value of changes in net operating revenues (NOR) to the commercial sector associated with the various allocation alternatives in Action 5 over a time horizon of ten years, assuming ACL=ABC, no commercial sector ACT, and using different discount rates. Dollar amounts are in million 2010 dollars.

	Sector Allocation of Commercial ACL				
Rebuilding Strategy	Subalternative 2a	Subalternative 2b	Subalternative 2c	Subalternative 2d	Subalternative 2e (Preferred)
	Comm. – 52% Rec. – 48%	Comm. – 54% Rec. – 46%	Comm. – 49% Rec. – 51%	Comm. – 41% Rec. – 59%	Comm. – 44% Rec. – 56%
	Net Present Value of Changes in NOR – 0% Discount Rate				
75%F_{MSY}	$0.99	$1.19	$0.67	-$0.45	$0.0
	Net Present Value of Changes in NOR – 3% Discount Rate				
75%F_{MSY}	$0.83	$0.99	$0.56	-$0.37	$0.0
	Net Present Value of Changes in NOR – 7% Discount Rate				
75%F_{MSY}	$0.66	$0.79	$0.45	-$0.30	$0.0

The management alternatives associated with Action 6 that are proposed in Amendment 24 are listed below. Alternative 1 is the No-Action Alternative and reflects regulations currently in place for the snapper-grouper fishery along with preferred alternatives in Actions 4, 5, and 7 from Amendment 24. These figures are the five-year averages based on historical logbook data from 2005-2009. Alternatives 2-4 propose alternative ACLs for red grouper while Alternative 5 proposes to eliminate the aggregate quota for red, black, and gag groupers in the south Atlantic snapper-grouper fishery.

Action 6: Specify Annual Catch Limits and Optimum Yield

Alternative 1 (No Action). Do not specify an individual ACL for red grouper. An individual ACL is currently not in place for red grouper. Retain aggregate recreational and commercial ACLs for black grouper, red grouper, and gag. The commercial sector ACL for gag, black grouper, and red grouper is 662,403 lbs gw (781,636 lbs ww) and 648,663 lbs gw (765,422 lbs ww) for the recreational sector. The total group ACL is 1,311,066 lbs gw (1,547,058 lbs ww). These values are equivalent to the expected catch resulting from the implementation of management measures for red grouper in Amendment 16 and specified in Amendment 17B.

Alternative 2 (Preferred). ACL = OY = ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond . The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 3. ACL = OY = 90% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 4. ACL = OY = 80% of the ABC. Specify commercial and recreational ACLs for red grouper for 2012, 2013, and 2014 and beyond. The ACL for 2014 would remain in effect until modified. ACLs in 2013 and 2014 will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL.

Alternative 5 (Preferred). Eliminate the commercial sector aggregate ACL of 662,403 lbs gw for black grouper, gag, and red grouper. Eliminate the in-season AM that specifies a prohibition on possession of all shallow water groupers once the commercial aggregate ACL is projected to be met.

Table 8. Net present value of net operating revenues (NOR) to the commercial sector associated with the ACL alternatives in Action 6 over a time horizon of ten years, assuming the preferred rebuilding path in Action 4 (Alternative 3), 44% commercial allocation, no commercial sector ACT, and using different discount rates. Dollar amounts are in million 2010 dollars.

	Specification of Alternative Commercial ACLs				
	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Rebuilding Strategy	No Action	(Preferred) ACL = ABC	ACL = 90%ABC	ACL = 80%ABC	(Preferred) Eliminate aggregate quota
	Net Present Value of NOR Streams – 0% Discount Rate				
75%F_{MSY}	\$91.68	\$92.08	\$91.40	\$90.72	\$92.08
	Net Present Value of NOR Streams – 3% Discount Rate				
75%F_{MSY}	\$78.11	\$78.41	\$77.84	\$77.25	\$78.41
	Net Present Value of NOR Streams – 7% Discount Rate				
75%F_{MSY}	\$64.22	\$64.40	\$63.94	\$63.46	\$64.40

Preferred Alternative 2 which equates the ACL to the ABC defined by the preferred rebuilding strategy (Action 4 – Alternative 3) is predicted to generate an additional $180,000 in NOR when compared to the No Action Alternative 1 over ten years and assuming a discount rate of 7%. If the ACL is set at 90% of the ABC then fishermen are expected to lose $280,000 over the same ten year period. If the ACL is set at 80% of the ABC losses are expected to total $760,000 over a ten year period and assuming a discount rate of 7%.

The dissolution of the aggregate quota for red, gag, and black is not expected to have any effect on the commercial fleet. Since we have constrained landings of shallow water groupers to zero during the first four months of the year the aggregate quota is not predicted to be met based on model simulations. However, if fishers change their behavior and fish more in the remaining eight months then the aggregate quota may be met and a reduction in benefits would be expected.

The management alternatives associated with Action 7 that are proposed in Amendment 24 are listed below. Alternative 1 is the No-Action Alternative and reflects regulations currently in place for the snapper-grouper fishery along with preferred alternatives in Actions 4, 5, and 6 from Amendment 24. Subalternatives 2a-2c propose alternative AMs for red grouper.

Action 7: Specify a Commercial ACT for Red Grouper

Alternative 1 (No Action) (Preferred). Do not specify a commercial ACT for red grouper. Currently, there is no commercial ACT for red grouper (The proposed commercial ACL would equal 284,680 pounds whole weight in 2012 but would change in 2013 and 2014 as long as the total ACL is not exceeded)

Alternative 2. The commercial ACT equals 90% of the commercial ACL (The proposed commercial ACT would equal 256,212 pounds whole weight in 2012 but would change in 2013 and 2014 as long as the total ACL is not exceeded)

Alternative 3. The commercial ACT equals 80% of the commercial ACL (The proposed commercial ACT would equal 227,744 pounds whole weight in 2012 but would change in 2013 and 2014 as long as the total ACL is not exceeded)

Table 9. Net present value of net operating revenues (NOR) to the commercial sector associated with the AM alternatives in Action 7 over a time horizon of ten years, assuming the preferred rebuilding path in Action 4 (Alternative 3), 44% commercial allocation, ACL=ABC, and using different discount rates. Dollar amounts are in million 2010 dollars.

	Specification of Alternative Commercial AMs				
Rebuilding Strategy	Alternative 1	Subalternative 2a	Subalternative 2b	Subalternative 2c	
	No Action	(Preferred) No Comm. ACT	ACT = 90%ACL	ACT = 80%ACL	
	Net Present Value of NOR Streams – 0% Discount Rate				
75%F_{MSY}	$92.08	$92.08	$91.40	$90.72	
	Net Present Value of NOR Streams – 3% Discount Rate				
75%F_{MSY}	$78.41	$78.41	$77.84	$77.25	
	Net Present Value of NOR Streams – 7% Discount Rate				
75%F_{MSY}	$64.40	$64.40	$63.94	$63.46	

Preferred Alternative 2 which equates the ACT to the ACL defined by the preferred rebuilding strategy (Action 4 – Alternative 3) would generate the same benefits to commercial fishers as the No Action Alternative. If the ACT is set at 90% of the ACL then fishermen are predicted to lose $460,000 over the ten year period. If the ACL is set at 80% of the ABC losses are expected to total $940,000 over a ten year period and assuming a discount rate of 7%.

Conclusion

The primary purpose of Amendment 24 is to implement the rebuilding plan for red grouper utilizing regulatory mechanisms such as rebuilding schedules, allocations and annual catch limits. A bioeconomic simulation model was used to calculate the expected economic effects of the proposed management alternatives in Amendment 24 for the commercial snapper-grouper fishery from North Carolina through the Atlantic side of the Florida Keys. Results were presented as projected simulations based on trip-level logbook data from 2005-2009.

The analysis suggests that from an industry-wide perspective Alternative 2 is economically superior to the other rebuilding strategy alternatives presented in Action 4. Alternatives 6 and 3 provide the second and third highest economic benefits, respectively. The least favorable alternative to the commercial fleet is Alternative 4.

Alternative 2 is economically superior to the other alternatives from a geographic perspective. Also, in all cases fishers who land their catch in North Carolina are expected to benefit the greatest relative to fishers in other states. Also, almost all benefits will accrue to the vertical line component of the commercial fishery.

APPENDIX I

Economic Effects of Amendment 24 to the Snapper Grouper Fishery Management Plan on the Recreational Sector

Introduction

The methodology employed in this assessment follows the methodology used in assessing the economic effects of the South Atlantic Comprehensive ACL Amendment (SAFMC 2011) and the Gulf Generic ACL Amendment (GMFMC 2011) on the recreational sector. Detailed discussions of the methodology may be found in those amendments and are incorporated herein by reference. A general description of this methodology is provided below.

This assessment evaluated the expected change in economic value relative to the no action alternative. The change in economic value is measured in terms of the consumer surplus (CS) to recreational anglers. The relatively sparse number of target trips for red grouper by anglers fishing through the for-hire vessels precluded the estimation of effects on the net operating revenues (NOR) of for-hire vessels. 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 an appropriate measure of economic effects on recreational anglers as a result of changes in fishing regulations.

In order to take account of certain direct relationships among the alternatives, the current economic assessment evaluated the combined effects of the rebuilding, allocation, and ACL alternatives. As the case with the economic assessment of the effects on the commercial sector, several scenarios were analyzed reflecting the various combinations of the alternatives.

The analysis relied on several key assumptions. In general, the historical fishery performance in 2005-2009 was considered to define the key components of the no action or baseline alternative. However, the landings component of this general assumption was modified because a January-April seasonal closure to recreational harvest of black grouper, gag, and red grouper was implemented through Amendment 16 starting in 2010. One possible baseline landing is the 2009 red grouper landing for May through December, as shown in Table 4-10. Landings in 2009, however, appear to be very low relative to landings in the last five years. Recreational red grouper landings steadily rose from 299,116 lb ww in 2005 to a peak of 1,099,141 lb ww in 2008, and then abruptly fell to 283,565 lb ww in 2009. The 2005-2009 average recreational red grouper landings stood at 564,213 lb ww. The abrupt fall in recreational red grouper landings in 2009 could be due to a variety of factors, some of which may not be present in the future. There is then a possibility landings could rise in the future although the four-month closure and the overfished status of the stock would still constrain landings below historical levels. Another possible baseline landing is the expected recreational red grouper landings of 326,553 lb ww (276,740 lb gw) under Amendment 16. These are below the 2005-2009 average but come relatively close to the 2009 landings. For the reasons just discussed, the current analysis used the

2009 landings as the baseline landings. This choice of a baseline has more immediate consequence on the estimated magnitude of effects than on the ranking of alternatives. Information from the 2010 fishing year appears to show relatively low recreational landings, so that the estimates in this assessment may understate the true results should future recreational performance mimic that of the 2010 fishing year in the absence of this plan amendment.

Another key assumption is that the recreational allocation (ACL) would be fully taken each year over the 10-year or 7-year rebuilding period. Unless the seasonal closure is modified or anglers shift their effort to the open months, it is possible the increasing allocation would not be fully taken over time. This creates certain issues related to the interpretation of the positive economic results. In general, the approach taken in this analysis is to consider the positive results as potential gains instead of forgone benefits. However, it may be noted that under the assumption that the aggregate ACL for black grouper, gag, and red grouper would remain and become actually constraining, positive results may be interpreted as forgone benefits.

In the particular case of negative economic results, the estimated CS effects would likely be overestimates of actual results. Fishers may shift their effort to target other species or they may undertake non-fishing activities which would reduce the loss in consumer surplus.

The baseline CS value based on several studies was uniform across all fishing sectors, areas, and harvest levels. This may not necessarily be the case. Headboat anglers may value some snapper-grouper species differently, on average, than private and charterboat anglers. The direction and magnitude of such 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. It is also possible CS values vary across geographic areas. No adjustments for these possibilities were introduced in the current analysis. It should also be noted that using an average recreational value per fish would not take into account diminishing returns exhibited in most recreational activities when the volume of the activity increases. This could very well lead to overestimation of CS effects.

The basic data used in determining the changes in CS due to the various alternatives are summarized in Table A-1. The CS values are based on the recent estimates of willingness to pay (CS) for grouper species in the Southeast. The high value is based on Haab et al. (2009), the medium value on Gentner (2009), and the low value on Carter and Liese (2011). All CS values are expressed in 2010 dollars. These are similar values used in the economic analysis of the effects of the Gulf Generic ACL Amendment and the South Atlantic Comprehensive ACL Amendment. The pound per fish for each sector is the 2005-2009 average pounds per red grouper. Applying this range of CS values on the entire recreational sector composed of private and for-hire anglers may not be entirely accurate. As noted in the previous paragraph, CS values could differ among anglers using various fishing platforms so that the range of CS values could also differ among these anglers. In the absence, however, of better information, this range of CS values was used to generate the CS effects on the entire recreational sector due to the management measures considered in this amendment.

Table A-1. Consumer surplus (CS) and pounds per red grouper in 2010 dollars.

Range[1]	Basic CS/Fish	Recreational[2]	
		Pound/Fish	CS/Pound
High	121.94	10.04	12.15
Medium	102.01	10.04	10.17
Low	26.52	10.04	2.64

[1]High CS is based on Haab et al. (2009); medium CS is based on Gentner (2009); and, low CS is based on Carter and Liese (2011).
[2]Pounds per red grouper are 2005-2009 averages.

Results

Presented in the following tables are the changes in CS associated with the rebuilding strategy, allocation, and ACL alternatives. The CS effects are classified into High, Medium, and Low to reflect the range of CS values obtained in the studies cited above.

The CS effects are shown for a 4-year period and a 10-year period. Although the ACLs provided in Tables 2-15 through 2-17 are for 2012, 2013, and 2014 (and onwards), the 4-year horizon as well as the 10-year horizon included 2011 as the starting year of the rebuilding period. The 2011 ACLs were based on the 2011 projected ABCs. Similarly, the ACLs beyond 2014 were based on the projected ABCs for those years.

To enable proper comparison of CS values across all alternatives or combinations of alternatives, net present values of CS that would accrue over time were estimated. A rate of 7 percent was chosen as a discounting factor, although other discounting rates were explored to determine the sensitivity of results. All CS values are expressed in 2010 dollars.

The relative effects of the allocation and rebuilding strategy alternatives are shown in Table A-2a under the condition that ACL is equal to ABC (**Alternative 2**), Table A-2b for ACL equal to 90 percent of ABC (**Alternative 3**), and Table A-2c for ACL equal to 80 percent of ABC (**Alternative 4**). A 7-percent discount rate was used in generating these tables.

When ACL is equated to ABC (Table A-2a), all rebuilding strategies would result in positive CS changes under any of the allocation alternatives, except for the 65%F_{MSY}. For this rebuilding strategy, the recreational sector would experience CS reductions over the first four years of the rebuilding period and only under the lowest recreational allocation ratio (46%). This negative effect, however, would turn positive over a ten-year horizon. At an ACL equal to 90 percent of ABC, $F_{REBUILD}$ (7 years) and 65%F_{MSY} would result in CS reductions under some allocation alternatives over a four-year period. However, all the effects would turn positive over a ten-year period. Under an ACL equal to 80 percent of ABC, all rebuilding strategies would result in CS reduction over a four-year period under most allocation alternatives. Again, all these effects would turn positive over a ten-year period, except for the 65%F_{MSY} rebuilding strategy at the lowest recreational allocation ratio.

The effects across rebuilding strategies, given any ACL, allocation alternative, and timeframe provide a measure for consistent ranking of alternatives. Regardless of the allocation or ACL alternatives or time horizon, $F_{REBUILD}$ (10 years) would consistently rank first, followed by $F_{REBUILD}$ (8 years), 75%F_{MSY}, $F_{REBUILD}$ (7 years), and 65%F_{MSY}. At the current preferred alternative for rebuilding strategy of 75%F_{MSY}, increases in CS (HIGH) over a four-year horizon would range from $1.08 million under the lowest recreational allocation ratio to $4.69 million under the highest recreational allocation ratio, given an ACL equal to ABC. The corresponding range over a ten-year period would be $7.26 million to $16.15 million. Naturally, the CS changes would be smaller but positive at lower ACLs.

For each rebuilding strategy, the CS changes would directly correlate with the size of the recreational allocation. That is, the larger the recreational allocation of the total ACL, the larger would be the expected change in CS. This result would hold true regardless of the ACL chosen and whether a 4-year or 10-year horizon was considered. For example, at $F_{REBUILD}$ (10 years) with ACL equal to ABC, the CS change (HIGH) would range from $1.94 million under the lowest allocation of 46 percent to $5.79 million under the highest allocation of 59 percent over four years, or from $8.76 million to $18.07 million over ten years (Table A-2a). At $F_{REBUILD}$ (10 years) and ACL equal to 90 percent of ABC, the CS change (HIGH) over four years would range from $0.58 million to $4.04 million, or from $5.46 million to $13.85 million over ten years (Table A-2b). The corresponding ranges in CS change (HIGH) with ACL equal to 80 percent of ABC would be -$0.78 million to $2.30 million over four years and $2.17 million to $9.62 million over ten years (Table A-2c). Thus, regardless of the rebuilding strategy, ACL alternative, and timeframe, the allocation alternatives may be ranked in descending order as follows: Alternative 2d, Alternative 2e, Alternative 2c, Alternative 2a, and Alternative 2b. At the current preferred allocation alternative of 56 percent for the recreational sector, the CS change (HIGH) over a four-year period would range from $2.23 million under 65%$F_{MSY}$ to $4.90 million under $F_{REBUILD}$ (10 years), given an ACL equal to ABC. The corresponding range over a ten-year period would be $11.10 million to $15.92 million. As may be expected, CS effects would be smaller at lower ACLs.

Table A-2a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=ABC** and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}$(10)	\$2.54	\$1.94	\$3.42	\$5.79	\$4.90	\$10.19	\$8.76	\$12.34	\$18.07	\$15.92
75%F_{MSY}	\$1.64	\$1.08	\$2.47	\$4.69	\$3.86	\$8.62	\$7.26	\$10.68	\$16.15	\$14.10
65%F_{MSY}	\$0.25	-\$0.25	\$0.99	\$2.98	\$2.23	\$6.06	\$4.80	\$7.95	\$12.99	\$11.10
$F_{REBUILD}$(7)	\$1.10	\$0.57	\$1.90	\$4.03	\$3.23	\$7.66	\$6.33	\$9.65	\$14.96	\$12.97
$F_{REBUILD}$(8)	\$1.77	\$1.21	\$2.61	\$4.85	\$4.01	\$8.87	\$7.49	\$10.94	\$16.45	\$14.38
	Medium									
$F_{REBUILD}$(10)	\$2.12	\$1.63	\$2.86	\$4.84	\$4.10	\$8.53	\$7.33	\$10.32	\$15.12	\$13.32
75%F_{MSY}	\$1.37	\$0.91	\$2.07	\$3.92	\$3.23	\$7.21	\$6.07	\$8.93	\$13.51	\$11.79
65%F_{MSY}	\$0.21	-\$0.21	\$0.83	\$2.49	\$1.87	\$5.07	\$4.01	\$6.65	\$10.87	\$9.29
$F_{REBUILD}$(7)	\$0.92	\$0.48	\$1.59	\$3.37	\$2.70	\$6.41	\$5.30	\$8.08	\$12.52	\$10.85
$F_{REBUILD}$(8)	\$1.48	\$1.01	\$2.18	\$4.06	\$3.36	\$7.42	\$6.27	\$9.15	\$13.76	\$12.03
	Low									
$F_{REBUILD}$(10)	\$0.55	\$0.42	\$0.74	\$1.26	\$1.07	\$2.22	\$1.91	\$2.68	\$3.93	\$3.46
75%F_{MSY}	\$0.36	\$0.24	\$0.54	\$1.02	\$0.84	\$1.88	\$1.58	\$2.32	\$3.51	\$3.07
65%F_{MSY}	\$0.05	-\$0.05	\$0.22	\$0.65	\$0.49	\$1.32	\$1.04	\$1.73	\$2.83	\$2.41
$F_{REBUILD}$(7)	\$0.24	\$0.12	\$0.41	\$0.88	\$0.70	\$1.67	\$1.38	\$2.10	\$3.25	\$2.82
$F_{REBUILD}$(8)	\$0.39	\$0.26	\$0.57	\$1.06	\$0.87	\$1.93	\$1.63	\$2.38	\$3.58	\$3.13

Table A-2b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=90% of ABC** and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$1.11	$0.58	$1.91	$4.04	$3.25	$6.75	$5.46	$8.69	$13.85	$11.91
$75\%F_{MSY}$	$0.31	-$0.19	$1.06	$3.05	$2.30	$5.34	$4.11	$7.19	$12.11	$10.27
$65\%F_{MSY}$	-$0.94	-$1.39	-$0.27	$1.51	$0.84	$3.03	$1.90	$4.74	$9.27	$7.57
$F_{REBUILD}(7)$	-$0.17	-$0.65	$0.54	$2.46	$1.74	$4.48	$3.28	$6.27	$11.05	$9.25
$F_{REBUILD}(8)$	$0.43	-$0.08	$1.18	$3.20	$2.44	$5.56	$4.32	$7.42	$12.38	$10.52
	Medium									
$F_{REBUILD}(10)$	$0.93	$0.49	$1.60	$3.38	$2.72	$5.65	$4.57	$7.27	$11.58	$9.96
$75\%F_{MSY}$	$0.26	-$0.16	$0.88	$2.55	$1.93	$4.47	$3.44	$6.01	$10.13	$8.59
$65\%F_{MSY}$	-$0.79	-$1.16	-$0.23	$1.27	$0.70	$2.54	$1.59	$3.96	$7.76	$6.33
$F_{REBUILD}(7)$	-$0.15	-$0.55	$0.45	$2.06	$1.46	$3.74	$2.74	$5.24	$9.24	$7.74
$F_{REBUILD}(8)$	$0.36	-$0.06	$0.99	$2.68	$2.04	$4.65	$3.62	$6.21	$10.36	$8.80
	Low									
$F_{REBUILD}(10)$	$0.24	$0.13	$0.42	$0.88	$0.71	$1.47	$1.19	$1.89	$3.01	$2.59
$75\%F_{MSY}$	$0.07	-$0.04	$0.23	$0.66	$0.50	$1.16	$0.89	$1.56	$2.63	$2.23
$65\%F_{MSY}$	-$0.21	-$0.30	-$0.06	$0.33	$0.18	$0.66	$0.41	$1.03	$2.02	$1.65
$F_{REBUILD}(7)$	-$0.04	-$0.14	$0.12	$0.53	$0.38	$0.97	$0.71	$1.36	$2.40	$2.01
$F_{REBUILD}(8)$	$0.09	-$0.02	$0.26	$0.70	$0.53	$1.21	$0.94	$1.61	$2.69	$2.29

Table A-2c. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=80% of ABC** and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-$0.31	-$0.78	$0.40	$2.30	$1.59	$3.31	$2.17	$5.03	$9.62	$7.90
75%F_{MSY}	-$1.02	-$1.47	-$0.36	$1.42	$0.75	$2.06	$0.96	$3.70	$8.08	$6.44
65%F_{MSY}	-$2.14	-$2.53	-$1.54	$0.05	-$0.55	$0.01	-$1.00	$1.52	$5.55	$4.04
$F_{REBUILD}(7)$	-$1.45	-$1.88	-$0.81	$0.89	$0.25	$1.29	$0.23	$2.88	$7.13	$5.54
$F_{REBUILD}(8)$	-$0.92	-$1.37	-$0.25	$1.55	$0.87	$2.25	$1.15	$3.91	$8.32	$6.66
	Medium									
$F_{REBUILD}(10)$	-$0.26	-$0.65	$0.34	$1.92	$1.33	$2.77	$1.81	$4.21	$8.05	$6.61
75%F_{MSY}	-$0.86	-$1.23	-$0.30	$1.18	$0.63	$1.72	$0.81	$3.10	$6.76	$5.38
65%F_{MSY}	-$1.79	-$2.12	-$1.29	$0.04	-$0.46	$0.01	-$0.84	$1.27	$4.65	$3.38
$F_{REBUILD}(7)$	-$1.21	-$1.57	-$0.68	$0.74	$0.21	$1.08	$0.19	$2.41	$5.97	$4.63
$F_{REBUILD}(8)$	-$0.77	-$1.14	-$0.21	$1.29	$0.73	$1.89	$0.96	$3.27	$6.96	$5.57
	Low									
$F_{REBUILD}(10)$	-$0.07	-$0.17	$0.09	$0.50	$0.35	$0.72	$0.47	$1.09	$2.09	$1.72
75%F_{MSY}	-$0.22	-$0.32	-$0.08	$0.31	$0.16	$0.45	$0.21	$0.80	$1.76	$1.40
65%F_{MSY}	-$0.46	-$0.55	-$0.34	$0.01	-$0.12	$0.00	-$0.22	$0.33	$1.21	$0.88
$F_{REBUILD}(7)$	-$0.32	-$0.41	-$0.18	$0.19	$0.05	$0.28	$0.05	$0.63	$1.55	$1.20
$F_{REBUILD}(8)$	-$0.20	-$0.30	-$0.05	$0.34	$0.19	$0.49	$0.25	$0.85	$1.81	$1.45

The ACT alternatives in this amendment are stated as some percent of the recreational ACL. If ACTs are used to trigger AMs, then ACTs would have economic implications on the recreational sector that would likely be more restrictive than those of the ACLs. For the current analysis, ACTs are assumed to have similar effects as ACLs in terms of constraining the harvest of red grouper. In this sense, the economic effects of ACTs may be analyzed in similar fashion as above.

Including the no action alternative, there are four ACT alternatives considered. The no action alternative is assumed to provide an ACT equal to ACL. For the current analysis, only the effects of ACTs under the condition that ACL is equal to ABC are evaluated. The nature of effects of the ACT alternatives, including the ranking of alternatives, would not change under other ACL values, although the magnitudes would be different. One alternative would set the ACT equal to 85 percent of ACL, another would set the ACT at 75% of ACL, and the last would set the ACT equal to (1-PSE) or 50 percent of ACL, whichever is larger. The estimated PSE is around 0.25, so the ACT under this last alternative would equal to 75 percent of ACL. In effect then, there are only two ACT alternatives exclusive of the no action alternative, namely, 85 percent of ACL and 75 percent of ACL. The economic effects of these two alternatives, using a

7 percent discount rate, are presented in Table A-3a and Table A-3b. These effects are expressed in 2010 dollars.
Under an ACT equal to 85 percent of ACL, negative CS changes would occur for all rebuilding strategies over a four-year period, particularly at the lower recreational allocation ratios (Table A-3a). Over a ten-year period, all effects would be positive for all rebuilding strategies and allocation alternatives. More and larger negative effects would result when the ACT is set equal to 75 percent of ACL (Table A-3b). Some of these negative effects would even persist over a ten-year period, particularly for the 65%F_{MSY} and $F_{REBUILD}$ (7 years) and to some extent, $F_{REBUILD}$ (8years), at lower recreational allocation ratios. Given the preferred alternatives for rebuilding strategy (75%F_{MSY}) and allocation ratio (56%), the CS change would amount to $1.53 million over four years or $8.35 million over ten years under an ACT equal to 85 percent of ACL. The corresponding CS change under an ACT equal to 75 percent of ACL would be -$.03 million over four years or $4.52 million over ten years. It can only be expected that an ACT equal to 85 percent of ACL would yield better economic results than an ACT equal to 75 percent of ACL.

Table A-3a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming ACL=ABC, **ACT=.85% of ACL**, and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}$(10)	$0.40	-$0.10	$1.16	$3.17	$2.42	$5.03	$3.81	$6.86	$11.73	$9.91
75%F_{MSY}	-$0.36	-$0.83	$0.35	$2.23	$1.53	$3.70	$2.54	$5.44	$10.09	$8.35
65%F_{MSY}	-$1.54	-$1.96	-$0.91	$0.78	$0.15	$1.52	$0.45	$3.13	$7.41	$5.81
$F_{REBUILD}$(7)	-$0.81	-$1.27	-$0.14	$1.67	$1.00	$2.88	$1.75	$4.57	$9.09	$7.40
$F_{REBUILD}$(8)	-$0.25	-$0.72	$0.47	$2.37	$1.66	$3.91	$2.74	$5.67	$10.35	$8.59
	Medium									
$F_{REBUILD}$(10)	$0.34	-$0.08	$0.97	$2.65	$2.02	$4.21	$3.19	$5.74	$9.81	$8.29
75%F_{MSY}	-$0.30	-$0.69	$0.29	$1.87	$1.28	$3.10	$2.12	$4.55	$8.44	$6.99
65%F_{MSY}	-$1.29	-$1.64	-$0.76	$0.65	$0.12	$1.27	$0.37	$2.62	$6.20	$4.86
$F_{REBUILD}$(7)	-$0.68	-$1.06	-$0.11	$1.40	$0.83	$2.41	$1.47	$3.83	$7.60	$6.19
$F_{REBUILD}$(8)	-$0.21	-$0.60	$0.39	$1.99	$1.39	$3.27	$2.29	$4.74	$8.66	$7.19
	Low									
$F_{REBUILD}$(10)	$0.09	-$0.02	$0.25	$0.69	$0.53	$1.09	$0.83	$1.49	$2.55	$2.15
75%F_{MSY}	-$0.08	-$0.18	$0.08	$0.49	$0.33	$0.80	$0.55	$1.18	$2.20	$1.82
65%F_{MSY}	-$0.34	-$0.43	-$0.20	$0.17	$0.03	$0.33	$0.10	$0.68	$1.61	$1.26
$F_{REBUILD}$(7)	-$0.18	-$0.28	-$0.03	$0.36	$0.22	$0.63	$0.38	$1.00	$1.98	$1.61
$F_{REBUILD}$(8)	-$0.05	-$0.16	$0.10	$0.52	$0.36	$0.85	$0.60	$1.23	$2.25	$1.87

Table A-3b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming ACL=ABC, **ACT=75% of ACL**, and using a 7% discount rate. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-\$1.02	-\$1.46	-\$0.35	\$1.43	\$0.76	\$1.59	\$0.52	\$3.21	\$7.50	\$5.89
$75\%F_{MSY}$	-\$1.69	-\$2.11	-\$1.07	\$0.60	-\$0.03	\$0.42	-\$0.61	\$1.96	\$6.06	\$4.52
$65\%F_{MSY}$	-\$2.73	-\$3.11	-\$2.17	-\$0.68	-\$1.24	-\$1.51	-\$2.45	-\$0.09	\$3.69	\$2.28
$F_{REBUILD}(7)$	-\$2.09	-\$2.49	-\$1.49	\$0.10	-\$0.49	-\$0.30	-\$1.30	\$1.19	\$5.17	\$3.68
$F_{REBUILD}(8)$	-\$1.59	-\$2.01	-\$0.96	\$0.72	\$0.09	\$0.60	-\$0.43	\$2.15	\$6.29	\$4.74
	Medium									
$F_{REBUILD}(10)$	-\$0.85	-\$1.22	-\$0.29	\$1.19	\$0.64	\$1.33	\$0.43	\$2.68	\$6.28	\$4.93
$75\%F_{MSY}$	-\$1.41	-\$1.76	-\$0.89	\$0.50	-\$0.02	\$0.35	-\$0.51	\$1.64	\$5.07	\$3.78
$65\%F_{MSY}$	-\$2.29	-\$2.60	-\$1.82	-\$0.57	-\$1.04	-\$1.26	-\$2.05	-\$0.07	\$3.09	\$1.90
$F_{REBUILD}(7)$	-\$1.75	-\$2.08	-\$1.25	\$0.09	-\$0.41	-\$0.25	-\$1.09	\$1.00	\$4.33	\$3.08
$F_{REBUILD}(8)$	-\$1.33	-\$1.68	-\$0.80	\$0.60	\$0.08	\$0.50	-\$0.36	\$1.80	\$5.26	\$3.96
	Low									
$F_{REBUILD}(10)$	-\$0.22	-\$0.32	-\$0.08	\$0.31	\$0.17	\$0.35	\$0.11	\$0.70	\$1.63	\$1.28
$75\%F_{MSY}$	-\$0.37	-\$0.46	-\$0.23	\$0.13	-\$0.01	\$0.09	-\$0.13	\$0.43	\$1.32	\$0.98
$65\%F_{MSY}$	-\$0.59	-\$0.68	-\$0.47	-\$0.15	-\$0.27	-\$0.33	-\$0.53	-\$0.02	\$0.80	\$0.50
$F_{REBUILD}(7)$	-\$0.45	-\$0.54	-\$0.32	\$0.02	-\$0.11	-\$0.07	-\$0.28	\$0.26	\$1.12	\$0.80
$F_{REBUILD}(8)$	-\$0.35	-\$0.44	-\$0.21	\$0.16	\$0.02	\$0.13	-\$0.09	\$0.47	\$1.37	\$1.03

Use of Other Discount Rates

To determine the sensitivity of the foregoing results to the choice of a discount rate, the CS changes were re-estimated using two other discount rates. For this purpose, the five tables above were replicated using discount rates of 5 percent and 3 percent. Results using 5 percent discount rate are presented in Tables A-3a through A-3c for ACL-based analysis and Tables 6a and 6b for ACT-based analysis. Results using a 3 percent discount rate are presented in Tables A-4a through A-4c for ACL-based analysis and Tables 7a and 7b for ACT-based analysis.

The use of other discount rates resulted in changes to the magnitudes of all estimates and the direction of change for some estimates. However, the ranking of alternatives has been preserved.

Table A-4a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=ABC** and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$2.69	$2.07	$3.62	$6.10	$5.17	$11.52	$9.93	$13.90	$20.26	$17.87
75%F_{MSY}	$1.75	$1.17	$2.62	$4.95	$4.08	$9.82	$8.30	$12.09	$18.16	$15.89
65%F_{MSY}	$0.29	-$0.23	$1.07	$3.16	$2.38	$7.02	$5.62	$9.12	$14.72	$12.62
$F_{REBUILD}(7)$	$1.19	$0.63	$2.03	$4.26	$3.42	$8.77	$7.29	$10.98	$16.87	$14.66
$F_{REBUILD}(8)$	$1.89	$1.30	$2.77	$5.12	$4.24	$10.08	$8.55	$12.38	$18.49	$16.20
	Medium									
$F_{REBUILD}(10)$	$2.25	$1.73	$3.03	$5.11	$4.33	$9.64	$8.31	$11.63	$16.95	$14.95
75%F_{MSY}	$1.46	$0.98	$2.19	$4.14	$3.41	$8.21	$6.94	$10.12	$15.19	$13.29
65%F_{MSY}	$0.25	-$0.19	$0.90	$2.64	$1.99	$5.87	$4.70	$7.63	$12.32	$10.56
$F_{REBUILD}(7)$	$0.99	$0.53	$1.70	$3.56	$2.86	$7.33	$6.10	$9.18	$14.12	$12.27
$F_{REBUILD}(8)$	$1.58	$1.09	$2.32	$4.28	$3.55	$8.43	$7.16	$10.35	$15.47	$13.55
	Low									
$F_{REBUILD}(10)$	$0.58	$0.45	$0.79	$1.33	$1.12	$2.51	$2.16	$3.02	$4.41	$3.89
75%F_{MSY}	$0.38	$0.25	$0.57	$1.08	$0.89	$2.13	$1.80	$2.63	$3.95	$3.46
65%F_{MSY}	$0.06	-$0.05	$0.23	$0.69	$0.52	$1.53	$1.22	$1.98	$3.20	$2.74
$F_{REBUILD}(7)$	$0.26	$0.14	$0.44	$0.93	$0.74	$1.91	$1.59	$2.39	$3.67	$3.19
$F_{REBUILD}(8)$	$0.41	$0.28	$0.60	$1.11	$0.92	$2.19	$1.86	$2.69	$4.02	$3.52

Table A-4b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=90% of ABC** and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}$(10)	$1.20	$0.64	$2.03	$4.27	$3.43	$7.71	$6.28	$9.85	$15.57	$13.43
75%F_{MSY}	$0.35	-$0.17	$1.14	$3.23	$2.45	$6.17	$4.81	$8.22	$13.69	$11.64
65%F_{MSY}	-$0.96	-$1.43	-$0.25	$1.62	$0.92	$3.65	$2.39	$5.55	$10.59	$8.70
$F_{REBUILD}$(7)	-$0.15	-$0.66	$0.60	$2.61	$1.86	$5.23	$3.90	$7.22	$12.53	$10.54
$F_{REBUILD}$(8)	$0.48	-$0.05	$1.27	$3.39	$2.59	$6.41	$5.04	$8.48	$13.98	$11.92
	Medium									
$F_{REBUILD}$(10)	$1.00	$0.53	$1.70	$3.57	$2.87	$6.45	$5.25	$8.24	$13.03	$11.23
75%F_{MSY}	$0.29	-$0.14	$0.95	$2.70	$2.05	$5.16	$4.02	$6.88	$11.45	$9.73
65%F_{MSY}	-$0.80	-$1.19	-$0.21	$1.36	$0.77	$3.06	$2.00	$4.64	$8.86	$7.28
$F_{REBUILD}$(7)	-$0.13	-$0.55	$0.50	$2.19	$1.55	$4.37	$3.26	$6.04	$10.48	$8.81
$F_{REBUILD}$(8)	$0.40	-$0.04	$1.06	$2.83	$2.17	$5.36	$4.21	$7.09	$11.70	$9.97
	Low									
$F_{REBUILD}$(10)	$0.26	$0.14	$0.44	$0.93	$0.75	$1.68	$1.37	$2.14	$3.39	$2.92
75%F_{MSY}	$0.08	-$0.04	$0.25	$0.70	$0.53	$1.34	$1.05	$1.79	$2.98	$2.53
65%F_{MSY}	-$0.21	-$0.31	-$0.06	$0.35	$0.20	$0.79	$0.52	$1.21	$2.30	$1.89
$F_{REBUILD}$(7)	-$0.03	-$0.14	$0.13	$0.57	$0.40	$1.14	$0.85	$1.57	$2.72	$2.29
$F_{REBUILD}$(8)	$0.10	-$0.01	$0.28	$0.74	$0.56	$1.39	$1.10	$1.84	$3.04	$2.59

Table A-4c. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=80% of ABC** and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-$0.29	-$0.79	$0.45	$2.44	$1.69	$3.89	$2.62	$5.80	$10.88	$8.98
$75\%F_{MSY}$	-$1.05	-$1.51	-$0.35	$1.52	$0.82	$2.53	$1.32	$4.35	$9.21	$7.39
$65\%F_{MSY}$	-$2.21	-$2.63	-$1.58	$0.08	-$0.54	$0.29	-$0.83	$1.97	$6.46	$4.77
$F_{REBUILD}(7)$	-$1.49	-$1.94	-$0.82	$0.96	$0.29	$1.69	$0.51	$3.46	$8.18	$6.41
$F_{REBUILD}(8)$	-$0.93	-$1.40	-$0.23	$1.65	$0.95	$2.74	$1.52	$4.58	$9.47	$7.64
	Medium									
$F_{REBUILD}(10)$	-$0.25	-$0.66	$0.38	$2.04	$1.42	$3.26	$2.19	$4.85	$9.10	$7.51
$75\%F_{MSY}$	-$0.87	-$1.26	-$0.29	$1.27	$0.68	$2.12	$1.10	$3.64	$7.70	$6.18
$65\%F_{MSY}$	-$1.85	-$2.20	-$1.32	$0.07	-$0.45	$0.24	-$0.69	$1.65	$5.40	$3.99
$F_{REBUILD}(7)$	-$1.25	-$1.62	-$0.69	$0.81	$0.25	$1.42	$0.43	$2.90	$6.84	$5.36
$F_{REBUILD}(8)$	-$0.78	-$1.17	-$0.19	$1.38	$0.79	$2.30	$1.27	$3.83	$7.92	$6.39
	Low									
$F_{REBUILD}(10)$	-$0.06	-$0.17	$0.10	$0.53	$0.37	$0.85	$0.57	$1.26	$2.37	$1.95
$75\%F_{MSY}$	-$0.23	-$0.33	-$0.08	$0.33	$0.18	$0.55	$0.29	$0.95	$2.00	$1.61
$65\%F_{MSY}$	-$0.48	-$0.57	-$0.34	$0.02	-$0.12	$0.06	-$0.18	$0.43	$1.40	$1.04
$F_{REBUILD}(7)$	-$0.32	-$0.42	-$0.18	$0.21	$0.06	$0.37	$0.11	$0.75	$1.78	$1.39
$F_{REBUILD}(8)$	-$0.20	-$0.31	-$0.05	$0.36	$0.21	$0.60	$0.33	$1.00	$2.06	$1.66

Table A-5a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=ABC** and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$2.85	$2.20	$3.83	$6.44	$5.46	$13.08	$11.31	$15.73	$22.81	$20.16
$75\%F_{MSY}$	$1.87	$1.26	$2.79	$5.23	$4.31	$11.22	$9.53	$13.76	$20.53	$17.99
$65\%F_{MSY}$	$0.34	-$0.20	$1.17	$3.36	$2.54	$8.15	$6.59	$10.50	$16.75	$14.41
$F_{REBUILD}(7)$	$1.28	$0.70	$2.16	$4.51	$3.63	$10.07	$8.43	$12.54	$19.12	$16.65
$F_{REBUILD}(8)$	$2.01	$1.40	$2.94	$5.41	$4.49	$11.51	$9.81	$14.07	$20.89	$18.33
	Medium									
$F_{REBUILD}(10)$	$2.39	$1.84	$3.20	$5.39	$4.57	$10.94	$9.46	$13.16	$19.08	$16.86
$75\%F_{MSY}$	$1.56	$1.05	$2.33	$4.38	$3.61	$9.39	$7.97	$11.51	$17.17	$15.05
$65\%F_{MSY}$	$0.29	-$0.17	$0.98	$2.81	$2.12	$6.82	$5.51	$8.78	$14.02	$12.05
$F_{REBUILD}(7)$	$1.07	$0.58	$1.81	$3.77	$3.04	$8.43	$7.05	$10.49	$15.99	$13.93
$F_{REBUILD}(8)$	$1.69	$1.17	$2.46	$4.53	$3.75	$9.63	$8.20	$11.77	$17.47	$15.33
	Low									
$F_{REBUILD}(10)$	$0.62	$0.48	$0.83	$1.40	$1.19	$2.84	$2.46	$3.42	$4.96	$4.38
$75\%F_{MSY}$	$0.41	$0.27	$0.61	$1.14	$0.94	$2.44	$2.07	$2.99	$4.46	$3.91
$65\%F_{MSY}$	$0.07	-$0.04	$0.25	$0.73	$0.55	$1.77	$1.43	$2.28	$3.64	$3.13
$F_{REBUILD}(7)$	$0.28	$0.15	$0.47	$0.98	$0.79	$2.19	$1.83	$2.73	$4.16	$3.62
$F_{REBUILD}(8)$	$0.44	$0.30	$0.64	$1.18	$0.98	$2.50	$2.13	$3.06	$4.54	$3.99

Table A-5b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=90% of ABC** and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$1.29	$0.70	$2.17	$4.52	$3.63	$8.83	$7.24	$11.22	$17.59	$15.20
$75\%F_{MSY}$	$0.40	-$0.15	$1.23	$3.43	$2.60	$7.16	$5.63	$9.44	$15.53	$13.25
$65\%F_{MSY}$	-$0.97	-$1.46	-$0.23	$1.74	$1.00	$4.40	$2.99	$6.51	$12.14	$10.03
$F_{REBUILD}(7)$	-$0.13	-$0.66	$0.67	$2.78	$1.99	$6.13	$4.65	$8.35	$14.27	$12.05
$F_{REBUILD}(8)$	$0.53	-$0.02	$1.37	$3.59	$2.76	$7.42	$5.89	$9.72	$15.86	$13.56
	Medium									
$F_{REBUILD}(10)$	$1.08	$0.58	$1.81	$3.78	$3.04	$7.39	$6.06	$9.39	$14.72	$12.72
$75\%F_{MSY}$	$0.34	-$0.13	$1.03	$2.87	$2.18	$5.99	$4.71	$7.90	$12.99	$11.08
$65\%F_{MSY}$	-$0.81	-$1.23	-$0.19	$1.46	$0.84	$3.68	$2.50	$5.44	$10.16	$8.39
$F_{REBUILD}(7)$	-$0.11	-$0.55	$0.56	$2.33	$1.66	$5.12	$3.89	$6.98	$11.93	$10.08
$F_{REBUILD}(8)$	$0.45	-$0.02	$1.14	$3.00	$2.31	$6.21	$4.92	$8.13	$13.27	$11.34
	Low									
$F_{REBUILD}(10)$	$0.28	$0.15	$0.47	$0.98	$0.79	$1.92	$1.57	$2.44	$3.83	$3.31
$75\%F_{MSY}$	$0.09	-$0.03	$0.27	$0.75	$0.57	$1.56	$1.23	$2.05	$3.38	$2.88
$65\%F_{MSY}$	-$0.21	-$0.32	-$0.05	$0.38	$0.22	$0.96	$0.65	$1.42	$2.64	$2.18
$F_{REBUILD}(7)$	-$0.03	-$0.14	$0.14	$0.60	$0.43	$1.33	$1.01	$1.82	$3.10	$2.62
$F_{REBUILD}(8)$	$0.12	-$0.01	$0.30	$0.78	$0.60	$1.61	$1.28	$2.11	$3.45	$2.95

Table A-5c. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACL=80% of ABC** and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	4-Year Horizon					10-Year Horizon				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}$(10)	-\$0.28	-\$0.80	\$0.50	\$2.59	\$1.81	\$4.58	\$3.17	\$6.71	\$12.37	\$10.25
75%F_{MSY}	-\$1.07	-\$1.56	-\$0.33	\$1.62	\$0.89	\$3.10	\$1.74	\$5.13	\$10.54	\$8.51
65%F_{MSY}	-\$2.29	-\$2.72	-\$1.63	\$0.12	-\$0.53	\$0.64	-\$0.61	\$2.52	\$7.53	\$5.65
$F_{REBUILD}$(7)	-\$1.54	-\$2.01	-\$0.83	\$1.05	\$0.34	\$2.18	\$0.86	\$4.15	\$9.41	\$7.44
$F_{REBUILD}$(8)	-\$0.95	-\$1.44	-\$0.21	\$1.77	\$1.03	\$3.33	\$1.97	\$5.38	\$10.83	\$8.78
	Medium									
$F_{REBUILD}$(10)	-\$0.23	-\$0.67	\$0.42	\$2.17	\$1.51	\$3.84	\$2.65	\$5.61	\$10.35	\$8.57
75%F_{MSY}	-\$0.89	-\$1.30	-\$0.28	\$1.36	\$0.74	\$2.59	\$1.46	\$4.29	\$8.82	\$7.12
65%F_{MSY}	-\$1.91	-\$2.28	-\$1.36	\$0.10	-\$0.45	\$0.54	-\$0.51	\$2.11	\$6.30	\$4.72
$F_{REBUILD}$(7)	-\$1.28	-\$1.68	-\$0.70	\$0.88	\$0.29	\$1.82	\$0.72	\$3.47	\$7.88	\$6.22
$F_{REBUILD}$(8)	-\$0.79	-\$1.21	-\$0.17	\$1.48	\$0.86	\$2.79	\$1.65	\$4.50	\$9.06	\$7.35
	Low									
$F_{REBUILD}$(10)	-\$0.06	-\$0.17	\$0.11	\$0.56	\$0.39	\$1.00	\$0.69	\$1.46	\$2.69	\$2.23
75%F_{MSY}	-\$0.23	-\$0.34	-\$0.07	\$0.35	\$0.19	\$0.67	\$0.38	\$1.12	\$2.29	\$1.85
65%F_{MSY}	-\$0.50	-\$0.59	-\$0.35	\$0.03	-\$0.12	\$0.14	-\$0.13	\$0.55	\$1.64	\$1.23
$F_{REBUILD}$(7)	-\$0.33	-\$0.44	-\$0.18	\$0.23	\$0.07	\$0.47	\$0.19	\$0.90	\$2.05	\$1.62
$F_{REBUILD}$(8)	-\$0.21	-\$0.31	-\$0.05	\$0.38	\$0.22	\$0.72	\$0.43	\$1.17	\$2.36	\$1.91

Table A-6a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=85% of ACL,** ACL=ABC, and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$0.45	-$0.08	$1.24	$3.35	$2.56	$5.80	$4.45	$7.83	$13.23	$11.20
$75\%F_{MSY}$	-$0.35	-$0.84	$0.40	$2.37	$1.63	$4.35	$3.06	$6.29	$11.45	$9.51
$65\%F_{MSY}$	-$1.58	-$2.03	-$0.92	$0.85	$0.19	$1.97	$0.78	$3.76	$8.52	$6.74
$F_{REBUILD}(7)$	-$0.82	-$1.30	-$0.11	$1.79	$1.08	$3.46	$2.21	$5.34	$10.35	$8.47
$F_{REBUILD}(8)$	-$0.23	-$0.73	$0.52	$2.52	$1.77	$4.58	$3.28	$6.53	$11.73	$9.78
	Medium									
$F_{REBUILD}(10)$	$0.38	-$0.06	$1.04	$2.81	$2.14	$4.85	$3.72	$6.55	$11.06	$9.37
$75\%F_{MSY}$	-$0.29	-$0.70	$0.33	$1.99	$1.36	$3.64	$2.56	$5.26	$9.58	$7.96
$65\%F_{MSY}$	-$1.32	-$1.70	-$0.77	$0.71	$0.16	$1.65	$0.65	$3.14	$7.13	$5.63
$F_{REBUILD}(7)$	-$0.69	-$1.09	-$0.09	$1.50	$0.90	$2.90	$1.85	$4.47	$8.66	$7.09
$F_{REBUILD}(8)$	-$0.19	-$0.61	$0.44	$2.11	$1.48	$3.83	$2.74	$5.46	$9.81	$8.18
	Low									
$F_{REBUILD}(10)$	$0.10	-$0.02	$0.27	$0.73	$0.56	$1.26	$0.97	$1.70	$2.88	$2.44
$75\%F_{MSY}$	-$0.08	-$0.18	$0.09	$0.52	$0.35	$0.95	$0.67	$1.37	$2.49	$2.07
$65\%F_{MSY}$	-$0.34	-$0.44	-$0.20	$0.19	$0.04	$0.43	$0.17	$0.82	$1.85	$1.47
$F_{REBUILD}(7)$	-$0.18	-$0.28	-$0.02	$0.39	$0.23	$0.75	$0.48	$1.16	$2.25	$1.84
$F_{REBUILD}(8)$	-$0.05	-$0.16	$0.11	$0.55	$0.39	$1.00	$0.71	$1.42	$2.55	$2.13

Table A-6b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=75% of ACL,** ACL=ABC, and using **5% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-\$1.04	-\$1.51	-\$0.34	\$1.52	\$0.82	\$1.99	\$0.80	\$3.77	\$8.54	\$6.75
$75\%F_{MSY}$	-\$1.74	-\$2.18	-\$1.09	\$0.66	\$0.00	\$0.71	-\$0.43	\$2.42	\$6.97	\$5.26
$65\%F_{MSY}$	-\$2.83	-\$3.23	-\$2.25	-\$0.68	-\$1.27	-\$1.39	-\$2.44	\$0.19	\$4.39	\$2.81
$F_{REBUILD}(7)$	-\$2.16	-\$2.58	-\$1.53	\$0.14	-\$0.49	-\$0.08	-\$1.18	\$1.58	\$6.00	\$4.35
$F_{REBUILD}(8)$	-\$1.64	-\$2.08	-\$0.98	\$0.79	\$0.12	\$0.91	-\$0.24	\$2.63	\$7.22	\$5.50
	Medium									
$F_{REBUILD}(10)$	-\$0.87	-\$1.26	-\$0.29	\$1.27	\$0.69	\$1.66	\$0.67	\$3.16	\$7.14	\$5.65
$75\%F_{MSY}$	-\$1.46	-\$1.82	-\$0.91	\$0.55	\$0.00	\$0.59	-\$0.36	\$2.02	\$5.83	\$4.40
$65\%F_{MSY}$	-\$2.37	-\$2.70	-\$1.88	-\$0.57	-\$1.06	-\$1.16	-\$2.04	\$0.16	\$3.67	\$2.35
$F_{REBUILD}(7)$	-\$1.81	-\$2.16	-\$1.28	\$0.12	-\$0.41	-\$0.06	-\$0.99	\$1.32	\$5.02	\$3.63
$F_{REBUILD}(8)$	-\$1.37	-\$1.74	-\$0.82	\$0.66	\$0.10	\$0.76	-\$0.20	\$2.20	\$6.04	\$4.60
	Low									
$F_{REBUILD}(10)$	-\$0.23	-\$0.33	-\$0.07	\$0.33	\$0.18	\$0.43	\$0.17	\$0.82	\$1.86	\$1.47
$75\%F_{MSY}$	-\$0.38	-\$0.47	-\$0.24	\$0.14	\$0.00	\$0.15	-\$0.09	\$0.53	\$1.52	\$1.14
$65\%F_{MSY}$	-\$0.62	-\$0.70	-\$0.49	-\$0.15	-\$0.28	-\$0.30	-\$0.53	\$0.04	\$0.95	\$0.61
$F_{REBUILD}(7)$	-\$0.47	-\$0.56	-\$0.33	\$0.03	-\$0.11	-\$0.02	-\$0.26	\$0.34	\$1.31	\$0.95
$F_{REBUILD}(8)$	-\$0.36	-\$0.45	-\$0.21	\$0.17	\$0.03	\$0.20	-\$0.05	\$0.57	\$1.57	\$1.20

Table A-7a. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=85% of ACL,** ACL=ABC, and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	$0.50	-$0.05	$1.33	$3.55	$2.72	$6.71	$5.20	$8.96	$14.98	$12.73
75%F_{MSY}	-$0.33	-$0.85	$0.45	$2.53	$1.75	$5.13	$3.69	$7.28	$13.04	$10.88
65%F_{MSY}	-$1.63	-$2.09	-$0.93	$0.93	$0.23	$2.52	$1.19	$4.51	$9.83	$7.84
$F_{REBUILD}(7)$	-$0.83	-$1.33	-$0.08	$1.91	$1.16	$4.15	$2.75	$6.25	$11.84	$9.74
$F_{REBUILD}(8)$	-$0.21	-$0.73	$0.58	$2.68	$1.89	$5.38	$3.93	$7.55	$13.34	$11.17
	Medium									
$F_{REBUILD}(10)$	$0.42	-$0.04	$1.12	$2.97	$2.28	$5.61	$4.35	$7.50	$12.53	$10.65
75%F_{MSY}	-$0.28	-$0.71	$0.37	$2.11	$1.46	$4.29	$3.09	$6.09	$10.91	$9.10
65%F_{MSY}	-$1.36	-$1.75	-$0.78	$0.78	$0.20	$2.11	$1.00	$3.78	$8.23	$6.56
$F_{REBUILD}(7)$	-$0.70	-$1.11	-$0.07	$1.60	$0.97	$3.47	$2.30	$5.23	$9.90	$8.15
$F_{REBUILD}(8)$	-$0.17	-$0.61	$0.48	$2.24	$1.58	$4.50	$3.29	$6.31	$11.16	$9.34
	Low									
$F_{REBUILD}(10)$	$0.11	-$0.01	$0.29	$0.77	$0.59	$1.46	$1.13	$1.95	$3.26	$2.77
75%F_{MSY}	-$0.07	-$0.19	$0.10	$0.55	$0.38	$1.12	$0.80	$1.58	$2.84	$2.37
65%F_{MSY}	-$0.35	-$0.46	-$0.20	$0.20	$0.05	$0.55	$0.26	$0.98	$2.14	$1.70
$F_{REBUILD}(7)$	-$0.18	-$0.29	-$0.02	$0.42	$0.25	$0.90	$0.60	$1.36	$2.58	$2.12
$F_{REBUILD}(8)$	-$0.05	-$0.16	$0.13	$0.58	$0.41	$1.17	$0.85	$1.64	$2.90	$2.43

Table A-7b. Net present value of changes in CS to the recreational sector associated with the rebuilding strategy and recreational allocation alternatives over **4 years and 10 years**, assuming **ACT=75% of ACL,** ACL=ABC, and using **3% discount rate**. Dollar amounts are in million 2010 dollars.

Rebuilding Strategy	**4-Year Horizon**					**10-Year Horizon**				
	Recreational Allocation of ACL					Recreational Allocation of ACL				
	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e	Alt 2a	Alt 2b	Alt 2c	Alt 2d	Alt 2e
	48%	46%	51%	59%	56%	48%	46%	51%	59%	56%
	High									
$F_{REBUILD}(10)$	-$1.06	-$1.55	-$0.33	$1.63	$0.89	$2.46	$1.13	$4.45	$9.76	$7.77
75%F_{MSY}	-$1.80	-$2.26	-$1.11	$0.72	$0.03	$1.07	-$0.20	$2.97	$8.05	$6.14
65%F_{MSY}	-$2.94	-$3.36	-$2.33	-$0.68	-$1.30	-$1.23	-$2.41	$0.52	$5.22	$3.46
$F_{REBUILD}(7)$	-$2.24	-$2.68	-$1.58	$0.18	-$0.48	$0.21	-$1.03	$2.06	$6.99	$5.14
$F_{REBUILD}(8)$	-$1.69	-$2.15	-$1.00	$0.86	$0.16	$1.29	$0.01	$3.20	$8.32	$6.40
	Medium									
$F_{REBUILD}(10)$	-$0.89	-$1.30	-$0.28	$1.36	$0.75	$2.06	$0.95	$3.72	$8.17	$6.50
75%F_{MSY}	-$1.51	-$1.89	-$0.93	$0.60	$0.03	$0.89	-$0.17	$2.48	$6.73	$5.14
65%F_{MSY}	-$2.46	-$2.81	-$1.95	-$0.57	-$1.09	-$1.03	-$2.01	$0.44	$4.36	$2.89
$F_{REBUILD}(7)$	-$1.87	-$2.24	-$1.32	$0.15	-$0.40	$0.17	-$0.86	$1.72	$5.85	$4.30
$F_{REBUILD}(8)$	-$1.41	-$1.80	-$0.83	$0.72	$0.14	$1.08	$0.01	$2.68	$6.96	$5.35
	Low									
$F_{REBUILD}(10)$	-$0.23	-$0.34	-$0.07	$0.35	$0.19	$0.54	$0.25	$0.97	$2.12	$1.69
75%F_{MSY}	-$0.39	-$0.49	-$0.24	$0.16	$0.01	$0.23	-$0.04	$0.65	$1.75	$1.34
65%F_{MSY}	-$0.64	-$0.73	-$0.51	-$0.15	-$0.28	-$0.27	-$0.52	$0.11	$1.13	$0.75
$F_{REBUILD}(7)$	-$0.49	-$0.58	-$0.34	$0.04	-$0.10	$0.04	-$0.22	$0.45	$1.52	$1.12
$F_{REBUILD}(8)$	-$0.37	-$0.47	-$0.22	$0.19	$0.04	$0.28	$0.00	$0.70	$1.81	$1.39

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Appendix J

FISHERY IMPACT STATEMENT (FIS)

The Magnuson-Stevens Act requires a FIS be prepared for all amendments to Fishery Management Plans (FMPs). The FIS contains an assessment of the likely biological and socioeconomic effects of the conservation and management measures on: 1) fishery participants and their communities; 2) participants in the fisheries conducted in adjacent areas under the authority of another Council; and 3) the safety of human life at sea.

Actions Contained in Amendment 24 to the Snapper Grouper FMP

The red grouper stock of the South Atlantic was assessed in 2008. The assessment showed red grouper to be overfished and undergoing overfishing. The primary purpose of Amendment 24 to the Fishery Management Plan for the Snapper Grouper Fishery (Amendment 24) is to implement the rebuilding plan. The South Atlantic Fishery Management Council (Council) is also proposing the re- specification of management benchmarks such as the maximum sustainable yield and minimum stock size threshold. Besides establishing a rebuilding plan, the Council is proposing the implementation or revision of the following items:

(1) annual catch limits (ACL)
(2) annual catch targets (ACT)
(3) accountability measures (AM)
(4) allocations
(5) maximum sustainable yield (MSY)
(6) optimum yield (OY)

Assessment of Biological Effects

The actions for modifying MSY and MSST for red grouper are expected to have positive biological impacts to the environment. The definitions are based on the most recent stock assessment and the best available scientific information reviewed by both Councils' Scientific and Statistical Committees, thereby suggesting the best protection for the resource.

The actions to specify ABC, ACL, and ACT would have positive effects to the red grouper stock ans associated ecosystem. The specification of targets and limits, in the form of ABCs, ACLs, and ACTs, are crucial component of any management program involving natural resources. Without the designation of these components, regulations may not be sufficient to prevent overfishing. The Council would manage towards a biological benchmark based on scientific advice, in the form of an ABC level. The specification of an ABC would protect fishery resources to allow sustainable exploitation. Sustainable exploitation would allow the existence of an appropriate number of older, larger fishes in the population; a robust population provides additional protections against recruitment failure due to several years of poor environmental conditions for eggs and larvae. Conversely, delaying rebuilding could make stocks more susceptible to adverse environmental conditions that might affect recruitment success, or to unanticipated errors in parameter estimates, which could result in excessive fishing.

The rebuilding plan would define a rebuilding strategy for red grouper that sets ABC equal to the yield at 75%FMSY. Under this strategy, the fishery would have at least an 81% chance of rebuilding to SSBMSY by 2020.

The biological effects of options that allocate more of the ABC to the commercial sector could have a greater biological benefit because there is less of a change than a commercial ACL is exceeded than a recreational ACL. Commercial data can be more closely monitored as they are based on dealer reports; whereas much of the recreational data (except headboat data) are based on survey information. The preferred allocation alternative (Subalterantive 2e), however, divides the ABC more or less evenly between the commercial and recreational sectors.

Assessment of Economic Effects

Although alternatives for MSY, MSST, and rebuilding schedule would condition the management measures to be implemented on the red grouper fishery, they would not alter the harvest of or fishing opportunities for red grouper. Thus, they would have no direct economic effects on fishery participants and associated industries or communities. However, there is an important aspect of the rebuilding schedule that needs to be noted. Regardless of the length of the rebuilding period chosen, the long-term benefits from the fishery would depend on, among others, the regulatory regime adopted over time and the discount factor. Regulatory regimes that promote economic efficiency generally have a higher likelihood of generating higher economic values while preserving the sustainability of the fish stock. Other regulatory regimes could very well erode the economic benefits over time, even at higher stock levels. For example, if regulations proposed in this amendment were successful in rebuilding the red grouper stock, higher levels of harvest approaching the chosen OY would be allowed. But if nothing is done to address overcapacity and other open-access problems in the fishery that currently beset the fishery or will develop over time, the economic status of the fishery could fall back to its current, or possibly worse, condition.

The economic effects of the actions for rebuilding strategy, ACL, ACT, and commercial/recreational allocation are closely intertwined that in analyzing one action, the preferred alternative for the other actions were assumed. Results of the analysis for the commercial and recreational sectors point to the economic superiority of $F_{REBUILD}$(10 years) over the other rebuilding strategies. This alternative would result in positive effects on each sub-sector (by area or gear type) within the commercial sector as well as on the recreational sector. The other rebuilding alternatives may be ranked as follows: $F_{REBUILD}$(8), 75%$F_{MSY,}$ $F_{REBUILD}$(7 years), and 65%F_{MSY}.

Because any action on commercial/recreational allocation would generally favor one sector over the other, the economic effects of each allocation alternative would have contrasting effects on the two sectors, at least in terms of magnitude. It is often the case that an allocation decision would benefit one sector over another, although there are rare cases when both sectors benefit. Alternative 2b would provide the largest benefits to the commercial sector (54%) and lowest to the recreational sector (46%) while Alternative 2d would have just to opposite effects.

Among the ACL/OY alternatives, the alternative equating ACL to ABC would yield the largest benefits to both the commercial and recreational sectors. On the other end would be the alternative with ACL equal to 80 percent of ABC. In addition, Preferred Alternatives 5 and 6 which would eliminate the commercial quota and recreational aggregate ACL for black grouper, red grouper, and gag, along with their associated AMs, would provide increased benefits to the commercial and recreational sectors.

All the ACT alternatives, except the no action alternatives, would result in lower benefits to both the commercial and recreational sectors, because these alternatives would provide potentially sectoral harvest limits lower than the ACL. The no action alternative, which is the preferred alternative, would provide the best economic scenario for both the commercial and recreational sectors.

The commercial and recreational AMs, including post-season AMs, would be expected to result in benefit reductions to both sectors. Considering, however, that baseline recreational harvest is less than the ACL, AMs were evaluated to provide no additional economic losses to both the commercial and recreational sectors. The economic effects of in-season AMs were estimated as part of the evaluation of the other alternatives in this amendment.

Assessment of the Social Effects

The combined impacts of the amendment are from actions to establish harvest levels, sector allocations and accountability measures that will be established as part of a rebuilding program for red grouper. The effects are described below in summary fashion for all alternatives.

As part of the rebuilding plan, the actions that will establish the MSY, MSST, and ABCs in general may have some short-term social impacts by limiting harvest of red grouper, but overall should produce long-term social benefits as the red grouper stock rebuilds. The preferred timeline of 10 years will allow for the least short-term social impacts from the limits and restrictions on red grouper harvest.

The action that will establish separate allocations for the recreational and commercial sectors will have some social effects by limiting one sector over another. The preferred alternative for the sector allocations will reflect more recent trends, and is expected to result in minimal short-term social impacts. There may be some long-term social effects as sector allocations may limit expansion in the commercial sector and will restrict additional growth in the recreational sector; however, the rebuilding strategy on its own will initially limit both sectors, and the preferred sector allocations will allow for social benefits as the red grouper stock rebuilds.

The establishment of an ACL for red grouper will result in short-term social impacts as red grouper harvest is restricted, but as the stock rebuilds there will be long-term social benefits from future harvest opportunities. This may be particularly important if restrictions continue for other stocks. The action that will remove of red grouper from the aggregate ACL with black grouper and gag grouper will likely have minimal social impacts, except with any additional limits on red grouper harvest through the individual ACL.

The ACT is the final threshold from which the Councils chooses to manage harvest levels through a series of decisions about uncertainty with stock status and management. The proposed actions will not set a commercial ACT, which will have minimal effects on the commercial sector. For the recreational sector, the proposed actions will set the recreational ACT lower than the ACL. If future regulations are tied to this ACT, the ACT is more likely to be reached and AMs triggered, and there will be social impacts due to limits on recreational effort and fishing opportunities.

Although some short-term adverse social consequences would be expected to result where harvests will be reduced or closures are triggered by AMs, the proposed actions in this amendment will result in positive long-term social benefits. These measures are expected to result in improved likelihood of species recovery, where appropriate, and protection, which should provide better safeguards for producing and maintaining a stable resource capable of supporting steady and sustainable social benefits. These actions should allow corrective action, when necessary, to be implemented in a more timely and efficient manner, thereby reducing their severity and the magnitude of associated short term adverse social effects. Short-term social impacts on the fishery would likely result from changes in the commercial and for-hire fleets due to closures or subsequent shorter seasons in case of overages. Additionally, recreational fishing opportunities are expected to be impacted by in-season bag limit reduction on some species.

Overall, the actions in this amendment and the rebuilding strategy for red grouper will likely impact the commercial and recreational sectors by limiting harvest for a portion of the rebuilding schedule, but long-term social benefits will be expected as the red grouper stock biomass increases.

Assessment of Effects on Safety at Sea

The implementation of a rebuilding plan for red grouper would not be expected to affect the current level of safety at sea.

APPENDIX K

Regulatory Impact Review

Introduction

The NOAA Fisheries Service requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, (3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the proposed regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866 and provides information that may be used in conducting an analysis of impacts on small business entities pursuant to the Regulatory Flexibility Act (RFA). This RIR analyzes the expected effects that this action would be expected to have on the commercial and recreational snapper grouper fisheries, with emphasis on the red grouper segment. Additional details on the expected economic effects of the various alternatives in this action are included in **Chapter 4** and are incorporated herein by reference.

Problems and Objectives

The purpose and need, issues, problems, and objectives of the proposed amendment are presented in **Chapter 1** and are incorporated herein by reference. The most recent stock assessment determined red grouper to be overfished and undergoing overfishing. The general purpose, therefore, of Amendment 24 to the Fishery Management Plan (FMP) for the Snapper Grouper Fishery of the South Atlantic Region is to implement a rebuilding plan to end overfishing and rebuild the spawning stock of red grouper. Management measures affecting the commercial and recreational sectors accompany the rebuilding plan.

Methodology and Framework for Analysis

This RIR assesses management measures from the standpoint of determining the resulting changes in costs and benefits to society. To the extent practicable, the net effects of the proposed measures are stated in terms of producer and consumer surplus. In addition, the public and private costs associated with the process of developing and enforcing regulations on fishing for snapper grouper in waters of the U.S. South Atlantic are provided.

Description of the Fishery

A description of the South Atlantic snapper grouper fishery, with particular reference to red grouper, is contained in **Chapter 3** and is incorporated herein by reference.

Effects of Management Measures

Details on the economic effects of all alternatives are found in **Chapter 4** and are included herein by reference. The following discussion focuses mainly on the expected effects of the preferred alternatives.

Defining MSY and MSST for red grouper would not alter the current harvest or use of the resource. Specification of these measures would merely establish a benchmark for fishery and resource evaluation from which additional management actions for the species would be based, should comparison of the fishery and resource with the benchmark indicate that management adjustments are necessary. The impacts of these management adjustments will be evaluated at the time they are proposed. **Alternative 2 (Preferred)** for MSY is recommended in the most recent SEDAR and by the SSC, and therefore has a better scientific basis as to provide a more solid ground for management actions that have economic implications. In terms of potential economic effects of future management measures which may be enacted under a defined MSST, **Alternative 3 (Preferred)** would fall in the middle of the considered MSST alternatives.

A major economic issue associated with the choice of a rebuilding schedule relates to the cost/benefit configuration of the various alternatives over time. This cost/benefit configuration depends on the functional distance between current and target fishery status and the length of the rebuilding schedule. The length of the rebuilding period would determine how stringent the management measure should be; the shorter the rebuilding period, the more stringent would be the required management measures, but the sooner would the benefits also accrue. Conversely, longer rebuilding periods would require less stringent management measures, but benefits would accrue later. Among the alternatives considered for the rebuilding period, **Alternative 5 (Preferred)** would provide the least restrictive management measures over the rebuilding timeframe. However, future benefits would accrue the latest under this alternative.

Given the preferred alternatives for all other actions in this amendment, **Alternative 3 (Preferred)** for the rebuilding strategy would provide the third highest economic benefits among the alternatives considered. From a regional perspective for the commercial sector, **Alternative 2** would be economically superior in that it makes all constituents better off without making anybody worse off. For the recreational sector, **Alternative 2** would also provide superior economic outcome than the other alternatives. **Alternative 3 (Preferred)** is expected to generate for the commercial sector an additional profit of $990,000 over the first 7 years of the rebuilding schedule relative to the no action alternative with an additional $310,000 generated in years 8 through 10 assuming a discount rate of 7%. The effects of **Alternative 3 (Preferred)** on the recreational sector in terms of consumer surplus increases would range from $0.84 million to $3.86 million over four years or from $3.86 million to $14.1 million over 10 years, assuming a 7% discount rate.

In general, **Subalternative 2e (Preferred)** for the commercial/recreational allocation of total ACL would not result in changes to the economic status of both sectors. The main reason for this is that the allocation ratio under this alternative would be exactly the same as the historical distribution of harvests between the two sectors defined for the baseline or no action alternative.

Alternative 2 (Preferred) for ACL/OY would provide the largest ACL/OY, and thus would result in the largest positive economic effects to the commercial and recreational sectors in the short term. **Alternatives 5 and 6 (Preferred)** would help ensure the benefits from the highest ACL/OY would be realized.

Alternative 1 (No Action, Preferred) would not set a commercial ACT and therefore no economic effects on this sector are expected from this alternative.

Should the ACT become a binding constraint in terms of triggering the implementation of AMs on the recreational sector, then **Alternative 4 (Preferred)** would result in consumer surplus losses ranging from $0.01 million to $0.03 million over four years, or from $0.98 million to $4.52 million over 10 years assuming a 7% discount rate.

Both **Alternative 2 (Preferred)** and **Alternative 3 (Preferred)** for the commercial sector AM are expected to result in short-term profit reductions to the commercial sector. Over the long-term, however, these alternatives would provide better economic scenario for the commercial sector by addressing issues related to overfishing of the stock. With a relatively stable stock over time, future harvest would increase or at least would be stable. This stability could benefit the commercial sector financially by paving the way for more confident business planning and improvements in marketing and reliability of landings to dealers. Considering that the reported 2010 commercial landings of red grouper are higher than the currently preferred ACL alternative, applications of AM under **Alternatives 2** and **3 (Preferred)** may occur in the near future.

Subalternative 2b (Preferred), together with **Subalternative 3a (Preferred)**, would implement in-season AM for the recreational sector while **Alternative 4g (Preferred)** would implement a post-season AM. Relative to the no action alternative, these preferred alternatives would result in short-term economic losses to the recreational sector. The expectation, however, is for these measures to result in long-term economic benefits by providing better protection for the stock in order to achieve the rebuilding target within the rebuilding timeframe. Considering the fact that the reported 2010 recreational harvests of red grouper are well below the preferred ACL in this amendment, there is low probability that harvests would exceed the ACL in the near future. Thus, there is also a low probability that AMs under **Alternatives 2b, 3a, and 4g (Preferred)** would be triggered in the near future.

Public and Private Costs of Regulations

The preparation, implementation, enforcement, and monitoring of this or any Federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Costs associated with this amendment include:

Council costs of document preparation, meetings, public hearings, and information dissemination………………………………………………………...…….. $300,000

NOAA Fisheries administrative costs of document
preparation, meetings and review $400,000

Annual law enforcement costs ....unknown

TOTAL $700,000

Law enforcement currently monitors regulatory compliance in these fisheries under routine operations and does not allocate specific budgetary outlays to these fisheries, nor are increased enforcement budgets expected to be requested to address components of this action. In practice, some enhanced enforcement activity might initially occur while the fishery becomes familiar with the new regulations. However, the costs of such enhancements cannot be forecast. Thus, no specific law enforcement costs can be identified.

Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a “significant regulatory action” if it is expected to result in: (1) an annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Based on the information provided above, this regulatory action would not meet the first criterion. Therefore, this regulatory action is determined to not be economically significant for the purposes of E.O. 12866.

APPENDIX L

Initial Regulatory Flexibility Analysis

Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure that such proposals are given serious consideration. The RFA does not contain any decision criteria; instead, the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions). The RFA is also intended to ensure that the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct a regulatory flexibility analysis for each proposed rule. The regulatory flexibility analysis is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. In addition to analyses conducted for the RIR, the regulatory flexibility analysis provides: 1) A statement of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for the proposed rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practical, of all relevant Federal rules which may duplicate, overlap, or conflict with the proposed rule; and 6) a description of any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.

Additional information on the description of affected entities may be found in **Chapter 3.3,** and additional information on the expected economic effects of the proposed action may be found in **Chapter 4**.

Statement of Need for, Objectives of, and Legal Basis for the Rule

The purpose and need, issues, problems, and objectives of the proposed rule are presented in **Chapter 1.0**. The general purpose of this amendment is to develop a rebuilding plan to end overfishing and rebuild the spawning stock of red grouper through the implementation of a rebuilding schedule, rebuilding strategy and acceptable biological catch (ABC), commercial/recreational allocation, annual catch limits (ACL) and optimum yield (OY), annual catch targets (ACTs) for the commercial and recreational sectors, and accountability measures (AMs) for the commercial and recreational sectors. This amendment would also define maximum sustainable yield (MSY) and minimum stock size threshold (MSST). The Magnuson-Stevens Fishery Conservation and Management Act, as amended, provides the statutory basis for the proposed rule.

Identification of All Relevant Federal Rules Which May Duplicate, Overlap or Conflict with the Proposed Rule

No duplicative, overlapping, or conflicting Federal rules have been identified. Previous amendments, whether already implemented or in the process of being implemented, have been considered in designing the various actions in this amendment.

Description and Estimate of the Number of Small Entities to Which the Proposed Rule will Apply

This proposed action is expected to directly affect commercial fishers and for-hire operators. The SBA has established size criteria for all major industry sectors in the U.S. including fish harvesters and for-hire operations. A business involved in fish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $4.0 million (NAICS code 114111, finfish fishing) for all its affiliated operations worldwide. For for-hire vessels, the other qualifiers apply and the annual receipts threshold is $7.0 million (NAICS code 713990, recreational industries).

From 2005-2009, an annual average of 892 vessels with valid permits to operate in the commercial snapper grouper fishery landed snapper grouper, generating dockside revenues of approximately $13.817 million (2009 dollars). Each vessel, therefore, generated an average of approximately $15,500 in gross revenues from snapper grouper. Gross dockside revenues by area were distributed as follows: $4.196 million in North Carolina, $3.612 million in South Carolina, $3.219 million in Georgia/East Florida, and $2.790 in the west coast of Florida. Vessels that operate in the snapper grouper fishery may also operate in other fisheries, the revenues of which cannot be determined with available data and are not reflected in these totals.

Based on revenue information, all commercial vessels affected by the proposed action can be considered small entities.

From 2005-2009, an annual average of 2,018 vessels had valid permits to operate in the snapper grouper for-hire fishery, of which 82 are estimated to have operated as headboats. The for-hire fleet is comprised of charterboats, which charge a fee on a vessel basis, and headboats, which charge a fee on an individual angler (head) basis. The charterboat annual average gross revenue is estimated to range from approximately $62,000-$84,000 for Florida vessels, $73,000-$89,000 for North Carolina vessels, $68,000-$83,000 for Georgia vessels, and $32,000-$39,000 for South Carolina vessels. For headboats, the corresponding estimates are $170,000-$362,000 for Florida vessels, and $149,000-$317,000 for vessels in the other states.

Based on these average revenue figures, all for-hire operations that would be affected by the proposed action can be considered small entities.

Some fleet activity, i.e., multiple vessels owned by a single entity, may exist in both the commercial and for-hire snapper grouper sectors but its extent is unknown, and all vessels are treated as independent entities in this analysis. A recent commenter on this amendment indicated he owns 12 snapper grouper commercial permits. For this fleet to reach the $4 million threshold, each permitted vessel would have to generate yearly receipts of approximately $333,000. It is not known whether or not this is the case, but it appears such amount is too high given the above noted average gross revenues per vessel.

Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

The proposed action would not introduce any changes to reporting, record-keeping, and other compliance requirements which are currently required.

Substantial Number of Small Entities Criterion

The proposed action is expected to directly affect all Federally permitted commercial and for-hire vessels that operate in the South Atlantic snapper grouper fishery. All directly affected entities have been determined, for the purpose of this analysis, to be small entities. Therefore, it is determined that the proposed action will affect a substantial number of small entities.

Significant Economic Impact Criterion

The outcome of 'significant economic impact' can be ascertained by examining two issues: disproportionally and profitability.

Disproportionally: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All entities that are expected to be affected by the proposed rule are considered small entities, so the issue of disproportional effects on small versus large entities does not arise in the present case.

Profitability: Do the regulations significantly reduce profit for a substantial number of small entities?

Redefining MSY and MSST and establishing a rebuilding schedule for red grouper would not alter the current harvest or use of the resource and thus would not affect the profitability of small entities.

Defining a rebuilding schedule as the maximum time to rebuild the stock to biomass at MSY would add flexibility in designing management measures that would have the least short-term effects on the profitability of small entities.

Given the preferred alternatives for all other actions in this amendment, the proposed action on the rebuilding strategy and ACL would result in an increase in commercial vessel profits of $990,000 over the first 7 years of the rebuilding schedule with an additional $310,000 generated in years 8 through 10 assuming a discount rate of 7%. The corresponding effects on the for-hire vessels would also be an increase in profits but the magnitude cannot be estimated with available information.

To the extent that the proposed action for the commercial/recreational allocation of total ACL would maintain the baseline landings distribution of red grouper between the two sectors, no profit changes to the commercial or for-hire vessels may be expected to occur as a direct result of the proposed action.

The proposed action for ACL/OY would provide the largest ACL/OY for red grouper, so that this proposed action may be expected to increase the profits of the commercial and for-hire vessels. The proposed action eliminating the aggregate black grouper, red grouper, and gag quota would tend to ensure profit increases from the largest ACL/OY alternative for red grouper would be realized.

The proposed action on ACT may be expected to reduce the profits of for-hire vessels should the ACT be used to trigger AMs but the magnitude of such reduction cannot be estimated with available information. There is no proposed ACT for the commercial sector.

The proposed AM for the commercial sector is expected to reduce the profits of commercial vessels especially that the most recent landings information suggests the ACL would likely be exceeded in the near future.

In principle, the proposed AM for the recreational sector is expected to reduce the profits of for-hire vessels. However, the most recent recreational harvest of red grouper is well below the proposed ACL for the recreational sector, suggesting the proposed AM has a low probability of being triggered in the near future. In effect then, the proposed AM for the recreational sector may be expected to have a low likelihood of affecting the profits of for-hire vessels in the near future.

Description of Significant Alternatives

Two alternatives, including the preferred alternative, were considered for the re-definition of MSY. The first alternative, the no action alternative, would retain the definition of MSY which would not be in accordance with the conclusions of the latest stock assessment. This alternative, like the preferred alternative, would not directly affect the profitability of small entities.

Five alternatives, including the preferred alternative, were considered for the redefinition of MSST. The first alternative, the no action alternative, would retain the definition of MSST as equal to natural mortality (M) times the biomass at MSY. The second alternative would set SST equal to 50 percent of biomass at MSY. The third alternative would set MSST equal to 85 percent of biomass at MSY. The fourth alternative would set MSST as the minimum stock size at which rebuilding to MSY would be expected to occur within 10 years at the minimum fishing mortality threshold level. All these alternatives, like the preferred alternative, would not directly affect the profitability of small entities.

Five alternatives, including the preferred alternative, were considered for the rebuilding schedule. The first alternative, the no action alternative, would not implement a rebuilding schedule. This alternative would not comply with Magnuson Act requirement to rebuild an overfished red grouper stock. The second, third, and fourth alternatives would establish a rebuilding period of 3 years (shortest), 7 years, and 8 years, respectively. These other alternatives would provide for a shorter rebuilding timeframe than the preferred alternative, and thus may be expected to afford lesser flexibility in designing management measures that would minimize the economic effects on the profits of small entities.

Six alternatives, including the preferred alternative, were considered for the rebuilding strategy and acceptable biological catch (ABC). The first alternative, the no action alternative, would not establish a rebuilding strategy for red grouper. Although the rebuilding strategy is currently specified ($F_{45\%SPR}$), the ABC, ACL, and OY levels are not explicitly stated. The specification of targets and limits is a crucial component of any management program involving natural resources. Without the designation of these components, regulations may not be sufficient to prevent overfishing and rebuild the stock. The second alternative would define a rebuilding strategy that sets ABC equal to the yield at $F_{REBUILD}$, which is a fishing mortality rate that would have a 70 percent probability of rebuilding success to biomass at MSY in 10 years. This alternative would provide the best profitability scenario for the commercial and for-hire vessels over the entire rebuilding timeframe. However, it would allow a higher fishing mortality rate than what would be appropriate if the stock was not overfished. Both this alternative and the preferred alternative would maintain catches at a similar level to what they have been in recent years, but the preferred alternative is more consistent with fishing at a level that would produce OY. The third alternative would define a rebuilding strategy that sets ABC equal to the yield at 65 percent of F_{MSY}. This alternative would likely result in lower profits to small entities than the preferred alternative, because it would require more restrictive management measures. The fourth alternative would define a rebuilding strategy that sets ABC equal to the yield at $F_{REBUILD}$, which is a fishing mortality rate that would have a 70 percent probability of rebuilding success to biomass at MSY in 7 years. This alternative would likely result in lower profits to small entities than the preferred alternative, because it would require more restrictive management measures. The fifth alternative would define a rebuilding strategy that sets ABC equal to the yield at $F_{REBUILD}$, which is a fishing mortality rate that would have a 70 percent probability of rebuilding success to biomass at MSY in 8 years. This alternative would likely result in lower profits to small entities than the preferred alternative, because it would require more restrictive management measures.

Two alternatives were considered for sector allocation, with one alternative being the no action alternative which would not establish sector allocation and the second would establish sector allocation. The no action alternative would not allow specification of sector ACL and corresponding AM, such that both sectors would be accountable for any ACL overages even if there is only one offending sector. Under the second alternative, five subalternatives including the preferred subalternative were considered. The first subalternative would establish a 52 percent commercial and 48 percent recreational allocation; the second subalternative, 54 percent commercial and 46 percent recreational allocation; the third subalternative, 49 percent commercial and 51 percent recreational allocation; and, the fourth subalternative, 41 percent commercial and 59 percent recreational allocation. All these alternatives, including the preferred alternative, would base the allocation ratio solely on sectoral distribution of landings. No economic valuation was considered due to the absence of sufficient information. In terms of effects on the profits of small entities, the general nature of the various allocation alternatives is to favor one sector over another. The higher the allocation to one sector, the higher would be the profit potential to that sector and the lower would be the profit potential to the other sector. Among the alternatives, the preferred alternatives was found to have neutral effects on profits on both the commercial and for-hire vessels, because the resulting allocation would be the same as the historical sectoral distribution of landings used as the baseline landings distribution.

Six alternatives, including the three preferred alternatives, were considered for ACL and OY. The first alternative, the no action alternative, would not establish a specific ACL for red grouper. This alternative would not afford specific management actions to specifically address the overfished/overfishing status of the red grouper stock. The second alternative would specify an ACL for red grouper equal to OY and OY equal to 90 percent of ABC. This alternative would result in lower profit potential to small entities than the preferred alternative. The third alternative would specify an ACL for red grouper equal to OY and OY equal to 80 percent of ABC. This alternative would result in lower profit potential to small entities than the preferred alternative.

Three alternatives, including the preferred alternative, were considered for the commercial sector ACT. The first and second alternatives would set the commercial ACT equal to 90 percent and 80 percent of commercial ACL, respectively. If ACTs were used to trigger AM applications, these two alternatives would result in lower profits to small entities than the preferred alternative.

Four alternatives, including the preferred alternative, were considered for the recreational ACT. The first alternative, the no action alternative, would not specify a recreational ACT for red grouper. This alternative would not allow consideration of management uncertainty which is deemed high in the recreational sector. Without consideration of management uncertainty, the probability of exceeding the ACL would be relatively high, increasing the probability of implementing more stringent management measures. The second and third alternatives would specify a recreational ACT equal to 85 percent and 75 percent of the recreational ACL, respectively. The second alternative would likely result in the same effects on the short-run profits of small entities as the preferred alternative. The third alternative would likely result in lower profits to small entities than the preferred alternative.

Three alternatives, including the two preferred alternatives, were considered for the commercial AM. The only alternative to the preferred alternatives is the no action alternative, which would not specify a commercial AM for red grouper. This alternative would retain the current commercial AM specified for the group of species consisting of red grouper, black grouper, and gag. This particular AM could be either more or less restrictive than the preferred AM alternatives specified for red grouper, but it would not allow implementing management measures that would specifically address the overfished/overfishing condition of the red grouper stock. In addition, the current AM for the aggregate species of red grouper, black grouper, and gag does not provide for post-season AM. The lack of post-season AM under the no action alternative would result in higher short-term profits to small entities than the preferred alternative, but there is an expectation that the long-term profit environment would be better under the preferred alternatives. It should also be noted that a separate ACL/AM for black grouper is proposed under the Comprehensive ACL Amendment, negating the need for the aggregate species ACL/AM.

Four alternatives were considered for the recreational AM. The first alternative is the no action alternative which would not set a specific recreational AM for red grouper. This alternative would retain the current recreational AM specified for the group of species consisting of red grouper, black grouper, and gag. This particular AM could be either more or less restrictive than the preferred AM alternatives specified for red grouper, but it would not allow implementing management measures that would specifically address the overfished/overfishing condition of the red grouper stock. It should also be noted that a separate ACL/AM for black grouper is proposed under the Comprehensive ACL Amendment, negating the need for the aggregate species ACL/AM.

The second alternative would specify a recreational AM trigger and includes five subalternatives, including the preferred subalternative. The first subalternative would not specify a recreational AM trigger. This subalternative would likely result in higher profits to small entities than the preferred subalternative. However, it would not allow specifically addressing the overfished/overfishing condition for red grouper. The second subalternative specifies that AM would be triggered if the mean recreational landings for the past three years exceed the recreational ACL. The profit environment for small entities under this subalternative may be lower or higher than that of the preferred subalternative, depending on whether the trend in landings is upward or downward. The third subalternative specifies that AM would be triggered if the modified mean (highest and lowest landings dropped) landings for the past five years exceed the recreational ACL. This subalternative has about the same nature of effects on profitability as the second subalternative, although the magnitude may be lower. The fourth subalternative specifies that AM would be triggered if the lower bound of the 90 percent confidence interval estimate of the MRFSS landings' population mean plus headboat landings is greater than the recreational ACL. This subalternative has about the same nature of effects on profitability as the first subalternative, but the magnitude could be lower or higher.

The third alternative for a recreational AM would specify a recreational in-season AM and includes two subalternatives, of which one is the preferred subalternative. The only subalternative to the preferred alternative is the no action alternative which would not specify a recreational in-season AM. This alternative would result in higher short-term profits to small entities, but it would not allow specifically addressing the overfished/overfishing condition for red grouper.

The fourth alternative for a recreational AM would specify a recreational post-season AM if the current year's recreational ACL is exceeded, and includes seven subalternatives, of which one is the preferred subalternative. The first subalternative would not specify a recreational post-season AM. This subalternative would result in higher short-term profits to small entities than the preferred alternative, although the expectation is for long-term profitability to better under the preferred subalternative. The second subalternative would compare the recreational ACL with the 2011 landings for 2011, with the mean 2011 and 2012 landings for 2012, and mean landings of the most recent three years for 2013 and beyond for triggering a post-season AM. This subalternative may or may not have the same nature of effects on profitability as the preferred alternative, depending on the specific AM measure that would be implemented. The third subalternative specifies monitoring the following year's landings for persistence in increased landings, with the Regional Administrator taking management actions as necessary. This subalternative would likely result in the lower adverse effects on short-term profits than the preferred alternative, although the actual effects would depend on the type of restrictions that would be imposed by the RA. The fourth subalternative specifies monitoring the following year's landings for persistence in increased landings, with the Regional Administrator publishing a notice to reduce the recreational fishing season as necessary. This subalternative would likely result in less adverse effects on short term profits than the preferred subalternative to the extent that post-season AM may not be imposed depending on how persistent the upward trend in landings would be. If a post-season AM were necessary, this subalternative could still result in higher profits than the preferred alternative since it would set a specific closure date, allowing for-hire vessels to make the necessary changes in their operations. The fifth subalternative specifies monitoring the following year's landings for persistence in increased landings, with the Regional Administrator publishing a notice to reduce the recreational bag limit as necessary. This subalternative would likely result in less adverse effects on short term profits than the preferred subalternative to the extent that post-season AM may not be imposed depending on how persistent the upward trend in landings would be. If a post-season AM were necessary, this subalternative could still result in higher profits than the preferred alternative since it would allow for-hire vessels to operate year round, although at lower bag limits. The sixth subalternative specifies that the Regional Administrator publish a notice to reduce the following year's recreational fishing season to ensure landings do not exceed the following fishing season's recreational ACL. There is a good possibility that this subalternative would result in the same fishing season length as the preferred alternative, although some other measures, like bag limit reduction, may be employed under the preferred alternative to effect a longer season that would provide more fishing opportunities. Whichever of these two subalternatives can provide for more fishing opportunities may be considered better than the other from the standpoint of profits to small entities.

Finding of No Significant Impact (FONSI) for Measures in Amendment 24 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region (Amendment 24)

National Marine Fisheries Service

May 2012

Introduction

This FONSI was prepared in accordance with National Oceanic and Atmospheric Administration Administrative Order 2 16-6 (NAO 2 16-6; May 20, 1999) and NMFS Instruction 30-124-1, July 22, 2005, Guidelines for Preparation of Finding of No Significant Impact, for determining the significance of impacts of a proposed management action. This introduction provides a brief description of the proposed management action and alternatives, and summarizes why actions in Amendment 24 will not have a significant effect on the human environment. Attached is the environmental assessment, entitled *Amendment 24 to the Snapper-Grouper Fishery Management Plan of the South Atlantic Region, dated December 2011.*

The most recent South Atlantic red grouper stock assessment was completed in 2010. The assessment determined red grouper to be overfished and undergoing overfishing. The South Atlantic Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to implement a rebuilding plan within two years after notification of an overfished stock. The primary purpose of Amendment 24 is to implement the rebuilding plan. The Council is also revising current management benchmarks based on the results of the stock assessment, as well as revising current annual catch limits (ACL) and accountability measures (AM).

The environmental assessment contains 10 actions specific to red grouper : (1) Re-define maximum sustainable yield (MSY); (2) re-define minimum stock size threshold (MSST); (3) establish a rebuilding schedule; (4) establish a rebuilding strategy and acceptable biological catch (ABC); (5) specify sector allocations; (6) specify ACLs and optimum yield (OY); (7) specify a commercial annual catch target (ACT); (8) specify a recreational ACT; (9) specify commercial AMs; and (10) specify recreational AMs. The actions specifying the red grouper ACLs and AMs include removal of the gag grouper, red grouper, and black grouper aggregate ACL and AM. Individual ACLs and AMs for gag grouper and black grouper were previously established in Amendment 16 to the FMP and the Comprehensive ACL Amendment, respectively.

The primary action is the establishment of a rebuilding plan. The two components of a rebuilding plan are the rebuilding schedule and the rebuilding strategy. The preferred alternative for the rebuilding schedule is to rebuild the stock within 10 years. The preferred alternative for the rebuilding strategy is to set ABC equal to the yield when fishing at 75%F_{MSY}; F_{MSY} is the level of fishing mortality that results in the MSY. Under this strategy, red grouper will have an 81 percent probability of rebuilding to SSB_{MSY} by 2020. The ABC will be 647,000 pounds whole weight (ww) in 2012, 718,000 lbs ww in 2013, and 780,000 lbs ww in 2014 and onwards until modified. The Council and National Marine Fisheries Service (NOAA Fisheries Service) propose, through the preferred alternative, to set the ACL equal to the ABC. The total ACL will be divided into a commercial sector ACL and a recreational sector ACL using the preferred allocation split of 44 percent commercial and 56 percent recreational. The Council and NOAA Fisheries Service are also proposing changes to the current AMs for red grouper.

Council ACLs and AMs

The Council and NOAA Fisheries Service have implemented ACLs and AMs for the red grouper stock in the South Atlantic through two recent amendments to the Fishery Management Plan (FMP) for the Snapper-Grouper Fishery of the South Atlantic Region (Table 1). There exists both gag grouper, black grouper, and red grouper aggregate ACLs and AMs, and a shallow water grouper complex AM that is tied to the gag grouper ACL. The shallow water grouper complex includes the following species: gag grouper, black grouper, red grouper, scamp, red hind, rock hind, yellowmouth grouper, tiger grouper, yellowfin grouper, graysby, and coney.

Table 1. The ACLs and AMs currently in place for red grouper.

Sector	ACL Value	ACL for Species	AM	Implementing Amendment
Commercial	352,940 lbs gutted weight	Gag grouper	Close shallow water grouper including red grouper, if projected to reach gag ACL.	Amendment 16
Commercial	662,403 lbs gutted weight	Gag grouper, red grouper, black grouper	Close shallow water grouper including red grouper, if projected to reach aggregate ACL.	Amendment 17B
Recreational	648,663 lbs gutted weight	Gag grouper, red grouper, black grouper	Once ACL is projected to be met and any one of the three species are listed as overfished (currently red grouper is), harvest of the three species will be prohibited. Evaluate landings using average as described in the regulations. Without regard to overfished status, if landings exceed the ACL, the following year's ACL will be reduced by the overage. Evaluate landings using average as described in the regulations.	Amendment 17B

Proposed ACLs and AMs

The preferred alternative will eliminate the commercial and recreational sectors' aggregate ACLs and AMs for black grouper, gag grouper, and red grouper outlined in Table 1. The aggregate ACLs and AMs will be replaced by individual red grouper ACLs and AMs in Amendment 24 (gag grouper and black grouper already have individual ACLs, established in Amendment 16 and the Comprehensive ACL Amendment, respectively). The in-season AM will close each sector (commercial and recreational) when the respective ACL is projected to be met. If a sector ACL is exceeded, the Regional Administrator will publish a notice to reduce that sector's ACL in the following season by the amount of the overage.

Minimum Stock Size Threshold (MSST)

The Council is proposing to change the current definition of overfished for red grouper from SSB_{MSY}((1-M) or 05, whichever is greater) to 75 percent of SSB_{MSY}. The M and SSB_{MSY} are the natural mortality rate and spawning biomass, respectively, when fishing at the MSY level. The proposed action, if implemented, will lower the MSST value from 4,914,053 to 4,285,742 lbs ww. The current value for SSB_{MSY} is 5,714,324 lbs ww, and M is 0.14 as determined by the most recent stock assessment. The justification for the change is to relieve a potential economic burden on fishermen. The red grouper stock is long-lived, and the correspondingly low values of M put the biomass limit (MSST) very close to the biomass target (SSB_{MSY}). Thus, stock biomass could fluctuate between an overfished and rebuilt status due to natural variation in recruitment. Lowering the MSST value will account for this natural variation and help ensure that a rebuilding plan, including necessary fishing restrictions, is implemented only if the stock is overfished.

Lowering the MSST could result in adverse biological impacts to the stock if biomass decreases to levels beyond those expected through natural variations in recruitment before fishery managers are made aware of the overfished condition. However, the Magnuson-Stevens Act requires a rebuilding plan for stocks determined to be overfished, and with the Act's reauthorization in 2007, also requires the establishment of a system of ACLs and AMs to prevent overfishing and achieve OY. As stated in the Southeast Fisheries Science Center evaluation of the MSST issue in a recent report (Appendix D of the EA):

> When specifying an appropriate buffer between the biomass limit and biomass target (e.g., defining a, b, and c above), it may be worth considering that biomass controls are the second tier of a two-tiered system. With reauthorization of the Magnuson-Stevens Act came stricter requirements on fishing mortality (the first tier) through the use of annual catch limits and accountability measures. The intent of ACLs and AMs is to end overfishing for all managed stocks. Their use is expected to help accomplish management objectives, including rebuilding stocks that are marginally below an optimal level.

This point was also made by the Council's Scientific and Statistical Committee (SSC) in their April 2011 report: "The SSC saw no reason to reconsider the MSST values because red grouper had been previously rated as a Tier 1-assessed stock with a P* of 30 percent (and hence a 70 percent expected success rate at rebuilding)." In the Council's ABC Control Rule, established in the Comprehensive ACL Amendment, Tier-1 are assessed stocks and P* is the percent probability of overfishing.

The Council's ability to restrain the fishing mortality rate to ensure overfishing is not occurring (i.e., keeping harvest below ACLs through the regulations and system of AMs) is important in the conservation of the stock and ensuring the success of a rebuilding plan. The Council believes that with the establishment of ACLs and AMs for red grouper, changing the definition of overfished will reduce the likelihood of future adverse economic effects on fishermen while ensuring that the red grouper stock will rebuild and remain in a rebuilt status.

Finding of No Significant Impact

National Oceanic and Atmospheric Administration Administrative Order 216-6 (NAO 216-6) (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 2 16-6 criteria and CEQ's context and intensity criteria. These include the following criteria:

1) Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?

Response: No. The proposed action will not be expected to jeopardize the sustainability of any target species. Red grouper is overfished and a rebuilding plan has not been implemented. This amendment will establish a plan to rebuild the red grouper stock, in addition to specifying ACLs and AMs. As discussed in Section 4.3.1 of the EA, these actions will be expected to increase the sustainability of the stock as it implements catch limits, catch targets, and measures to ensure catch stays within these levels. The rebuilding plan will end overfishing immediately upon implementation and will have an 81 percent probability of rebuilding the stock in 10 years.

As discussed in Section 5.2 of the EA, The Council's ability to restrain the fishing mortality rate to ensure overfishing is not occurring (i.e., keeping harvest below ACLs through the regulations and system of AMs) is important in the conservation of the stock and ensuring the success of a rebuilding plan. The Council believes that with the establishment of ACLs and AMs for red grouper, changing the definition of overfished will reduce the likelihood of future adverse economic effects on fishermen while ensuring that the red grouper stock will rebuild and remain in a rebuilt status.

The removal of the three species aggregate ACL and AM for gag grouper, black grouper, and red grouper in this amendment will not adversely affect the stock. Although the aggregate ACL and AMs offer additional methods to prohibit harvest, this amendment will establish red grouper individual ACLs and AMs. Gag grouper ACLs and AMs are in place, and the Comprehensive ACL Amendment established black grouper ACLs and AMs. All three species' ACLs are based on the SSC's catch recommendation using the best available scientific information from Southeast Data, Assessment, and Review (SEDAR) stock assessments. In contrast, the aggregate ACLs were based on catch history for black grouper and red grouper that was available prior to the completion of more recent stock assessments for these species.

The actions in Amendment 24 will not result in a significant increase in bycatch mortality. Although bycatch of red grouper could increase if fishermen continue to encounter red grouper once the ACL is reached and red grouper is closed to possession and retention, the most recent stock assessment indicates 80 percent of incidentally-caught red grouper will survive if released. Furthermore, it is possible fishermen will fish in specific areas to avoid red grouper if the ACL is reached.

2) Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

Response: No. The Council's proposed action is not anticipated to have such effects on non-target species. In certain circumstances fishery management actions can adversely impact non-target species by increasing bycatch, reducing habitat availability, or altering predator-prey relationships, However, Amendment 24 will not change the existing management measures pertaining to seasonal closures, minimum size limits, or bag limits, and is not expected to appreciably changing fishing behavior.

A bycatch practicability analysis (BPA) is included in Appendix G. Species that are most likely to co-occur with red grouper include: Gag grouper; gray triggerfish; greater amberjack; red snapper; scamp; and vermilion snapper. The agency concluded that the actions in Amendment 24 could increase bycatch of red grouper if the ACL is reached and red grouper is closed to possession and retention. The recent stock indicates 80 percent of incidentally-caught red grouper will survive if released. Negative effects to non-target species are not anticipated.

3) Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Stevens Act) and defined in the Fishery Management Plan for the Snapper- Grouper Fishery of the South Atlantic Region (FMP)?

Response: No. The area affected by the proposed actions in the snapper-grouper fishery has been identified as essential fish habitat for the Shrimp, Snapper-Grouper, Coral, Dolphin Wahoo, *Sargassum*, and Golden Crab FMPs of the Council; the Coastal Migratory Pelagics and Spiny Lobster joint FMPs of the Gulf and South Atlantic Councils; the Bluefish and Squid/Mackerel/Butterfish FMPs of the Mid-Atlantic Council, and the Tuna/Swordfish/Shark and Billfish FMPs of NOAA Fisheries Service's Highly Migratory Species Division. Although fishery management actions can adversely affect habitat by gear interactions with the seafloor and/or redistributing fishing effort over more vulnerable habitat, the proposed action is not anticipated to have such an effect. Fishing effort is not expected to increase as a result of this action, nor are changes in fishing technique or behavior expected. Additionally, the Council has implemented a number of gear restrictions designed to minimize adverse effects of the snapper-grouper fishery on particularly vulnerable or valuable habitat. Therefore, the proposed action will not result in substantial impacts to coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs.

4) Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

Response: No. The actions in Amendment 24 are not expected to have any adverse affects on public health. Although fishery management actions can sometimes affect public safety by eliminating or minimizing fishermen's flexibility to decide when, where, and how to fish, the proposed actions are not expected to have such an effect. The actions do not include new closed areas, closed seasons, or gear restrictions, and are not expected to change fishing techniques or operations in a way that will impact the safety of commercial or recreational fishermen.

5) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

Response. No. Fishery management actions can adversely affect species or habitat protected by the Endangered Species Act (ESA) or Marine Mammal Protection Act(MMPA) ESA-listed species the purview of NOAA Fisheries Service occurring in the action area include species of marine mammals, sea turtles, and corals ("Acropora"), as well as smalltooth sawfish, and two distinct population segments (DPSs) of Atlantic sturgeon. Coral critical habitat and North Atlantic right whale critical habitat also occur in the action area. The proposed alternatives are unlikely to alter fishing in ways that will cause new adverse affects to species or critical habitat that was not previously considered.

NOAA Fisheries Service completed a biological opinion (opinion) on the South Atlantic snapper-grouper fishery on June 7, 2006. The opinion concluded the continued authorization of the fishery would not affect marine mammals and is not likely to jeopardize the continued existence of any other ESA-listed species. Subsequent to the June 7, 2006, opinion, elkhorn and staghorn coral (*Acropora cervicornis* and *Acropora palmata*) were listed as threatened. In a consultation memorandum dated July 9, 2007, NOAA Fisheries Service concluded the continued authorization of the South Atlantic snapper-grouper fishery is not likely to adversely affect these *Acropora* species. On November 26, 2008, an *Acropora* critical habitat was designated. In a consultation memorandum dated December 2, 2008, NOAA Fisheries Service concluded the continued authorization of the snapper-grouper fishery is not likely to adversely affect *Acropora* critical habitat.

On September 22, 2011, NOAA Fisheries Service and the U.S. Fish and Wildlife Service determined the loggerhead sea turtle population consists of nine DPSs (76 FR 58868). Previously, loggerhead sea turtles were listed as threatened species throughout their global range. The snapper-grouper fishery interacts with animals from what is now considered the Northwest Atlantic DPS, which remains listed as threatened.

On February 6, 2012, the final rule listing Atlantic sturgeon under the ESA was published in the Federal Register with an effective date of April 6, 2012. In a consultation memorandum dated February 15, 2012, NOAA Fisheries Service concluded the continued authorization of the South Atlantic snapper-grouper fishery, is not likely to adversely affect the Carolina or South Atlantic distinct population segments (DPSs) of Atlantic sturgeon. A memorandum dated February 21, 2012, determined Amendment 24 will not affect endangered and threatened species or critical habitat in any manner not previously considered.

There are 31 different species of marine mammals that may occur in the EEZ of the South Atlantic region. All 31 species are protected under the MMPA and six are also listed as endangered under the ESA (i.e., sperm, sei, fin, blue, humpback, and North Atlantic right whales). The Southeastern U.S. Atlantic snapper-grouper fishery is classified as a Category III fishery, meaning the annual mortality and serious injury of a marine mammal resulting from the fishery is less than or equal to one percent of the maximum number of animals, not including natural moralities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

> 6) Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g. benthic productivity, predator-prey relationships, etc.)

Response: No. Although fishery management actions can impact biodiversity and ecosystem function by altering predator-prey relationships and damaging habitat, the proposed action is not expected to have such an effect. The affected area includes the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West. Establishing ACLs, AMs, and a rebuilding plan for red grouper is expected to ensure overfishing does not occur and allow biomass to increase to a sustainable level. As a result, population structure and predator-prey relationships that are more representative of a healthy stock will be established. Addressing overfishing of red grouper and implementing mechanisms to prevent future overfishing from occurring will benefit, but not substantially impact, the biodiversity and ecosystem function.

> 7) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: No. There are no significant social or economic impacts interrelated with natural or physical environmental effects because significant social or economic impacts are not expected to occur. In the context of the fishery as a whole, the social and economic impacts of the preferred alternatives are not expected to be significant because the expected magnitude of the net effects of the proposed actions comprise a relatively small portion of the entire economic and social activities associated with the snapper-grouper fishery in the South Atlantic. In conjunction with all the other preferred alternatives, the preferred alternative that equates the ACL to the ABC, as defined by the preferred rebuilding strategy, is predicted to have the greatest economic impacts by generating an additional $180,000 in net operating revenue when compared to Alternative 1 (No Action) over ten years and assuming a discount rate of 7 percent. Overall, the net operating revenues for all commercial vessels in the South Atlantic snapper-grouper fishery are estimated at $10 million annually, so the increase is relatively minor compared to total revenues in the fishery. The preferred ACL alternative is estimated to increase the consumer surplus of the recreational sector by $0.84 million to $3.86 million over four years, or $3.07 million to $14.1 million over ten years. Although there is no estimate of total consumer surplus for snapper-grouper in the South Atlantic, it is very likely the changes in consumer surplus from the ACL alternatives would be small relative to total snapper-grouper consumer surplus. This can be inferred from the relative size of the red grouper recreational sector. Red grouper accounts for only about 5 percent of total snapper grouper harvests, 0.04 percent of total target trips, and 2 percent of total catch trips. The very low level of target trips for red grouper is particularly important because target trips play a critical role in generating economic surplus.

8) Are the effects on the quality of the human environment likely to be highly controversial?

Response: No. Though there may be some degree of controversy in the future if the red grouper fishery closes in-season, the effects on the quality of the human environment are not likely to be highly controversial for the following reasons: (1) whether in-season closures will occur is uncertain; and (2) the possibility of an in-season closure of the red grouper fishery currently exists.

Recreational landings of red grouper in 2010 were 98,419 lbs ww. The proposed recreational ACL is 362,320 lbs ww. Based on a comparison of 2010 landings and 2012 ACL, there is a low probability that the recreational ACL will be met and a low probability of an in-season closure. Commercial landings of red grouper in 2010 were 327,258 lbs ww. The proposed commercial ACL is 284,680 lbs ww. Based on a comparison of 2010 landings and 2012 ACL, there may be an in-season closure of the commercial red grouper sector. However, the possibility of an in-season closure of red grouper for the commercial sector currently exists because of the black grouper, gag grouper, and red grouper aggregate ACL/AM and the gag ACL/AM. Currently, once the aggregate ACL or the gag grouper ACL are projected to be met, harvest of all shallow water groupers is prohibited.

9) Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?

Response: No. The U.S. Monitor, Gray's Reef, and Florida Keys National Marine Sanctuaries are within the boundaries of the South Atlantic EEZ. However, the proposed actions are not expected to result in substantial impacts to these unique areas or other historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas because of their limited scope. The actions in the amendment establish ACLs and AMs for red grouper and implement a rebuilding plan. These actions are not expected to result in appreciable changes to current fishing practices.

10) Are the effects on the human environment likely to be highly uncertain or involve unique and unknown risks?

Response: No. The amendment will establish ACLs and AMs for red grouper and implement a rebuilding plan. ACLs and AMs are specified using the best available scientific information and a transparent process. Further, ACLs and AMs are currently in place for most federally-managed stocks. There are no foreseen effects on the human environment that may be highly uncertain or involve unique and unknown risks as a result of any of the actions contained in Amendment 24.

11) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: No. Proposed management actions would update management reference points for red grouper, specify sector ACLs and AMs, and establish a rebuilding plan for the South Atlantic red grouper stock. Because management measures implemented through Amendment 16 restricted harvest of red grouper through the extension of the snapper grouper spawning season closure and the reduction of the aggregate grouper bag limit, it is unlikely further restrictions will be needed to end overfishing of the stock within the specified rebuilding timeframe. Therefore, cumulative impacts that may result from actions in this amendment are likely to be negligible and the proposed actions are not related to other actions with individually insignificant, but cumulatively significant impacts. Therefore, there are no foreseeable significant additive or interactive effects as a result of the proposed action.

12) Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?

Response: No. The environment affected by the action does not include districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places. However, the U.S. Monitor, Gray's Reef, and Florida Keys National Marine Sanctuaries are within the boundaries of the South Atlantic EEZ. The proposed actions are not likely to cause loss or destruction of significant scientific, cultural, or historical resources such as these national marine sanctuaries because the actions, which establish ACLs and AMs for red grouper and implement a rebuilding plan, are not expected to result in appreciable changes to current fishing practices.

13) Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

Response: No. The implementation of a rebuilding plan for red grouper will not introduce or spread any non-indigenous species because it does not change existing fishing practices or otherwise involve non-indigenous species.

14) Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?

Response: No. The proposed action does not establish a precedent for future action with significant effects or represent a decision in principle about a future consideration because management reference points, allocations, and management measures are currently in place, all of which are long established legal requirements of fishery management plans.

15) Can the proposed action reasonably be expected to threaten a violation of Federal, State or local law requirements imposed for the protection of the environment?

Response: No. The proposed action is not likely to impose or cause a violation of federal, state, or local law or requirements imposed for the protection of the environment. A thorough analysis of other applicable laws related to the implementation of Amendment 24 was conducted, and an environmental assessment fulfills the mandates set forth in the National Environmental Policy Act (NEPA). These analyses revealed all actions contained in the amendment and its associated NEPA documentation are in compliance with all federal, state, and local laws.

16) Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target or non-target species?

Response: No. The proposed actions are not expected to result in any cumulative adverse effects that could have a substantial effect on the target species or non-target species. A cumulative effects analysis was conducted for Amendment 24 and revealed negligible cumulative adverse effects on the biological environment.

Determination

In view of the information presented in this document and the analysis contained in the supporting Environmental Assessment, I have determined that the Preferred Alternatives will not significantly impact the quality of the human environment as described above and in the supporting Environmental Assessment. In addition, all beneficial and adverse impacts of the proposed action have been identified and analyzed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement for this action is not necessary.

Roy E. Crabtree, Ph.D.
Regional Administrator
National Marine Fisheries Service
Southeast Regional Office

5/23/12
Date