Regulatory Amendment 22 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region

Revise the annual catch limits (ACLs) and optimum yield (OY) for gag and wreckfish, and revise management measures for gag

Environmental Assessment Regulatory Impact Review Regulatory Flexibility Act Analysis

February 26, 2015

Definitions, Abbreviations, and Acronyms Used in the Document

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

SAFMC 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

Regulatory Amendment 22 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region

Documents:	Regulatory Amendment 22 Environmental Assessment Regulatory Impact Review, Regulatory Flexibility Act Analysis
Proposed actions:	This amendment proposes modifications to the annual catch limits and optimum yield for gag; recreational bag limit for gag; and annual catch limits and optimum yield for wreckfish
Lead agency:	Regulatory Amendment 22 – South Atlantic Fishery Management Council EA/RIR/RFA – National Marine Fisheries Service (NMFS)
For Further Information Contact:	South Atlantic Fishery Management Council 4055 Faber Place, Suite 201 North Charleston, SC 29405 843-571-4366 866-SAFMC-10 Myra Brouwer Myra.Brouwer@safmc.net NMFS, Southeast Region 263 13th Avenue South St. Petersburg, FL 33701 727-824-5305 Mary Janine Vara Mary.Vara@noaa.gov

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Summary

What Action Is Being Proposed?

Regulatory Amendment 22 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP) proposes to adjust the annual catch limits (ACL) and optimum yield (OY) for gag and wreckfish, and modify the recreational bag limit for gag within the aggregate bag limit.

Who is Proposing the Action?

The South Atlantic Fishery Management Council (South Atlantic Council) is proposing Regulatory Amendment 22 to the Snapper Grouper FMP (Regulatory Amendment 22). The South Atlantic Council recommends management measures to the National Marine Fisheries Service (NMFS) who ultimately implements the actions in the framework amendment through the development of regulations on behalf of the Secretary of Commerce. NMFS is a line office in the National Oceanic and Atmospheric Administration within the Department of Commerce.

Purpose for Action

The *purpose* for the amendment is to: adjust annual catch limits (ACL) and optimum yield (OY) for gag and wreckfish, and assess the need to modify the recreational bag limit for gag.

Need for Action

The *need* for the amendment is to: (1) address the recent stock assessment results for gag and wreckfish, and prevent overfishing while minimizing, to the extent practicable, adverse social and economic effects; and (2) to ensure the gag recreational bag limit is set at an appropriate level to foster sustainable harvest rates of the species.

Why are the South Atlantic Council and NMFS Considering Action?

Revise the Annual Catch Limits (ACL) and Optimum Yield (OY) for Gag

In 2006, the South Atlantic gag (*Mycteroperca microlepis*) stock was assessed through Southeast Data Assessment and Review (SEDAR) and found to be undergoing overfishing and approaching an overfished condition (SEDAR 10 2006). Measures to end overfishing were contained in Amendment 16 to the Snapper Grouper FMP (SAFMC 2009a). The assessment was updated in 2014 including data through 2012, to provide new information on stock status and projections (SEDAR 10 Update 2014). The 2014 assessment indicated that the stock is undergoing overfishing based on the average fishing mortality rates from 2010-2012, but is not overfished. The South Atlantic Council's Scientific and Statistical Committee (SSC) noted that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing did not occur in 2012 and 2013 (SAFMC SSC report, April 2014). A letter from NMFS to the South Atlantic Council Chairman dated September 8, 2014, stated that gag is neither overfished nor undergoing overfishing.

At their April 2014 meeting, the South Atlantic Council's SSC stated that the update assessment is the best scientific information available and concluded it could be used for management of the gag resource in the South Atlantic. Revisions in the data and methods were reasonable and the SSC determined that the assessment can be used for catch level recommendations. The SSC recommended using 5-year projections at P*=50% for overfishing limit and at P*=30% for acceptable biological catch (ABC). Hence, the South Atlantic Council is taking action through Regulatory Amendment 22 to adopt the SSC's recommendations and revise the ACL and OY for gag to ensure overfishing does not occur.

Modify the recreational bag limit for gag within the aggregate bag limit

Less than half of the recreational ACL for gag has been met each year since it was put in place in 2011. Furthermore, it is not anticipated that the new recreational ACL proposed in Regulatory Amendment 22 would be met if landings are maintained at their current levels. Thus, the South Atlantic Council considered the need to modify the recreational bag limit for gag.

Revise the Annual Catch Limits (ACL) and Optimum Yield (OY) for Wreckfish

A statistical catch-at-age assessment of the wreckfish stock in the South Atlantic was initially conducted in 2012. Following the November 2012 SSC meeting, and based on the recommendations of the SSC, the South Atlantic Council adopted a new third-party peer review process in 2013, and determined that this assessment should be subject to that process. Following this process, the SSC reviewed the revised assessment at their April/May 2014 meeting, accepted it as representing the best scientific information available on the current status of wreckfish in South Atlantic waters, and recommended it as appropriate for management decisions. Hence, the South Atlantic Council, through Regulatory Amendment 22, is taking action to update the wreckfish ACL and OY based on the SSC's recommendations for ABC and OFL.

Summary of Effects

Alternatives for Action 1

(Preferred alternatives in **bold**)

1. No Action. Retain the current annual catch limits (ACL) and optimum yield (OY) for gag. Optimum Yield (OY) will remain equal to the yield produced by F_{OY} (Amendment 16). If a stock is overfished, F_{OY} remains equal to the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. ABC = 805,000 pounds gutted weight (lbs gw; landings only); OFL = Yield at F_{MSY} = 903,000 lbs gw. The total ACL (Yield at 75%F_{MSY}) will continue to be 694,000 lbs gw. Commercial and recreational allocations will continue to be 51% and 49%, respectively. The directed commercial ACL will continue to be 326,722 lbs gw (reduced from 353,940 lbs gw commercial ACL to account for gag discard mortality from commercial trips that target co-occurring species (i.e., red grouper and scamp) during a gag closure). The recreational ACL will continue to be 340,060 lbs gw. Currently, there are no ACTs for gag.

2. ACL = OY = ABC projected landings from 2015-2019 with P*=0.3. The ACL for 2019 would remain in place until modified.

3. Preferred. ACL = OY = 0.95*Proposed ABC. The ACL for 2019 would remain in place until modified.

4. ACL = OY = 0.90*Proposed ABC. The ACL for 2019 would remain in place until modified.

5. ACL = OY = 0.80*Proposed ABC. The ACL for 2019 would remain in place until modified.

Action 1. Revise the annual catch limits (ACL) and optimum yield (OY) for gag

Biological Effects

Retaining the ACLs and OY specified in **Alternative 1 (No Action)** would not update harvest parameters for gag using the best scientific information available from the recent stock assessment update. Under **Alternatives 2-5,** the P* approach, which is a component of the ABC control rule, is used to specify the ABC and the overfishing limit (OFL) values, where P* is equal to the acceptable probability of overfishing. A smaller P* provides a larger buffer against overfishing, resulting in reduced catches. Under these alternatives, the ACL and OY for gag are updated based upon results from the updated gag assessment, and recommendations from the South Atlantic Council's SSC, and have a greater positive biological effect on the stock by reducing the commercial and recreational ACLs.

Alternative 2 would set the ACL equal to the ABC (**Table S-1**). The National Standard 1 (NS 1) guidelines indicate the ACL may typically be set very close to the ABC. **Alternative 3 (Preferred)** would set the ACL at 95% of the ABC, and the quota would be set below the ACL to account for discard mortality (**Table S-2**). **Alternatives 3 (Preferred)**, **4**, and **5** would have a greater positive biological effect than **Alternative 2** because they would create a buffer between the ACL/OY and the ABC, with **Alternative 5** setting the most conservative ACL at 80% of the ABC (**Tables S1-S4**). Creating a buffer between the ACL/OY and ABC would provide greater assurance that overfishing is prevented and the long-term average biomass is near or above the biomass associated with MSY. 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. With vastly improved commercial monitoring mechanisms recently implemented, it is unlikely that repeated commercial ACL overages would occur. Thus, there may not be a biological need to set the ACL below the ABC.

Regulatory Amendment 15 to the Snapper Grouper FMP (SAFMC 2013a) reduced the gag commercial ACL by 27,218 pounds gutted weight (lbs gw) from 353,940 lbs gw to 326,722 lbs gw to account for discard mortality of gag that would result from targeting other shallow water groupers (i.e., red grouper and scamp) after harvest of gag is closed. The gag ACL was adjusted for post-quota bycatch mortality in accordance with analyses in Amendment 16 to the Snapper Grouper FMP (SAFMC 2009a), and the reduction in the gag ACL was calculated by determining the pounds of gag lost from discard mortality if eliminated target trips still occurred but instead of targeting gag they fished for co-occurring shallow water groupers. A discard mortality rate of 40% was applied to the pounds of gag caught to estimate dead discards in pounds. Additionally, during development of Amendment 16, the Snapper Grouper Advisory Panel and other fishermen reported that their trips would be reduced by 20% after a gag quota closure. To get an additional estimate of dead discards, target trips were decreased by 20% to estimate pounds of gag lost to discard mortality. Total dead discards in pounds were calculated by combining the pounds of gag lost to discard mortality from non-target trips with the pounds of gag lost to discard mortality from target trips switching to target other shallow water grouper. This analysis is described in detail in Appendix E of Regulatory Amendment 15 (SAFMC 2013a). The update assessment (SEDAR 10 Update 2014) included data through 2012, *before* regulations were changed in 2013 to remove the accountability measure that prohibited harvest of all shallow water groupers (red grouper, black grouper, scamp, yellowmouth grouper, yellowfin grouper, red hind, rock hind, graysby, and coney) once the commercial ACL for gag was met. When the next assessment is conducted, these discards will be included in the discard estimate from the assessment and an adjustment to the ACL will not be required.

Table S-1. ABC and ACLs for gag specified under Alternative 2 where ACL = OY = ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	666,000	339,660	312,442	326,340
2016	671,000	671,000	342,210	314,992	328,790
2017	713,000	713,000	363,630	336,412	349,370
2018	748,000	748,000	381,480	354,262	366,520
2019	773,000	773,000	394,230	367,012	378,770

All values in pounds gutted weight (lbs gw)
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Table S-2. ABC and ACLs for gag specified under **Alternative 3 (Preferred)** where ACL = OY = 95%ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	632,700	322,677	295,459	310,023
2016	671,000	637,450	325,100	297,882	312,351
2017	713,000	677,350	345,449	318,231	331,902
2018	748,000	710,600	362,406	335,188	348,194
2019	773,000	734,350	374,519	347,301	359,832

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Table S-3. ABC and ACLs for gag specified under Alternative 4 where ACL = OY = 90%ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	599,400	305,694	278,476	293,706
2016	671,000	603,900	307,989	280,771	295,911
2017	713,000	641,700	327,267	300,049	314,433
2018	748,000	673,200	343,332	316,114	329,868
2019	773,000	695,700	354,807	327,589	340,893

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Table S-4. ABC and ACLs for gag specified under Alternative 5 where ACL = OY = 80%ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	532,800	271,728	244,510	261,072
2016	671,000	536,800	273,768	246,550	263,032
2017	713,000	570,400	290,904	263,686	279,496
2018	748,000	598,400	305,184	277,966	293,216
2019	773,000	618,400	315,384	288,166	303,016

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Economic Effects

Whenever ACLs are changed, economic effects can be expected if the changes have an effect on the number of fish or trips that can or would be taken by a sector. When the commercial sector's ACL decreases, it can be expected that there would be negative direct effects in that fewer trips would be taken. When the recreational sector's ACL is reduced, the overall consumer surplus (CS) would be reduced in those years.

In terms of economic effects, for both the commercial and recreational sectors, compared to **Alternative 1 (No Action)**, **Alternative 2** would be expected to result in the best change in economic benefits (a net increase in commercial revenue and angler consumer surplus), followed by **Alternative 3 (Preferred)**, **Alternative 4**, and **Alternative 5**, each of which would be expected to result in a net decrease in economic benefits (commercial revenue and angler CS).

Social Effects

Gag is an important component to the commercial species landed in several North Carolina and South Carolina communities, in addition to potentially being an important recreational species. Changes to the ACL and access to the resource could affect individuals and businesses in these communities.

In general, the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue, assuming harvest does not result in overfishing and long-term management goals are met. Adhering to sustainable harvest through an ACL is assumed to result in net long-term positive social and economic benefits. **Alternative 1 (No Action)**, which specifies an ACL higher than the SSC's catch level recommendation, could be expected to be the most beneficial for fishermen in 2015 and 2016 unless it results in overfishing. **Alternative 1 (No Action)**, however, would result in an ACL that is higher than the ABC recommended by the South Atlantic Council's SSC which would not be in compliance with the Magnuson-Stevens Fishery Conservation and Management Act. However, the increase in the ACL during 2017-2019 under **Alternative 2** would likely result in greater social benefits for the commercial and recreational fleets than **Alternative 1 (No Action)**. Incorporating a buffer between ABC and ACL under **Alternatives 3 (Preferred)-5** and decreasing the available quota for gag could have negative effects on fishermen and communities if access to the gag resource is restricted due to triggering accountability measures (AMs).

Additionally, adjustments in an ACL based on updated information from a stock assessment would have the most long-term benefits to fishermen and communities because catch limits would be based on the current conditions, even if the updated information indicates that a lower ACL is appropriate to sustain the stock. **Alternatives 2-5** would incorporate new information and recommendations and would be more beneficial in the long term to communities and fishermen than **Alternative 1 (No Action)**.

Action 2. Modify the recreational bag limit for gag within the aggregate bag limit

Alternatives for Action 2

(Preferred alternatives in **bold**)

1 (Preferred). No Action. Retain the current aggregate grouper bag limit of 3 fish. Within this limit, only one fish can be a gag or black grouper.

2. Increase the gag bag limit to 2 fish within the 3 fish aggregate bag limit. Only one fish within the aggregate can be a black grouper.

3. Increase the gag bag limit to 3 fish within the 3 fish aggregate bag limit. Only one fish within the aggregate can be a black grouper.

Biological Effects

Under **Preferred Alternative 1 (No Action)**, there would be a continued positive biological benefit for gag by limiting harvest to 1 gag or black grouper per person per day within the 3-grouper aggregate. National Standard 1 (NS 1) establishes the relationship between conservation and management measures, preventing overfishing, and achieving OY from each stock, stock complex, or fishery. The long-term objective is to achieve OY through annual achievement of an ACL; however, the recreational fishermen have not harvested the gag ACL in several years, which could be due to the 1-fish bag limit. **Alternative 2** and **Alternative 3** would increase the gag bag limit to two and three gag per person per day; respectively, within the 3-grouper aggregate to help achieve the recreational ACL proposed in **Action 1**. The black grouper bag limit would remain at 1 per person per day within the aggregate grouper bag limit. When compared to **Preferred Alternative 1 (No Action)**, the biological consequences of increasing the recreational gag bag limit within the 3-fish aggregate grouper bag limit under **Alternative 2** and **Alternative 3** are likely to be negligible, since the updated SEDAR 10 Update (2014) stock assessment and information included below (**Tables S-5** and **S-6**) indicate that the 3-fish aggregate bag limit is only rarely met by recreational anglers. Additionally, the gag recreational ACL has not been met during the past 4 fishing years: 23% of the recreational ACL was met in 2013, 52% in 2012, 49.9% in 2011, and 50.5% in 2010. If the ACL is met, AMs are in place to ensure overfishing does not occur. **Alternatives 2** and **3** would change the allowance of 1 gag or black grouper within the 3-fish aggregate grouper bag limit to 1 black grouper within the grouper aggregate, which could potentially increase the black grouper harvest. However, the low catch per angler for gag and/or black grouper trips (**Table S-5**) indicates that it is unlikely that the increase in the black grouper bag limit under **Alternatives 2** and **3** within the 3-fish grouper aggregate would have much effect on black grouper landings. Furthermore, increasing the gag bag limit within the grouper aggregate bag limit under **Alternative 2** and **Alternative 3** is not likely to increase harvest of other groupers and tilefish within the aggregate. **Table S-7** suggests that only a portion of the recreational gag ACL would be reached under the proposed bag limits in **Alternatives 2** and **3**.

Table S-5. Number of trips that caught a species in aggregate grouper bag limit and the average landings per angler per trip (LPA) by year from the MRIP data.

		2009	2010	2011	2012	2013
Aggregate	Trips that caught an aggregate fish	145	448	278	446	359
	Positive aggregate trips (landed an aggregate fish)	72	139	96	167	118
	Trips that with aggregate LPA ≥ 3	3	8	5	16	12
	Average aggregate LPA, all aggregate trips (max = 3)	0.45	0.29	0.29	0.34	0.33
	Average aggregate LPA, positive trips (max = 3)	0.90	0.92	0.84	0.90	1.0
Gag	Trips that landed gag	27	38	28	52	24
	Trips that discarded gag	38	121	93	154	78
	% aggregate trips that landed gag	19%	8%	10%	12%	7%
	Average gag LPA, all aggregate trips (max = 1)	0.07	0.05	0.05	0.05	0.03
	Average gag LPA, positive trips (max = 1)	0.40	0.53	0.50	0.43	0.47
Black grouper	Trips landed black grouper	6	11	7	18	16
	% all aggregate trips that landed black grouper	4%	2%	3%	4%	4%
	Average black grouper LPA, all aggregate trips (max = 1)	0.03	0.01	0.02	0.02	0.02
	Average black grouper LPA, positive trips (max = 1)	0.65	0.33	0.78	0.46	0.43
Gag and black grouper	Trips landed gag and/or black grouper	33	48	35	69	40
	% all aggregate trips that landed gag and/or black grouper	23%	11%	13%	15%	11%
	Trips where gag/ black grouper LPA ≥ 1	3	10	8	13	6
	Trips landing both gag and black grouper	0	1	0	1	0
	Average gag/black grouper LPA, all aggregate trips	0.10	0.05	0.07	0.07	0.05
	Average gag/black grouper LPA, positive trips	0.44	0.50	0.56	0.45	0.45

Table S-6. Number of trips that caught a species in aggregate grouper bag limit and the average landings per angler per trip (LPA) by year from the HBS data.

		2009	2010	2011	2012	2013
Aggregate	Trips that caught an aggregate fish	4967	4916	3772	4572	4423
	Positive aggregate trips (landed an aggregate fish)	2583	2344	1988	1926	2007
	Trips with aggregate LPA ≥ 3	23	12	32	47	20
	Average aggregate LPA, all aggregate trips (max = 3)	0.13	0.13	0.16	0.13	0.12
	Average aggregate LPA, positive trips (max = 3)	0.24	0.28	0.31	0.30	0.27
Gag	Trips that landed gag	1177	1122	922	674	663
	Trips that discarded gag	2048	1760	1428	1855	913
	% aggregate trips that landed gag	24%	23%	24%	15%	15%
	Average gag LPA, all aggregate trips (max = 1)	0.03	0.03	0.03	0.02	0.02
	Average gag LPA, positive trips (max = 1)	0.12	0.14	0.14	0.13	0.10
Black grouper	Trips landed black grouper	138	138	176	163	240
	% all aggregate trips that landed black grouper	3%	3%	5%	4%	5%
	Average black grouper LPA, all aggregate trips (max = 1)	0.003	0.003	0.006	0.004	0.007
	Average black grouper LPA, positive trips (max = 1)	0.10	0.12	0.13	0.12	0.13
Gag and black grouper	Trips landed gag and/or black grouper	1293	1240	1085	823	865
	% all aggregate trips that landed gag and/or black grouper	26%	25%	29%	18%	20%
	Trips where gag/black grouper LPA≥ 1	18	19	15	20	6
	Trips landing both gag and black grouper	22	20	13	14	38
	Average gag/black grouper LPA	0.03	0.04	0.04	0.02	0.02
	Average gag/black grouper LPA, positive trips	0.12	0.14	0.14	0.13	0.11

Table S-7. Projected landings of gag (lbs gw) under proposed bag limits.

ACL	Bag Limit	Projected			
		Closure date	Days Open*	Landings	% ACL
ACL = ABC: 326,340 lbs gw	Status Quo	12/31	245	98,582	30%
	Gag Bag limit = 2			133,587	41%
	Gag Bag limit = 3			168,592	52%
ACL = 95%ABC: 310,023 lbs gw	**Status Quo**	**12/31**	**245**	**98,582**	**32%**
	Gag Bag limit = 2			**133,587**	**43%**
	Gag Bag limit = 3			**168,592**	**54%**
ACL = 90%ABC 293,706 lbs gw	Status Quo	12/31	245	98,582	34%
	Gag Bag limit = 2			133,587	45%
	Gag Bag limit = 3			168,592	57%
ACL = 80%ABC 261,072 lbs gw	Status Quo	12/31	245	98,582	38%
	Gag Bag limit = 2			133,587	51%
	Gag Bag limit = 3			168,592	65%

*120 days correspond to the 4-month spawning season closure

Economic Effects

The bag limit analysis, which takes into account the possible ACLs from **Action 1**, indicates that the entire recreational ACL is not expected to be caught under any of the alternatives under **Action 2** (**Table S-7**). Allowing recreational fishermen to keep as many fish as possible without exceeding their sector ACL could increase both CS for the fishermen, and NOR for the for-hire portion of the sector.

Based on the assumptions of the bag limit analysis, and relative to **Preferred Alternative 1 (No Action)**, **Alternative 3** is expected to have greater increase in CS than would be expected under **Alternative 2**. The overall increase in CS for recreational trips is expected to be minor. The for-hire target effort is so low that no expected change would occur, hence, no increase in NOR is expected. However, note that additional benefits may be received if there is an increase in for-hire target effort (due to an increase in the number of trips due to an increase in the bag limit).

Additionally, it must be noted that the current recreational ACL for gag is under-harvested and it is possible that changing the gag bag limit could increase the number of trips taken, thus increasing the number of trips where one or more fish are caught. It is possible that the current bag limit for black grouper and gag may be limiting the number of trips with any level of gag harvest and, by severing the gag-black grouper connection, there may be an increase in trips with a gag. Thus, there could be an increase in trips with gag in total, as well as an increase in trips with multiple gag. However, it is not possible to estimate any change in the number of trips that may be taken that land gag.

Social Effects

In general, the social effects of increasing the bag limit for gag within the 3-grouper aggregate would be associated with the expected biological costs (if any) of each alternative, as well as the effects on current recreational fishing opportunities. The expected effects on recreational fishermen and for-hire businesses under the proposed alternatives would depend on any resulting changes in access to the resource through estimated season length, in addition to opportunities to reach the recreational ACL.

The bag limits for gag proposed in **Alternative 2** and **Alternative 3** would not be expected to shorten the season length under any ACLs proposed in **Action 1**, and it can be assumed that gag fishing opportunities under current conditions would be the same for **Alternative 2** and **Alternative 3**. However, **Table S-7** and **Appendix F** also suggest that only a portion of the recreational gag ACL would be reached under the proposed bag limits in **Alternatives 2** and **3**. If the management goal is to reach the total ACL for gag, not harvesting a portion due to the bag limits could result in foregone benefits to recreational fishermen and not maximizing their harvest. Conversely, there are benefits to not harvesting all allowable ACL, such as leaving fish for future fishing opportunities in addition to biological benefits of lower removals of gag.

Action 3. Revise the annual catch limits (ACL) and optimum yield (OY) for wreckfish

Alternatives for Action 3

(Preferred alternatives in **bold**)

1. No Action. Retain the current annual catch limits (ACL) and optimum yield (OY) for wreckfish. The wreckfish ABC=ACL=OY=235,000 pounds whole weight (lbs ww). Commercial and recreational allocations will remain equal to 95% and 5%, respectively. The commercial ACL will continue to be 223,250 lbs ww. The recreational ACL will continue to be 11,750 lbs ww. Currently, there are no annual catch targets (ACTs) for wreckfish.

2. Preferred. ACL = OY = Proposed ABC. The ACL for 2020 would remain in place until modified.

3. ACL = OY = 0.95*Proposed ABC. The ACL for 2020 would remain in place until modified.

4. ACL = OY = 0.90*Proposed ABC. The ACL for 2020 would remain in place until modified.

5. ACL = OY = 0.80*Proposed ABC. The ACL for 2020 would remain in place until modified.

Biological Effects

Alternative 1 (No Action) would retain the current ACL, equal to the ABC=OY=ABC of 235,000 lbs ww. Sector allocations for the commercial and recreational ACLs are 95% (223,250 lbs ww) and 5% (11,750 lbs ww), respectively. The amount of wreckfish that are allocated to recreational fishermen is very small, (approximately 300-350 fish), as wreckfish average weight is 30 to 40 lbs ww. Since ACLs for wreckfish were implemented in 2012, the recreational ACL has not been met.

Like **Alternative 1 (No Action)**, **Alternatives 2 (Preferred)-5** would set OY equal to the ACL (**Tables S-8** to **S-11**). National Standard 1 (NS 1) establishes the relationship between conservation and management measures, preventing overfishing, and achieving OY from each stock, stock complex, or fishery. The long-term objective is to achieve OY through annual achievement of an ACL.

The biological benefits of **Alternatives 2 (Preferred)** through **Alternative 5** would be less than under **Alternative 1 (No Action)** because they would increase the ACL and OY for wreckfish based upon a percentage of the updated ABC (100% to 80%, respectively; **Tables S-8** to **S-11**). However, a new assessment has been conducted for wreckfish, and the South Atlantic Council's SSC has increased their catch level recommendations indicating that there is not a biological need to retain the ACL at the levels specified under **Alternative 1 (No Action)**. Thus, compared to **Alternative 1 (No Action)**, increasing the ACL under **Alternative 2 (Preferred)-5** would not be expected to negatively impact the health of the wreckfish stock. **Alternative 2 (Preferred)** would set the ACL equal to the SSC's recommendation for the updated ABC. The preferred alternative for ACL specified for wreckfish in the Comprehensive ACL Amendment (SAFMC 2011a) also set ACL equal to the ABC. A buffer between the ACL/OY and ABC would provide greater assurance that overfishing is prevented and the long-term average biomass is near or above SSB_{MSY}. However, as mentioned for gag under **Action 1**, commercial monitoring mechanisms have been improved and a Joint Dealer Reporting Amendment (GMFMC & SAFMC 2013b), which became effective on August 7, 2014, requires dealers to report landings electronically each week. Furthermore, overages of the commercial ACL are not expected because an individual transferable quota (ITQ) program is in place where there is a limited number of quota shares and a cap on the number of wreckfish quota shares a single entity may

own. Under the ITQ program, commercial wreckfish landings are tracked closely, due to mandatory reporting requirements. There is very little recreational harvest of wreckfish. Thus, it is unlikely that the ACL would be exceeded, and there may not be a biological need to set the ACL below the ABC.

Table S-8. ABC and ACLs for wreckfish specified under **Alternative 2 (Preferred)** where ACL = OY = ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	433,000	411,350	21,650
2016	423,700	423,700	402,515	21,185
2017	414,200	414,200	393,490	20,710
2018	406,300	406,300	385,985	20,315
2019	396,800	396,800	376,960	19,840
2020	389,100	389,100	369,645	19,455

Table S-9. ABC and ACLs for wreckfish specified under Alternative 3 where ACL = OY = 95%ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	411,350	390,783	20,568
2016	423,700	402,515	382,389	20,126
2017	414,200	393,490	373,816	19,675
2018	406,300	385,985	366,686	19,299
2019	396,800	376,960	358,112	18,848
2020	389,100	369,645	351,163	18,482

Table S-10. ABC and ACLs for wreckfish specified under Alternative 4 where ACL = OY = 90%ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	389,700	370,215	19,485
2016	423,700	381,330	362,264	19,067
2017	414,200	372,780	354,141	18,639
2018	406,300	365,670	347,387	18,284
2019	396,800	357,120	339,264	17,856
2020	389,100	350,190	332,681	17,510

Table S-11. ABC and ACLs for wreckfish specified under Alternative 5 where ACL = OY = 80%ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	346,400	329,080	17,320
2016	423,700	338,960	322,012	16,948
2017	414,200	331,360	314,792	16,568
2018	406,300	325,040	308,788	16,252
2019	396,800	317,440	301,568	15,872
2020	389,100	311,280	295,716	15,564

Economic Effects

Whenever ACLs are changed, economic effects can be expected if the changes are expected to have an effect on the number of fish that can be taken by any sector. When the commercial sector's ACL increases, it can be expected that there would be positive direct effects in that more trips would be taken, assuming the entire ACL would be caught. When the recreational sector's ACL is increased, the overall consumer surplus would increase due to the greater availability of fish. All alternatives other than **Alternative 1 (No Action)** would increase the ACL for both sectors over what is currently available. **Preferred Alternative 2** would be expected to provide the highest level of benefits to fishermen, followed (in order) by **Alternative 3**, **Alternative 4**, and **Alternative 5**. The ACL level in **Alternative 1 (No Action)** would be expected to result in the fewest benefits to wreckfish fishermen. Positive direct economic effects to the commercial sector from the proposed alternatives would be moderate, while the positive effects for the recreational sector would be considered minimal.

Social Effects

Information about the social dimensions of the wreckfish portion of the snapper grouper fishery is described in **Section 3.3.2**. As described in **Section 4.1.3**, the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue. **Preferred Alternative 2** would be expected to provide the highest level of benefits to fishermen, followed (in order) by **Alternative 3**, **Alternative 4**, and **Alternative 5**. The ACL level in **Alternative 1 (No Action)** would be expected to result in the fewest benefits to wreckfish fishermen.

Chapter 1. Introduction

1.1 What Action Is Being Proposed?

Regulatory Amendment 22 to the Snapper Grouper FMP proposes to: adjust annual catch limits (ACL) and optimum yield (OY) for gag and wreckfish based on acceptable biological catch (ABC) recommendations from the South Atlantic Fishery Management Council's (South Atlantic Council) Scientific and Statistical Committee (SSC); and (2) modify the recreational bag limit for gag within the aggregate bag limit.

South Atlantic Fishery Management Council

- Responsible for conservation and management of fish stocks
- Consists of 13 voting members: 8 appointed by the Secretary of Commerce, 1 representative from each of the 4 South Atlantic states, the Southeast Regional Administrator of NMFS; and 4 non-voting members
- Responsible for developing fishery management plans and amendments under the Magnuson-Stevens Act; and recommends actions to NMFS for implementation
- Management area is from 3 to 200 miles off the coasts of North Carolina, South Carolina, Georgia, and east Florida through Key West with the exception of Mackerel which is from New York to Florida, and Dolphin Wahoo, which is from Maine to Florida

1.2 Who is Proposing the Actions?

The South Atlantic Council is proposing the actions. The South Atlantic Council recommends management measures to the National Marine Fisheries Service (NMFS) which ultimately implements the actions in the amendment through development of regulations on behalf of the Secretary of Commerce. NMFS is a line office in the National Oceanic and Atmospheric Administration within the Department of Commerce.

1.3 Where is the Project Located?

Management of the federal snapper grouper fishery located off the southeastern United States (South Atlantic) in the 3-200 nautical miles U.S. Exclusive Economic Zone is conducted under the Snapper Grouper FMP (SAFMC 1983) (**Figure 1.3.1**). Species included in Regulatory Amendment 22 are among the 59 species managed by the South Atlantic Council under the Snapper Grouper FMP.

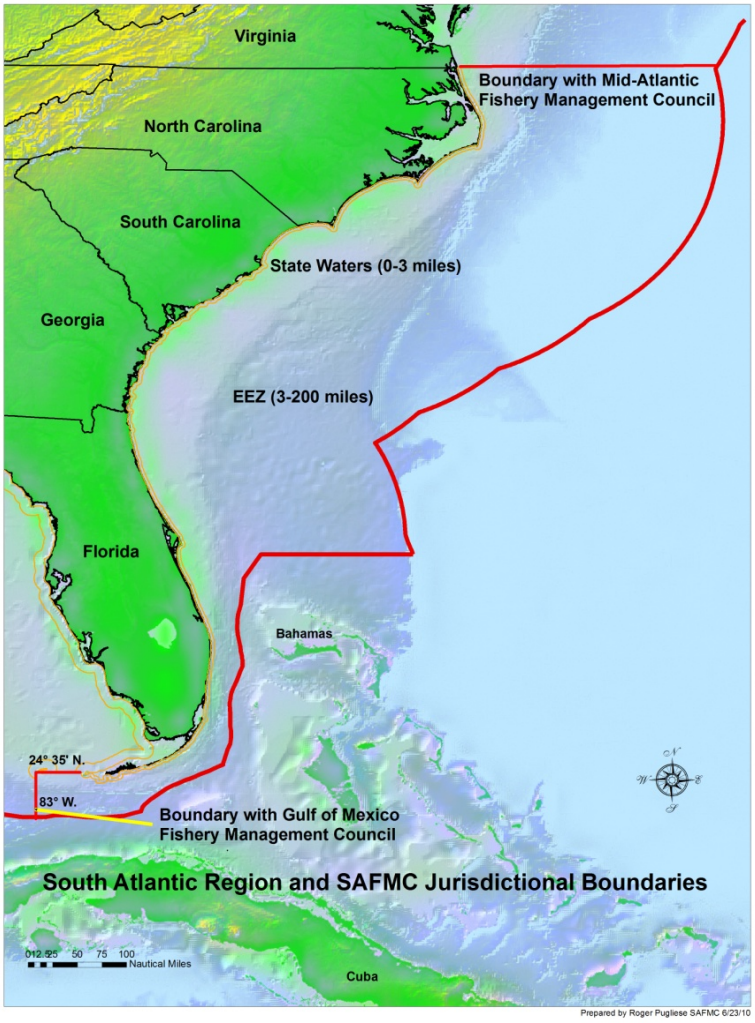

Figure 1.3.1. Jurisdictional boundaries of the South Atlantic Council.

1.4 Purpose and Need

Purpose for Actions

The purpose for the amendment is to: adjust annual catch limits (ACL) and optimum yield (OY) for gag and wreckfish, and assess the need to modify the recreational bag limit for gag.

Need for Actions

The *need* for the amendment is to: (1) address the recent stock assessment results for gag and wreckfish, and prevent overfishing while minimizing, to the extent practicable, adverse social and economic effects; and (2) to ensure the gag recreational bag limit is set at an appropriate level to foster sustainable harvest rates of the species.

1.5 What is the History of Management for the species considered in this amendment?

Snapper grouper regulations in the South Atlantic were first implemented in 1983. See **Appendix D** for a detailed history of management for the snapper grouper fishery.

1.6 Background on the SSC's ABC recommendations for gag and wreckfish

1.6.1 Gag

In 2006, the South Atlantic gag (*Mycteroperca microlepis*) stock was assessed through Southeast Data Assessment and Review (SEDAR) and found to be undergoing overfishing and approaching an overfished condition (SEDAR 10 2006). Measures to end overfishing were contained in Amendment 16 to the Snapper Grouper FMP (SAFMC 2009a). The assessment was updated in 2014 including data through 2012, to provide new information on stock status and projections (SEDAR 10 Update 2014). The 2014 assessment indicated that the stock is undergoing overfishing based on the average fishing mortality rates from 2010-2012, but is not overfished. The South Atlantic Council's SSC noted that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing did not occur in 2012 and 2013 (SAFMC SSC report, April 2014). A letter from NMFS to the South Atlantic Council Chairman dated September 8, 2014, stated that gag is neither overfished nor undergoing overfishing.

At their April/May 2014 meeting, the SSC accepted and recommended the gag stock assessment update as the best scientific information available and concluded it could be used for management of the gag resource in the South Atlantic. Revisions in the data and methods were reasonable and the assessment can be used for catch level recommendations. The SSC specified an overfishing limit (OFL) with a P* = 0.50, and an ABC based on a P*= 0.30 (**Table 1.6.1**). The P* approach, which is a component of the ABC control rule, is used to specify the ABC and the OFL values, where P* is equal to the acceptable probability of overfishing. A smaller P* provides a larger buffer against overfishing, resulting in reduced catches.

The assessment update assumes that commercial harvest of shallow water groupers closes when the gag quota is met. This accountability measure was removed through implementation of Regulatory Amendment 15 (SAFMC 2013a) in 2013 and commercial harvest of other shallow water groupers is now allowed when the gag season is closed. Since the 2014 update assessment does not include the recent management measure implemented through Regulatory Amendment 15, alternatives in Action 1 adjust the gag commercial quota to account for dead discards of gag that would be expected to occur when fishermen target co-occurring shallow water groupers after the gag quota is met.

Table 1.6.1. Status determination criteria for gag based on the SEDAR 10 Update assessment and recommendations from the South Atlantic Council's SSC.

Criteria	Deterministic**	Probabilistic
Overfished evaluation SSB/MSST(1-M)	1.13	1.21
Overfished evaluation SSB/MSST(75%)	1.29	1.38
Overfishing evaluation Fcurrent/F_{MSY}	1.23	1.37
MFMT	0.29	0.27
SSB_{MSY} (unit)	4,038,207 lbs ww	1806.8 mt
MSST (1-M)	3,472,942 lbs ww	1546.3 mt
MSST (75%)	3,028,711 lbs ww	1355.1 mt
MSY	938,200 lbs gw	900,400 lbs gw
Y at 75% F_{MSY}	921,100 lbs gw	883,600 lbs gw
ABC Control Rule Adjustment		20%
P-Star		30%

	OFL RECOMMENDATIONS: P*=50%			
Year	Landed lbs gw	Discard lbs gw	Landed Number	Discard Number
2015	782,000	107,000	55,000	25,000
2016	765,000	105,000	55,000	24,000
2017	792,000	104,000	57,000	24,000
2018	813,000	104,000	58,000	24,000
2019	825,000	104,000	59,000	24,000

	ABC RECOMMENDATIONS: P*=30%			
Year	Landed lbs gw	Discard lbs gw	Landed Number	Discard Number
2015	666,000	90,000	47,000	21,000
2016	671,000	89,000	48,000	21,000
2017	713,000	88,000	51,000	20,000
2018	748,000	89,000	53,000	21,000
2019	773,000	89,000	55,000	21,000

** The SSC recommends using the deterministic values for stock status.

1.6.2 Wreckfish

The SSC discussed setting an ABC for wreckfish during their August 2010 meeting. The SSC stated that the 2001 assessment (Vaughan et al. 2001) indicated depletion at higher historical levels of effort and that the catch reductions appeared to have come mainly from gear restrictions, spawning season closure, and individual transferable quota (ITQ) implementation. Since stock size cannot be projected, an estimate of OFL from the 2001 assessment could not be produced. A Depletion-Based Stock Reduction Analysis (DBSRA) or Depletion-Corrected Average Catch (DCAC) estimate could be calculated, but recent landings were confidential; therefore, the SSC was not able to perform the calculations to produce these estimates. The SSC agreed the 2001 assessment was dated and did not apply to current landings and conditions. Therefore, in September 2010, the SSC recommended setting the ABC at the average historical catch (1997-recent) of 250,000 pounds whole weight (lbs ww). Due to data confidentiality, a more precise level could not be set. The SSC also recommended conducting DCAC or DBSRA analysis in the next year to compare with their catch-only recommendation.

In October 2011, the NMFS Southeast Regional Office, submitted a document (updated in December 2011) titled "Depletion-Corrected Average Catch Estimates for U.S. South Atlantic Wreckfish" (SERO LAPP-2011-07) (hereunder referenced as "the DCAC Estimates") to the South Atlantic Council's SSC. The SSC reviewed the document at their November 9, 2010 meeting; formed a subcommittee to review and refine the analysis; and, on November 10, 2010, recommended a new ABC = 235,000 lbs ww for Atlantic wreckfish. The new ABC for wreckfish was implemented through the Comprehensive ACL Amendment (SAFMC 2011a) in April 2012.

In November 2012, the document titled "An Application of Statistical Catch-at-Age Assessment Methodology to Assess U.S. South Atlantic Wreckfish" (hereunder referenced as "SCAA Application"), authored by Butterworth and Rademeyer (2012), was discussed at the SSC meeting in Charleston, South Carolina. The SCAA Application proposed an alternative methodological approach to the wreckfish assessment. The SSC recommended that the SCAA Application be subjected to a "SEDAR-like review." Following the November 2012 SSC meeting, and based on the recommendations of the SSC, the South Atlantic Council adopted a new third-party peer review process, and determined that this assessment should be subject to that process. Following this process, the SSC reviewed the SCAA Application at their April/May 2014 meeting, accepted the benchmark assessment as representing the best scientific information available on the current status of wreckfish in South Atlantic waters, and recommended it as appropriate for management decisions. **Table 1.6.2** lists the SSC recommendations for wreckfish based on the recent assessment.

The assessment indicated that the wreckfish stock is neither undergoing overfishing nor overfished, and biomass is above SSB_{MSY} (**Table 1.6.2**). Furthermore, the yield at F_{MSY} (439,700 lbs ww) was determined to be higher than the maximum sustainable yield (MSY) value of 279,000 lbs ww. Estimates of yield and productivity for fish stocks are available as both equilibrium and static values. Equilibrium values represent the yield expected, on average, over a long period of time from a given management strategy. An example of an equilibrium value is the MSY. Static values represent the yield that can be taken at any given point in time, and may be more or less than the equilibrium values. Examples are the yield estimated by stock assessment projections and presented as the result of a particular exploitation rate

applied at a particular time. The important quantities in determining both static or equilibrium yield from a population are the amount of fish in the population, usually presented in stock biomass (weight), and the fishing pressure or rate of removal, usually presented as a rate (i.e., fishing mortality rate or F). When biomass is above SSB_{MSY} there can be short-term yields in excess of equilibrium expectations. They represent windfall conditions that are typically short lived, as the natural tendency of the population is to return to, and vary around, the estimated equilibrium conditions for a given exploitation rate. Therefore, as the extra yield and stock biomass is removed, or "fished down", population abundance diminishes toward MSY, the equilibrium value. This is why the projected wreckfish OFLs and ABCs for 2015-2020 decrease in **Table 1.6.2**.

Table 1.6.2. SSC recommendations for wreckfish based on the 2012 benchmark assessment.

Criteria	Deterministic**	Probabilistic
Overfished evaluation	**No** ($SSB/75\%SSB_{MSY}$=2.11)	
Overfishing evaluation	**No** (F/F_{MSY}=0.583)	
MFMT	0.065	
SSB_{MSY} (unit)	1,809 tons (3,988,000 lbs ww)	
MSST (75%)	1,357 tons (2,992,000 lbs ww)	
MSST (1-M)	1,743 tons (3,843,000 lbs ww)	
MSY	279,000 lbs ww	
Y at 75% F_{MSY} (1000 lbs)		
ABC Control Rule Adjustment		22.5%
P-Star		27.5%
OFL (1000 lbs)	Projections at $F=F_{MSY}$	

OFL Projections		
Yield at F_{MSY} (1000 lbs)		
Deterministic		**Probabilistic (P*=50%)**
2014	439,700 lbs ww	571,500 lbs ww
2015	429,400 lbs ww	553,300 lbs ww
2016	419,700 lbs ww	536,700 lbs ww
2017	410,600 lbs ww	521,900 lbs ww
2018	402,000 lbs ww	507,300 lbs ww
2019	394,000 lbs ww	493,700 lbs ww
2020	386,600 lbs ww	481,200 lbs ww

ABC RECOMMENDATIONS: Projections at P*, 5 years	
ABC Projections (P*=27.5%)	
Year	**Landings (1000 Lbs)**
2014	443,800 lbs ww
2015	433,000 lbs ww
2016	423,700 lbs ww
2017	414,200 lbs ww
2018	406,300 lbs ww
2019	396,800 lbs ww
2020	389,100 lbs ww

** The SSC recommends using the deterministic values for stock status.

1.7 How is overfishing determined?

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.

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.

Each of the two methods for determining overfishing has benefits and drawbacks. The MFMT method provides a better estimate of overfishing status in a year in which a stock is assessed and the OFL method provides 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 metrics to determine the overfishing status of snapper grouper species.

For gag and wreckfish, overfishing will be determined on an annual basis by the MFMT and OFL methods. The estimate of F_{MSY} (MFMT) for gag from the SEDAR 10 assessment update is 0.29, while the corresponding OFL values decrease as the stock moves to equilibrium conditions. 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. OFL values for gag during the years 2015 through 2019 are shown in **Table 1.6.3**.

Table 1.6.3. OFL for gag based on SEDAR 10 Update assessment and recommendations from the South Atlantic Council's SSC.

OFL Recommendation for gag: P*=50%				
Year	**Landed lbs gw**	**Discard lbs gw**	**Landed Number**	**Discard Number**
2015	782,000	107,000	55,000	25,000
2016	765,000	105,000	55,000	24,000
2017	792,000	104,000	57,000	24,000
2018	813,000	104,000	58,000	24,000
2019	825,000	104,000	59,000	24,000

The estimate of F_{MSY} (MFMT) for wreckfish from SCAA Application is 0.065, while the corresponding OFL values increase as the stock rebuilds to SSB_{MSY}. 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. OFL values for wreckfish during the years 2015 through 2019 are shown **Table 1.6.4**.

Table 1.6.4. OFL for wreckfish based on the 2012 benchmark assessment and recommendations from the South Atlantic Council's SSC.

OFL Projections		
Year	**Yield at F_{MSY} (1000 lbs)**	
	Deterministic**	**Probabilistic (P*=50%)**
2015	429,400 lbs ww	553,300 lbs ww
2016	419,700 lbs ww	536,700 lbs ww
2017	410,600 lbs ww	521,900 lbs ww
2018	402,000 lbs ww	507,300 lbs ww
2019	394,000 lbs ww	493,700 lbs ww

** The SSC recommends using the deterministic values for stock status.

Chapter 2. Proposed Actions and Alternatives

2.1 Action 1. Revise the annual catch limits (ACL) and optimum yield (OY) for gag

Alternative 1 (No Action). Retain the current annual catch limits (ACL) and optimum yield (OY) for gag. Optimum Yield (OY) will remain equal to the yield produced by F_{OY} (Amendment 16). If a stock is overfished, F_{OY} remains equal to the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. ABC = 805,000 pounds gutted weight (lbs gw; landings only); OFL = Yield at F_{MSY} = 903,000 lbs gw. The total ACL (Yield at 75%F_{MSY}) will continue to be 694,000 lbs gw. Commercial and recreational allocations will continue to be 51% and 49%, respectively. The directed commercial ACL will continue to be 326,722 lbs gw (reduced from 353,940 lbs gw commercial ACL to account for gag discard mortality from commercial trips that target co-occurring species (i.e., red grouper and scamp) during a gag closure). The recreational ACL will continue to be 340,060 lbs gw. Currently, there are no ACTs for gag.

ABC	ACL (yield at 75% F_{MSY})	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
805,000	694,000	353,940	326,722	340,060

All values in pounds gutted weight (lbs gw)
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Alternative 2. ACL = OY = ABC projected landings from 2015-2019 with P*=0.3. The ACL for 2019 will remain in place until modified.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	666,000	339,660	312,442	326,340
2016	671,000	671,000	342,210	314,992	328,790
2017	713,000	713,000	363,630	336,412	349,370
2018	748,000	748,000	381,480	354,262	366,520
2019	773,000	773,000	394,230	367,012	378,770

All values in pounds gutted weight (lbs gw)
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Alternative 3 (Preferred). ACL = OY = 0.95*Proposed ABC. The ACL for 2019 would remain in place until modified.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	632,700	322,677	295,459	310,023
2016	671,000	637,450	325,100	297,882	312,351
2017	713,000	677,350	345,449	318,231	331,902
2018	748,000	710,600	362,406	335,188	348,194
2019	773,000	734,350	374,519	347,301	359,832

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Alternative 4. ACL = OY = 0.90*Proposed ABC. The ACL for 2019 would remain in place until modified.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	599,400	305,694	278,476	293,706
2016	671,000	603,900	307,989	280,771	295,911
2017	713,000	641,700	327,267	300,049	314,433
2018	748,000	673,200	343,332	316,114	329,868
2019	773,000	695,700	354,807	327,589	340,893

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Alternative 5. ACL = OY = 0.80*Proposed ABC. The ACL for 2019 would remain in place until modified.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	532,800	271,728	244,510	261,072
2016	671,000	536,800	273,768	246,550	263,032
2017	713,000	570,400	290,904	263,686	279,496
2018	748,000	598,400	305,184	277,966	293,216
2019	773,000	618,400	315,384	288,166	303,016

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Discussion:

The commercial ACL needs to be reduced by 27,218 pounds gutted weight (lbs gw) to account for discard mortality after commercial harvest for gag closes but commercial harvest for shallow water groupers remains open. Regulatory Amendment 15 to the Snapper Grouper FMP (SAFMC 2013a) reduced the gag commercial ACL by 27,218 pounds gutted weight (lbs gw) from 353,940 lbs gw to 326,722 lbs gw to account for discard mortality of gag that would result from targeting other shallow water groupers (i.e., red grouper and scamp) after harvest of gag is closed. The gag ACL was adjusted for post-quota bycatch mortality in accordance with analyses in Amendment 16 to the Snapper Grouper FMP (SAFMC 2009a), and the reduction in the gag ACL was calculated by determining the pounds of gag lost from discard mortality if eliminated target trips still occurred but instead of targeting gag they fished for the other co-occurring shallow water groupers. A discard mortality rate of 40% was applied to the pounds of gag caught to estimate dead discards in pounds. Additionally, during development of Amendment 16, the Snapper Grouper Advisory Panel and other fishermen reported that their trips would be reduced by 20% after a gag quota closure. To get an additional estimate of dead discards, target trips were decreased by 20% to estimate pounds of gag lost to discard mortality. Total dead discards in pounds were calculated by combining the pounds of gag lost to discard mortality from non-target trips with the pounds of gag lost to discard mortality from target trips switching to target other shallow water grouper. This analysis is described in detail in **Appendix E** of Regulatory Amendment 15 (SAFMC 2013a). The update assessment (SEDAR 10 Update 2014) included data through 2012, *before* regulations were changed in 2013 to remove the accountability measure that prohibited harvest of all shallow water groupers (red grouper, black grouper, scamp, yellowmouth grouper, yellowfin grouper, red hind, rock hind, graysby, and coney) once the commercial ACL for gag was met. When the next assessment is conducted, these discards will be included in the discard estimate from the assessment and an adjustment to the ACL will not be required.

2.1.1 Comparison of Alternatives

Results of the 2014 update assessment (SEDAR 10 Update 2014) revealed that the gag stock in the South Atlantic is experiencing overfishing based on the average fishing mortality rates from 2010-2012, but is not overfished. The South Atlantic Scientific and Statistical Committee (SSC) noted that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing did not occur in 2012 and 2013 (SAFMC SSC report, April 2014). A letter from NMFS to the South Atlantic Council Chairman dated September 8, 2014 stated that gag is neither overfished nor undergoing overfishing. **Alternative 1 (No Action)** would retain the current OY and ACLs, including sector ACLs and directed commercial quota, and would not update harvest parameters for gag using the best scientific information available from the recent stock assessment update.

Under **Alternatives 2-5,** the P* approach, which is a component of the ABC control rule, is used to specify the ABC and the overfishing limit (OFL) values, where P* is equal to the acceptable probability of overfishing. A smaller P* provides a larger buffer against overfishing, resulting in reduced catches. Under these alternatives, the ACL and OY for gag are updated based upon results from the updated gag assessment, and recommendations from the South Atlantic Council's SSC, and have a greater positive biological effect on the stock by reducing the commercial and recreational ACLs. **Alternatives 2-5** would set OY equal to the ACL. **Alternative 2** would set the ACL equal to the ABC; however, the quota

would be adjusted for discard mortality (**Table 4.1.3**) and set below the ACL. **Alternative 3 (Preferred)** would set the ACL at 95% of the ABC, and the quota would be set below the ACL to account for discard mortality. **Alternatives 3 (Preferred)**, **4**, and **5** would have a greater positive biological effect than **Alternative 2** because they would create a buffer between the ACL/OY and the ABC, with **Alternative 5** setting the most conservative ACL at 80% of the ABC. Setting a buffer between the ABC and ACL decreases the probability that the ABC or OFL is exceeded and overfishing would occur. However, with improved commercial monitoring mechanisms recently implemented, it is unlikely that repeated commercial ACL overages would occur. Thus, there may not be a biological need to set the ACL below the ABC.

Although **Alternative 2** is projected to result in lower landings and reduced revenue for 2015 and 2016, **Alternative 2** is projected to result in an increase in landings over the time series of 2015 through 2019. Thus, in terms of economic effects, for both the commercial and recreational sectors, compared to **Alternative 1 (No Action)**, **Alternative 2** would be expected to result in the best change in economic benefits (a net increase in commercial revenue and angler consumer surplus (CS)), followed by **Alternative 3 (Preferred)**, **Alternative 4**, and **Alternative 5**, each of which would be expected to result in a net decrease in economic benefits (commercial revenue and angler CS). The magnitude of economic changes of the alternatives relative to **Alternative 1 (No Action)** is illustrated in **Tables 4.1.7** and **4.1.8**.

In general, the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue, assuming harvest does not result in overfishing and long-term management goals are met. Adhering to sustainable harvest through an ACL is assumed to result in net long-term positive social and economic benefits. Additionally, adjustments to an ACL based on updated information from a stock assessment would be the most beneficial in the long term to fishermen and communities because catch limits would be based on the current conditions, even if the updated information indicates that a lower ACL is appropriate to sustain the stock. **Alternatives 2-5** would incorporate new information and recommendations, and would be more beneficial in the long term to communities and fishermen than **Alternative 1 (No Action)**.

Since mechanisms are already in place for monitoring and enforcing the current ACL, any increase in the administrative burden from **Alternatives 2-5** would be expected to be small and would not represent a significant addition to the administrative burden. As with any changes to regulations, administrative costs could occur associated with disseminating the information and educating the public.

2.2 Action 2. Modify the recreational bag limit for gag within the aggregate bag limit

Preferred Alternative 1 (No Action). Retain the current aggregate grouper bag limit of 3 fish. Within this limit, only one fish can be a gag or black grouper.

Aggregate bag limit includes:	Gag*, black grouper*, golden tilefish**, snowy grouper***, misty grouper, red grouper, scamp, yellowedge grouper, yellowfin grouper, yellowmouth grouper, blueline tilefish, sand tilefish, coney, graysby, red hind, and rock hind
*	Maximum of 1 gag OR black grouper (but not both) per person/day
**	Maximum of 1 golden tilefish per person/day
***	Maximum of 1 snowy grouper per vessel/day

Alternative 2. Increase the gag bag limit to 2 fish within the 3 fish aggregate. Only one fish within the aggregate can be a black grouper.

Aggregate bag limit includes:	Gag*, black grouper**, golden tilefish***, snowy grouper****, misty grouper, red grouper, scamp, yellowedge grouper, yellowfin grouper, yellowmouth grouper, blueline tilefish, sand tilefish, coney, graysby, red hind, and rock hind
*	Maximum of 2 gag per person/day
**	Maximum of 1 black grouper per person/day
***	Maximum of 1 golden tilefish per person/day
****	Maximum of 1 snowy grouper per vessel/day

Alternative 3. Increase the gag bag limit to 3 fish within the 3 fish aggregate. Only one fish within the aggregate can be a black grouper.

Aggregate bag limit includes:	Gag*, black grouper*, golden tilefish**, snowy grouper***, misty grouper, red grouper, scamp, yellowedge grouper, yellowfin grouper, yellowmouth grouper, blueline tilefish, sand tilefish, coney, graysby, red hind, and rock hind
*	Maximum of 3 gag per person/day
**	Maximum of 1 black grouper per person/day
***	Maximum of 1 golden tilefish per person/day
****	Maximum of 1 snowy grouper per vessel/day

2.2.1 Comparison of Alternatives

Alternative 2 and **Alternative 3** would increase the gag bag limit to 2 and 3 per person per day, respectively, within the 3-grouper aggregate bag limit to help achieve the recreational ACL proposed in **Action 1**. The black grouper bag limit would remain at 1 per person per day within the aggregate bag limit. Currently, the recreational ACL is not being met, and **Table 4.2.3** indicates that the proposed recreational ACLs for gag under **Action 1** would not be met under any of the bag limits proposed in

Action 2. Furthermore, an amendment has been approved by the South Atlantic Council (Amendment 34 to the Snapper Grouper FMP) that would modify the recreational AM for gag to further ensure ACLs are not exceeded and overfishing does not occur. Therefore, in comparison to **Preferred Alternative 1 (No Action)**, negative biological effects to the gag stock are not expected under **Alternative 2** or **Alternative 3**.

Increasing the number of gag in the grouper aggregate to 2 or 3 per person per day could result in decreased harvest of other groupers and tilefish within the aggregate. However, since the 3-fish grouper aggregate is rarely met and most fishermen do not catch 1 gag within the 3-fish aggregate, any change in harvest of other groupers and tilefish within the aggregate is expected to be small under **Alternatives 2** and **3**. **Alternatives 2** and **3** would change the allowance of 1 gag or black grouper within the 3 fish aggregate grouper bag limit to 1 black grouper within the grouper aggregate, which could potentially increase the black grouper harvest. However, the low catch per angler for gag and/or black grouper trips (**Table 4.2.4**) indicates that it is unlikely that the increase in the black grouper bag limit under **Alternatives 2** and **3** within the 3-fish grouper aggregate would have much effect on black grouper landings.

In terms of economic effects, allowing recreational fishermen to keep as many fish as possible without exceeding their sector ACL would increase both CS for the fishermen, and NOR for the for-hire portion of the sector, as applicable. Based on the assumptions of the bag limit analysis, and relative to **Preferred Alternative 1 (No Action)**, **Alternative 3** is expected to have greater increase in CS than would be expected under **Alternative 2**. The overall increase in CS for recreational trips is expected to be minor. The for-hire target effort is so low, that no expected change would occur; hence, no increase in NOR is expected. However, note that additional benefits may be received if there is an increase in for-hire target effort (due to an increase in the number of trips due to an increase in the bag limit).

The bag limits proposed in **Alternatives 2** and **3** would not be expected to shorten the season length under any ACLs proposed in **Action 1**, and it can be assumed that gag fishing opportunities under current conditions would be the same for **Alternatives 2** and **3**. However, analyses also suggest that only a portion of the recreational gag ACL would be landed under the proposed bag limits in **Alternatives 2** and **3**. If the management goal is to reach the total ACL for gag, not harvesting a portion due to the bag limits could result in foregone benefits to recreational fishermen. Conversely, there are benefits to not harvesting all allowable ACL, such as leaving fish for future fishing opportunities in addition to biological benefits of lower removals of gag.

Since mechanisms are already in place for monitoring and enforcing the current ACL, any increase in the administrative burden from **Preferred Alternative 1 (No Action)** and **Alternatives 2-3** would be expected to be small.

2.3 Action 3. Revise the annual catch limits (ACL) and optimum yield (OY) for wreckfish

Alternative 1 (No Action). Retain the current annual catch limits (ACL) and optimum yield (OY) for wreckfish. The wreckfish ABC=ACL=OY=235,000 pounds whole weight (lbs ww). Commercial and recreational allocations will remain equal to 95% and 5%, respectively. The commercial ACL will continue to be 223,250 lbs ww. The recreational ACL will continue to be 11,750 lbs ww. Currently, there are no annual catch targets (ACTs) for wreckfish.

Alternative 2 (Preferred). ACL = OY = Proposed ABC. The ACL for 2020 would remain in place until modified.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	433,000	411,350	21,650
2016	423,700	423,700	402,515	21,185
2017	414,200	414,200	393,490	20,710
2018	406,300	406,300	385,985	20,315
2019	396,800	396,800	376,960	19,840
2020	389,100	389,100	369,645	19,455

All values in pounds whole weight (lbs ww).

Alternative 3. ACL = OY = 0.95*Proposed ABC. The ACL for 2020 would remain in place until modified.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	411,350	390,783	20,568
2016	423,700	402,515	382,389	20,126
2017	414,200	393,490	373,816	19,675
2018	406,300	385,985	366,686	19,299
2019	396,800	376,960	358,112	18,848
2020	389,100	369,645	351,163	18,482

All values in lbs ww.

Alternative 4. ACL = OY = 0.90*Proposed ABC. The ACL for 2020 would remain in place until modified.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	389,700	370,215	19,485
2016	423,700	381,330	362,264	19,067
2017	414,200	372,780	354,141	18,639
2018	406,300	365,670	347,387	18,284
2019	396,800	357,120	339,264	17,856
2020	389,100	350,190	332,681	17,510

All values in lbs ww.

Alternative 5. ACL = OY = 0.80*Proposed ABC. The ACL for 2020 would remain in place until modified.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	346,400	329,080	17,320
2016	423,700	338,960	322,012	16,948
2017	414,200	331,360	314,792	16,568
2018	406,300	325,040	308,788	16,252
2019	396,800	317,440	301,568	15,872
2020	389,100	311,280	295,716	15,564

All values in lbs ww.

2.3.1 Comparison of Alternatives

Like **Alternative 1 (No Action)**, **Alternative 2 (Preferred)** would set OY equal to the ACL. The biological benefits of **Alternatives 2 (Preferred)-5** would be slightly less than under **Alternative 1 (No Action)** because they would increase the ACL and OY for wreckfish based upon a percentage of the updated ABC (100% to 80%, respectively). However, a new assessment has been conducted for wreckfish and the South Atlantic Council's SSC has increased their catch level recommendations indicating that there is not a biological need to retain the ACL at the levels specified under **Alternative 1 (No Action)**. Thus, increasing the ACL under **Alternative 2 (Preferred)-5** would be slightly more biologically adverse than **Alternative 1 (No Action)** but not be expected to negatively impact the health of the wreckfish stock. The catch levels specified in **Alternatives 2 (Preferred)-5** are sustainable and based on the recommendations from the South Atlantic Council's SSC. **Alternatives 3**, **4**, and **5** would have a greater positive biological effect than **Preferred Alternative 2** because they would create a buffer between the ACL/OY and the ABC, with **Alternative 5** setting the most conservative ACL at 80% of the ABC. Setting a buffer between the ABC and ACL decreases the probability that the ABC or OFL would be exceeded and overfishing would occur. However, an individual transferable quota is in place for the commercial sector and there is very little recreational harvest. Thus, it is unlikely that the ACL would be exceeded, and there may not be a biological need to set the ACL below the ABC.

The higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue. All alternatives other than **Alternative 1 (No Action)** would increase the ACL for both sectors over what is currently available. **Preferred Alternative 2** would be expected to provide the highest level of benefits to fishermen, followed (in order) by **Alternative 3**, **Alternative 4**, and **Alternative 5**. The ACL level in **Alternative 1 (No Action)** would be expected to result in the fewest benefits to wreckfish fishermen. Positive direct economic effects to the commercial sector from the proposed alternatives would be moderate, while the positive effects for the recreational sector would be considered minimal.

Since mechanisms are already in place for monitoring and enforcing the current ACL, any increase in the administrative burden from **Alternative 1 (No Action)** through **Alternative 5** would be expected to be small.

Chapter 3. Affected Environment

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

Affected Environment

- **Habitat environment (Section 3.1)**

  Examples include coral reefs and sea grass beds

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

  Examples include populations of groupers, corals, and turtles

- **Economic environment (Section 3.3)**

  Examples include economic descriptions of the commercial and recreational fisheries

- **Social environment (Section 3.4)**

  Examples include description of fishing communities

- **Administrative environment (Section 3.5)**

  Examples include the fishery management process and enforcement activities

3.1 Habitat Environment

3.1.1 Inshore/Estuarine Habitat

Many 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. Additional information on the habitat utilized by species in the Snapper Grouper Complex is included in Volume II of the Fishery Ecosystem Plan (FEP; SAFMC 2009b) and incorporated here by reference. The FEP can be found at: http://safmc.net/ecosystem-management/fishery-ecosystem-plan-1

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 ft) or greater for live-bottom habitats, 55 to 110 meters (180 to 360 ft) for the shelf-edge habitat, and from 110 to 183 meters (360 to 600 ft) for lower-shelf habitat areas.

The exact extent and distribution of productive snapper grouper habitat on the continental shelf north of Cape Canaveral, Florida 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 ft), 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, Florida the continental shelf narrows from 56 to 16 kilometers (35 to 10 mi) wide 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 ft). 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 ft) 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 ft) 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 Program (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 scientific information available on the distribution of hard bottom habitat in the South Atlantic region, prepared ArcView maps for the four-state project. These maps, which consolidate known distribution of coral, hard/live bottom, and artificial reefs as hard bottom, are available on the online map services provided by the SAFMC Habitat and Ecosystem Atlas: http://ocean.floridamarine.org/safmc_atlas/

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 South Atlantic Council's Internet Mapping System at the above 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 ft (but to at least 2,000 ft 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-ft) 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.

EFH utilized by wreckfish (*Polyprion americanus*) off the coast of South Carolina and Georgia, is an area of extensive hard bottom habitat known as the Charleston Bump, on the northern Blake Plateau (Sedberry et al. 2001). This topographic feature is located in the Gulf Stream at depths of 400–800 m and roughly 160 km offshore. The rough topography of the Charleston Bump includes over 100 m of near-vertical steep rocky relief with carbonate outcroppings, overhangs, and phosphorite–manganese flat hard bottom (Popenoe and Manheim 2001, Sedberry et al. 2001). The high topographic relief of the bottom deflects the Gulf Stream offshore and creates eddies, gyres, and upwellings in the Gulf Stream flow (Sedberry et al. 2001), which advect nutrients from the bottom into the euphotic zones, creating areas of high productivity (Lee et al. 1991).

Refer to **Appendix I** for more information about EFH and Ecosystem Based Management in the South Atlantic.

3.1.4 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; South Atlantic Council-designated Artificial Reef Special Management Zones (SMZs); and deepwater MPAs.

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

Refer to **Appendix I** for detailed information on EFH and EFH-HAPCs for all Council managed species.

3.2 Biological and Ecological Environment

The reef environment in the South Atlantic management area affected by actions in this environmental assessment is defined by two components (**Figure 3.2.1**). Each component will be described in detail in the following sections.

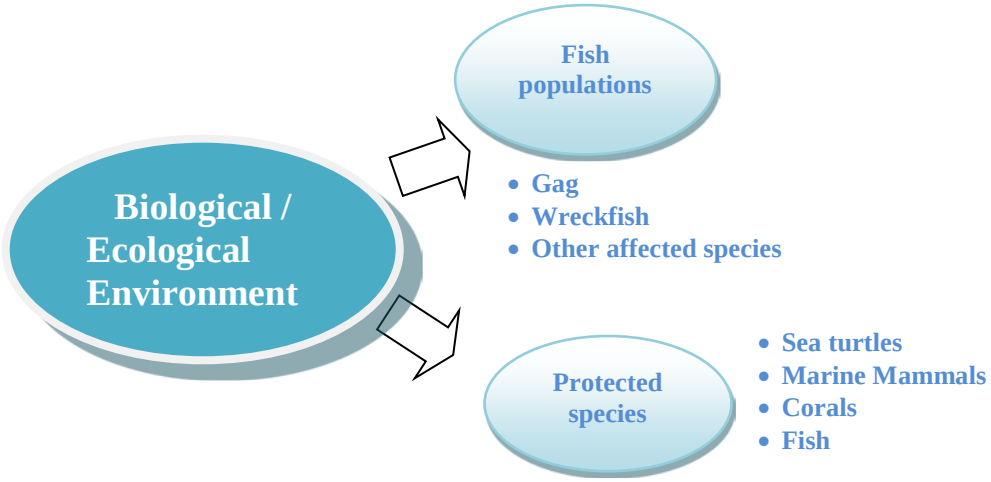

Figure 3.2.1. Two components of the biological environment described in this document.

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 contains 59 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 porgy) 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 dictates the nature of the fishery (multi-species) and further forms the type of management regulations proposed in this document.

Other snapper grouper species commonly taken with those directly affected by the actions proposed in this amendment could be affected by the action. Snapper grouper species most likely to be affected by the proposed actions include species that occupy the same habitat at the same time (refer to **Section 3.2.1.3** for a list of the co-occurring species).

3.2.1.1 Gag (*Mycteroperca microlepis*)

Gag occur in the Western Atlantic from North Carolina to the Yucatan Peninsula, and throughout the Gulf of Mexico. Juveniles are sometimes observed as far north as Massachusetts (Heemstra and Randall 1993). Gag commonly occur at depths of 39-152 m (131-498 ft) (Heemstra and Randall 1993) and prefer

inshore-reef and shelf-break habitats (Hood and Schlieder 1992). Bullock and Smith (1991) indicated that gag probably do not move seasonally between reefs in the Gulf of Mexico, but show a gradual shift toward deeper water with age. McGovern et al. (2005) reported extensive movement of gag along the Southeast United States. In a tagging study, 23% of the 435 recaptured gag moved distances greater than 185 km. Most of these individuals were tagged off South Carolina and were recaptured off Georgia, Florida, and in the Gulf of Mexico (McGovern et al. 2005).

Gag are considered estuarine dependent (Keener et al. 1988; Ross and Moser 1995; Koenig and Coleman 1998; Strelcheck et al. 2003). Juveniles (age 0) occur in shallow grass beds along Florida's east coast during the late spring and summer (Bullock and Smith 1991). Sea grass is also an important nursery habitat for juvenile gag in North Carolina (Ross and Moser 1995). Post-larval gag enter South Carolina estuaries when they are 13 mm total length (TL) and 40 days old during April and May each year (Keener et al. 1988), and utilize oyster shell rubble as nursery habitat. Juveniles remain in estuarine waters throughout the summer and move offshore as water temperatures cool during September and October.

Huntsman et al. (1999) indicated that gag are vulnerable to overfishing since they are long-lived, change sex, and aggregate to spawn. Maximum reported size for gag is 145 cm (57.5 in) TL and 36.5 kg (81 lbs) (Heemstra and Randall 1993), and maximum reported age is 26 years (Harris and Collins 2000). Most gag are females at lengths less than 87.5 cm (34.7 in) TL. As they grow, females change to males with 50% of the fish being males at 105 cm (41.6 in) TL and almost 100% males at lengths greater than 120 cm (47.5 in) TL (McGovern et al. 1998).

Along the southeastern United States (1994-1995), size at first maturity is 50.8 cm (20.2 in) TL, and 50% of gag females are sexually mature at 62.2 cm (24.7 in) (McGovern et al. 1998). According to Harris and Collins (2000), age-at-first-maturity is 2 years, and 50% of gag are mature at 3 years. For data that were collected during 1978-1982 off the southeastern United States, McGovern et al. (1998) reported that the smallest mature females were 58 cm (22.9 in) TL and 3 years old. Hood and Schlieder (1992) indicated that most females reach sexual maturity at ages 5-7 in the Gulf of Mexico. Off the southeastern United States, gag spawn from December through May, with a peak in March and April (McGovern et al. 1998). Duration of planktonic larvae is about 42 days (Keener et al. 1988, Koenig and Coleman 1998, Lindeman et al. 2000). McGovern et al. (1998) reported that the percentage of male gag landed by commercial fishermen decreased from 20% during 1979-1981 to 6% during 1995-1996. This coincided with a decrease in the mean length of fish landed. A similar decrease in the percentage of males was reported in the Gulf of Mexico (Hood and Schleider 1992, Coleman et al. 1996).

Adults are sometimes solitary, or can occur in groups of 5 to 50 individuals, especially during the spawning season. They feed primarily on fishes, but also prey on crabs, shrimps, and cephalopods (Heemstra and Randall 1993), and often forage in small groups far from the reef ledge (Bullock and Smith 1991). Juveniles feed primarily on crustaceans, and begin to consume fishes when they reach about 25 mm (1 in) in length (Bullock and Smith 1991, Mullaney 1994).

Stock Status of Gag

An update assessment to evaluate the stock of gag (*Mycteroperca microlepis*) off the southeastern United States was conducted in 2014 (SEDAR 10 Update 2014). The primary objectives were to update and improve the SEDAR 10 (2006) benchmark assessment of gag and to conduct new stock projections.

For the update assessment, data compilation and assessment methods were guided by SEDAR 10, as well as more recent SEDAR assessments. The assessment period for gag was 1962-2012.

Results suggest that spawning stock declined until the mid-1980s and has since been relatively stable, fluctuating around the Minimum Stock Size Threshold (MSST), with an upturn in the last several years. The terminal (2012) base-run estimate of spawning stock was near SSB_{MSY} (SSB_{2012}=SSB_{MSY} =0.97), as is the median estimate (SSB_{2012}=SSB_{MSY} =1.04), and this level is above the MSST (base: SSB_{2012}=MSST =1.13; median: SSB_{2012}=MSST =1.21). Projections suggested that spawning biomass would decline in the years immediately after 2012, primarily because of poor recruitment in 2010 and 2011. The estimated fishing rate exceeded the MFMT (represented by F_{MSY}) for most of the last three decades, but decreased in the last several years with the 2012 estimate below the MFMT. The estimate of fishing rate, which is based on a three-year geometric mean, was above F_{MSY} in the case of the base run $F_{2010-2012}/F_{MSY}$ = 1.23) and the median ($F_{2010-2012}/F_{MSY}$ = 1.37). Thus, the assessment found that the stock is undergoing overfishing based on the average fishing mortality rates from 2010-2012, but is not overfished. The South Atlantic Council's SSC noted that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing did not occur in 2012 and 2013 (SAFMC SSC report, April 2014). A letter from NMFS to the South Atlantic Council Chairman dated September 8, 2014, stated that gag is neither overfished nor undergoing overfishing.

3.2.1.2 Wreckfish (*Polyprion americanus*)

The wreckfish, *Polyprion americanus,* is a large grouper-like fish that has a global anti-tropical distribution, but it was rarely captured in the western North Atlantic until the late 1980s, when a bottom hook-and-line fishery that targets wreckfish developed on the Blake Plateau (Vaughan et al. 2001). Wreckfish occur in the Eastern and Western Atlantic Ocean, on the Mid-Atlantic Ridge, on Atlantic islands and seamounts, and in the Mediterranean Sea, southern Indian Ocean, and southwestern Pacific Ocean (Heemstra 1986, Sedberry 1995; Sedberry et al. 1994, 2001). In the western Atlantic, they occur from Grand Banks (44°50' N) off Newfoundland (Scott and Scott 1988) to the Valdes Peninsula (43°30' S) in Argentina (Menni et al. 1981). Genetic evidence suggests that there are three stocks: one that encompasses the entire North Atlantic and Mediterranean, one from Brazil, and the third from Australia/New Zealand in the South Pacific (Ball et al. 2000, Sedberry et al. 1996). Active adult migration is also possible based on the observation of European fish hooks present in western North Atlantic wreckfish suggest migration across great distances (Sedberry et al. 2001).

Wreckfish have supported substantial fisheries in the eastern North Atlantic, Mediterranean, Bermuda, and the western South Atlantic, but concentrations of wreckfish adequate to support a fishery off the southeastern United States were not discovered until 1987. The fishery off the southeastern United States occurs over a complex bottom feature that has over 100 m of topographic relief, known as the Charleston Bump, located 130-160 km southeast of Charleston, South Carolina, at 31°30' N and 79°00' W on the Blake Plateau (Sedberry et al. 2001). Fishing occurs at water depths of 450-600 m. Primary fishing grounds comprise an area of approximately 175-260 km^2 characterized by a rocky ridge and trough feature with a slope greater than 15° (Sedberry et al. 1994, 1999, 2001).

Adults are demersal and attain lengths of 200 cm TL (79 in; Heemstra 1986) and 100 kg (221 pounds; Roberts 1986). Wreckfish landed in the southeastern United States average 15 kg (33 pounds) and 100 cm TL (39 inches TL) (Sedberry et al. 1994). Goldman and Sedberry (2011) found that wreckfish predominantly consumed bony fish and squid. Juvenile wreckfish (< 60 cm TL) are pelagic, and often

associate with floating debris, which accounts for their common name. The absence of small pelagic and demersal wreckfish on the Blake Plateau has led to speculation that young wreckfish drift for an extended period, up to four years, in surface currents until reaching the eastern Atlantic, or perhaps that they make a complete circuit of the North Atlantic (Sedberry et al. 2001).

Vaughan et al. (2001) reported a maximum age of 35 years; however, off Brazil the maximum age for wreckfish has been reported as 76 years (Peres and Haimovici 2004). In a recent Marine Resources Monitoring, Assessment, and Prediction (MARMAP) report (Wyanski and Meister 2002), mature gonads were present in 60% of females at 751-800 mm, 57% at 801-850 mm, and 100% at larger sizes. The smallest mature female was 692 mm, and a portion of the females was immature at lengths between 576 and 831 mm. The estimate of length at 50% maturity (L_{50}) was 790 mm (Gomperz model; 95% CI = 733-820). Mature gonads were present in 40% of males between 651 and 800 mm and 100% at larger sizes. The smallest mature male was 661 mm, and a portion of males was immature between 518 and 883 mm. L_{50} was not estimated for males because transition to maturity was abrupt.

Wreckfish spawn from December through May based on female gonadal maturity. Spawning activity peaks from February to March. The highest percentages of ripe males occurred from December through May, which corresponded with the female spawning season; however, males in spawning condition were collected throughout the year. The male spawning peak was also during February and March.

Stock Status of Wreckfish

In April 2010, the SSC determined the wreckfish acceptable biological catch (ABC) was unknown because effort and landings were reduced to the extent that landings information was confidential. The SSC indicated the South Atlantic Council should consider an ACL that did not exceed 200,000 lbs (90,718 kg) ww. Additionally, the SSC discussed setting an ABC for wreckfish during their August 2010 meeting. The SSC stated that a 2001 assessment indicated wreckfish stock depletion occurred at higher historical levels of effort and that the catch reductions may have occurred mainly from gear restrictions, a spawning season closure, and the wreckfish ITQ (Individual Transferable Quota) implementation. The SSC stated that a depletion-based stock reduction analysis (Level 2 of the ABC control rule) or depletion-corrected average catch (Level 3 of the ABC control rule) estimate could be calculated, but recent wreckfish landings were confidential; therefore, the SSC was not able to perform the calculations to produce these estimates. The SSC agreed the 2001 assessment was dated and no longer applied to current wreckfish landings and conditions. The SSC additionally concluded that the ABC control rule based on catch-only data (Level 4 of the ABC control rule) should be used even though a dated stock assessment existed for wreckfish.

A statistical catch-at-age assessment of the wreckfish stock in the South Atlantic was conducted in 2012. The assessment was not done through the Southeast Data Assessment and Review (SEDAR) process, however (see **Section 1.6.2**). At their spring 2014 meeting, the South Atlantic Council's SSC conducted a review of the assessment and accepted it as representing the best scientific information available on the current status of wreckfish in South Atlantic waters and considered it appropriate for SAFMC management decisions.

The summary that follows was presented to the SSC in April/May 2014:

The available information on past catches, CPUE and catch-at-length distributions is sufficient to allow the application of Statistical Catch-at-Age methodology to assess the US South Atlantic wreckfish

resource. The assessment is carried out for all combinations of four natural mortality (M) and three steepness values. A poor log-likelihood plus an inability to reflect a recent upward trend in CPUE rules out the lowest value of M = 0.025 yr-1 considered. Although the fit to the length distribution data improves steadily as M is increased, estimated abundances become realistically large as M approaches 0.1. For the range of M (0.05 to 0.075) over which reasonable and realistic fits to the data are obtained, the resource is ***not overfished and overfishing is not occurring****. The corresponding estimates of MSY range from 278 to 1293 thousand lbs, and suggest that a yet more optimistic conclusion about the resource can be reached than that drawn from a recent DCAC based analysis, with an appreciable increase in the ABC above its current level of 250 thousand lbs being defensible* (Butterworth and Rademeyer 2012).

3.2.1.3 Other Species Affected

Snapper grouper species that co-occur with gag grouper are:
Red grouper, *Epinephelus morio*
Black grouper, *Epinephelus nigritus*
Red hind, *Epinephelus guttatus*
Rock hind, *Epinephelus adscensionis*
Yellowmouth grouper, *Mycteroperca interstitialis*
Yellowfin grouper, *Mycteroperca venenosa*
Coney, *Cephalopholis fulva*
Graysby, *Cephalopholis cruentata*

Descriptions of other South Atlantic Council managed species may be found in Volume II of the Fishery Ecosystem Plan (SAFMC 2009b) available at:
http://safmc.net/ecosystem-management/fishery-ecosystem-plan-1

In the wreckfish commercial fishery, barrelfish (*Hyperoglyphe perciformes*) and red bream (*Beryx decadactylus*) are caught as bycatch (Goldman and Sedberry 2011). Other species collected by Goldman and Sedberry (2011) on vertical lines with baited hooks from 400 to 800 m depth, on and around Charleston Bump were: splendid alfonsino (*Beryx splendens*), conger eel (*Conger oceanicus*), gulper shark (*Centrophorus granulosus*), roughskin dogfish (*Cirrhigaleus asper*), and shortspine dogfish (*Squalus mitsukurii*).

3.2.2 The Stock Assessment Process

Gag has been assessed through the Southeast Data, Assessment and Review (SEDAR) process. 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 U.S. Caribbean. The Caribbean, Gulf of Mexico, and South Atlantic Fishery Management Councils manage SEDAR in coordination with the National Marine Fisheries Service (NMFS) 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.

SEDAR is organized around three workshops. First is the Data Workshop, during which fisheries monitoring and life history data are reviewed and compiled. Second is the Assessment Workshop, which may be conducted via a workshop and several webinars, during which assessment models are developed and population parameters are estimated using the information provided from the Data Workshop. Third and final is the Review Workshop, during which independent experts review the input data, assessment methods, and assessment products. The completed assessment, including the reports of all three workshops and all supporting documentation, are then forwarded to the South Atlantic Council's Scientific and Statistical Committee (SSC). The SSC considers whether the assessment represents the best science available and develops fishing level recommendations for South Atlantic Council consideration.

SEDAR workshops are public meetings organized by SEDAR. Workshop participants appointed by the lead Council are drawn from state and federal agencies, non-government organizations, Council members, Council advisors, and the fishing industry with a goal of including a broad range of disciplines and perspectives. All participants are expected to contribute to this scientific process by preparing working papers, contributing data, providing assessment analyses, evaluating and discussing information presented, and completing the workshop report.

3.2.3 Protected Species

There are 49 species, or distinct population segments (DPSs) of species, protected by the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), or both, that may occur in the exclusive economic zone (EEZ) of the South Atlantic Region. Thirty-one of these species are marine mammals protected under the MMPA (Wynne and Schwartz 1999, Waring et al. 2013). The MMPA requires that each commercial fishery be classified by the number of marine mammals they seriously injure or kill. NMFS's List of Fisheries (LOF) classifies U.S. commercial fisheries into three categories based on the number of incidental mortality or serious injury they cause to marine mammals. More information about the LOF and the classification process can be found at: http://www.nmfs.noaa.gov/pr/interactions/lof/.

Six of the marine mammal species (sperm, sei, fin, blue, humpback, and North Atlantic right whales) protected by the MMPA, are also listed as endangered under the Endangered Species Act (ESA). In addition to those six marine mammals, five species of sea turtles (green, hawksbill, Kemp's ridley, leatherback, and loggerhead); the smalltooth sawfish; five DPSs of Atlantic sturgeon; and six species of coral [elkhorn coral (*Acropora palmata*), staghorn coral (*A. cervicornis*) ("*Acropora*" collectively); lobed star coral (*Orbicella annularis*), mountainous star coral (*O. faveolata*), and knobby star coral (*O. franksi*) ("*Orbicella*" collectively); and rough cactus coral (*Mycetophylia ferox*)] are also protected under the ESA.

Portions of designated critical habitat for North Atlantic right whales, the Northwest Atlantic (NWA) DPS of loggerhead sea turtles, and *Acropora* corals occur within the South Atlantic Council's jurisdiction. NMFS has conducted specific analyses ("Section 7 consultations") to evaluate the potential adverse effects from the South Atlantic snapper grouper fishery on species and critical habitat protected under the ESA. Summaries of those consultations and their determination are in **Appendix C**. Those consultations indicate that, of the species listed above, sea turtles and smalltooth sawfish interact the most with the hook-and-line portion of the snapper grouper fishery via incidental capture. Information on these sea

turtles and smalltooth sawfish and how they are adversely affected by the snapper grouper fishery are discussed below.

ESA-Listed Sea Turtles

Sea turtles are vulnerable to capture by vertical hook-and-line line gear used in the wreckfish and gag components of the snapper grouper fishery. The effects of the wreckfish and gag fisheries on sea turtles were evaluated in the previous biological opinion on the entire South Atlantic snapper grouper fishery (NMFS 2006). The biological opinion concluded the entire South Atlantic snapper grouper fishery (including the wreckfish and gag sectors) was likely to adversely affect sea turtles, but not jeopardize their continued existence.

The magnitude of the interactions between sea turtles and the South Atlantic snapper grouper fishery was evaluated in NMFS (2006) using data from the Supplementary Discard Data Program (SDDP). Three loggerheads and three unidentified sea turtles were caught on vertical lines; one leatherback and one loggerhead were caught on bottom longlines, all were released alive. The effort reported in the program represented between approximately 5% and 14% of all South Atlantic snapper grouper fishing effort. These data were extrapolated in NMFS (2006) to better estimate the number of interactions between the entire snapper grouper fishery and ESA-listed sea turtles. The extrapolated estimate was used to project future interactions (**Table 3.2.1**).

Table 3.2.1. Three-year South Atlantic anticipated takes of sea turtles in the snapper grouper fishery.

Species	Amount of Take	Total
Green	Total Take	39
	Lethal Take	14
Hawksbill	Total Take	4
	Lethal Take	3
Kemp's Ridley	Total Take	19
	Lethal Take	8
Leatherback	Total Take	25
	Lethal Take	15
Loggerhead	Total Take	202
	Lethal Take	67

Source: NMFS 2006. NMFS (National Marine Fisheries Service). 2006. Endangered Species Act Section 7 consultation on the continued authorization of snapper grouper fishing under the Snapper Grouper FMP and Proposed Amendment 13C. Biological Opinion. June 7.

Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all highly migratory and travel widely throughout the South Atlantic. The following sections are a brief overview of the general life history characteristics of the sea turtles found in the South Atlantic region. Several volumes exist that cover the biology and ecology of these species more thoroughly (i.e., Lutz and Musick (eds.) 1997, Lutz et al. (eds.) 2002).

Green sea turtle hatchlings are thought to occupy pelagic areas of the open ocean and are often associated with *Sargassum* rafts (Carr 1987, Walker 1994). Pelagic stage green sea turtles are thought to be carnivorous. Stomach samples of these animals contained ctenophores and pelagic snails (Frick 1976, Hughes 1974). At approximately 20 to 25 cm carapace length, juveniles migrate from pelagic habitats to

benthic foraging areas (Bjorndal 1997). As juveniles move into benthic foraging areas, a diet shift towards herbivory occurs. They consume primarily seagrasses and algae, but are also know to consume jellyfish, salps, and sponges (Bjorndal 1980, 1997; Paredes 1969; Mortimer 1981, 1982). The diving abilities of all sea turtles species vary by their life stages. The maximum diving range of green sea turtles is estimated at 110 m (360 ft) (Frick 1976), but they are most frequently making dives of less than 20 m (65 ft.) (Walker 1994). The time of these dives also varies by life stage. The maximum dive length is estimated at 66 minutes with most dives lasting from 9 to 23 minutes (Walker 1994).

The **hawksbill's** pelagic stage lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988, Meylan and Donnelly 1999). The pelagic stage is followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Little is known about the diet of pelagic stage hawksbills. Adult foraging typically occurs over coral reefs, although other hard-bottom communities and mangrove-fringed areas are occupied occasionally. Hawksbills show fidelity to their foraging areas over several years (Van Dam and Diéz 1998). The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Gravid females have been noted ingesting coralline substrate (Meylan 1984) and calcareous algae (Anderes Alvarez and Uchida 1994), which are believed to be possible sources of calcium to aid in eggshell production. The maximum diving depths of these animals are not known, but the maximum length of dives is estimated at 73.5 minutes. More routinely, dives last about 56 minutes (Hughes 1974).

Kemp's ridley hatchlings are also pelagic during the early stages of life and feed in surface waters (Carr 1987, Ogren 1989). Once the juveniles reach approximately 20 cm carapace length they move to relatively shallow (less than 50 m) benthic foraging habitat over unconsolidated substrates (Márquez-M. 1994). They have also been observed transiting long distances between foraging habitats (Ogren 1989). Kemp's ridleys feeding in these nearshore areas primarily prey on crabs, though they are also known to ingest mollusks, fish, marine vegetation, and shrimp (Shaver 1991). The fish and shrimp which Kemp's ridleys ingest are not thought to be a primary prey item but instead may be scavenged opportunistically from bycatch discards or from discarded bait (Shaver 1991). Given their predilection for shallower water, Kemp's ridleys most routinely make dives of 50 m or less (Soma 1985, Byles 1988). Their maximum diving range is unknown. Depending on the life stage, Kemp's ridleys may be able to stay submerged anywhere from 167 minutes to 300 minutes, though dives of 12.7 minutes to 16.7 minutes are much more common (Soma 1985, Mendonca and Pritchard 1986, Byles 1988). Kemp's ridleys may also spend as much as 96% of their time underwater (Soma 1985, Byles 1988).

Leatherbacks are the most pelagic of all ESA-listed sea turtles and spend most of their time in the open ocean. Although they will enter coastal waters and are seen over the continental shelf on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherbacks feed primarily on cnidarians (medusae, siphonophores) and tunicates. Unlike other sea turtles, leatherbacks' diets do not shift during their life cycles. Because leatherbacks' ability to capture and eat jellyfish is not constrained by size or age, they continue to feed on these species regardless of life stage (Bjorndal 1997). Leatherbacks are the deepest diving of all sea turtles. It is estimated that these species can dive in excess of 1,000 m (Eckert et al. 1989) but more frequently dive to depths of 50 m to 84 m (Eckert et al. 1986). Dive times range from a maximum of 37 minutes to more routines dives of 4 to 14.5 minutes (Standora et al. 1984, Eckert et al. 1986, Eckert et al. 1989, Keinath and Musick 1993). Leatherbacks may spend 74% to 91% of their time submerged (Standora et al. 1984).

Loggerhead hatchlings forage in the open ocean and are often associated with *Sargassum* rafts (Hughes 1974, Carr 1987, Walker 1994, Bolten and Balazs 1995). The pelagic stage of these sea turtles eat a wide range of organisms including salps, jellyfish, amphipods, crabs, syngnathid fish, squid, and pelagic snails (Brongersma 1972). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic (Witzell 2002). Here they forage over hard- and soft-bottom habitats (Carr 1986). Benthic foraging loggerheads eat a variety of invertebrates with crabs and mollusks being an important prey source (Burke et al. 1993). Estimates of the maximum diving depths of loggerheads range from 211 m to 233 m (692-764ft.) (Thayer et al. 1984, Limpus and Nichols 1988). The lengths of loggerhead dives are frequently between 17 and 30 minutes (Thayer et al. 1984, Limpus and Nichols 1988, Limpus and Nichols 1994, Lanyan et al. 1989) and they may spend anywhere from 80 to 94% of their time submerged (Limpus and Nichols 1994, Lanyan et al. 1989).

ESA-Listed Marine Fish

Historically the **smalltooth sawfish** in the U.S. ranged from New York to the Mexico border. Their current range is poorly understood, but believed to have contracted from these historical areas. In the South Atlantic region, they are most commonly found in Florida, primarily off the Florida Keys (Simpfendorfer and Wiley 2004). Only two smalltooth sawfish have been recorded north of Florida since 1963 [the first was captured off North Carolina in 1963 and the other off Georgia in 2002 (National Smalltooth Sawfish Database, Florida Museum of Natural History)]. Historical accounts and recent encounter data suggest that immature individuals are most common in shallow coastal waters less than 25 meters (Bigelow and Schroeder 1953, Adams and Wilson 1995), while mature animals occur in waters in excess of 100 meters (Simpfendorfer pers. comm. 2006). Smalltooth sawfish feed primarily on fish. Mullet, jacks, and ladyfish are believed to be their primary food sources (Simpfendorfer 2001). Smalltooth sawfish also prey on crustaceans (mostly shrimp and crabs) by disturbing bottom sediment with their saw (Norman and Fraser 1938, Bigelow and Schroeder 1953).

3.3 Economic Environment

3.3.1 Economic Description of the Commercial Sector

Number of Vessels and Ex-vessel Revenue

Table 3.3.1 contains estimates of the average number of vessels per fishing year that recorded harvesting at least one pound of gag (2009-2013), the average ex-vessel revenue from gag harvested by these vessels, the average ex-vessel revenue from all other species harvested on all trips by these vessels on trips on which gag were harvested and all other trips by these vessels, and the average total ex-vessel revenue per vessel. **Table 3.3.2** contains similar information for vessels that harvested at least one pound of wreckfish. Additional information on the commercial harvest of these species is contained in the Comprehensive ACL Amendment (SAFMC 2011a; gag and wreckfish), and Regulatory Amendment 14 (SAFMC 2013b; gag), and Yandle and Crosson (2015), and is incorporated herein by reference. Although not shown in **Table 3.3.1**, gag vessels took an average of 8 trips per year on which gag were harvested and 19 trips per year on which only other species were harvested. The average revenue per gag trip, however, was almost twice the average revenue per trip on which no gag was harvested, approximately $2,696 compared to approximately $1,366. Also not shown in **Table 3.3.1**, these results are based on an average harvest of approximately 356,000 lbs (gutted weight) of gag per year (across all vessels) and an average price of $4.93 per lb (2013 dollars). These vessels collectively harvested an average of approximately 4.235 million lbs per year of other species, which received an average price of $2.40 per lb.

For vessels that harvested wreckfish, the comparable values are an average of 8 trips per year with wreckfish landings compared to 33 trips per year on which only other species were harvested, and wreckfish trips averaged approximately $16,026 per trip in total revenue compared to approximately $4,210 for other trips. These results are based on an average harvest of 217,000 lbs (gutted weight) of wreckfish per year (across all vessels) and an average price of $3.61 per lb (2013 dollars). These vessels collectively harvested an average of approximately 237,000 lbs per year of other species, which received an average price of $3.61 per lb.

Table 3.3.1. Average number of vessels, ex-vessel revenue from gag, ex-vessel revenue from all species harvested by same vessels, and average total ex-vessel revenue per vessel, 2009-2013. All revenue estimates are in 2013 dollars.

Year	Number of vessels that harvested gag	Dockside revenue from gag	Dockside revenue from 'other species' jointly harvested with gag	Dockside revenue from 'other species' harvested on trips without gag	Total dockside revenue all trips	Average total dockside revenue per vessel
2009	292	$1,801,490	$4,835,668	$6,811,524	$13,448,683	$46,057
2010	243	$1,798,703	$3,782,850	$6,199,878	$11,781,431	$48,483
2011	233	$1,942,384	$3,873,760	$5,767,783	$11,583,927	$49,716
2012	225	$1,659,178	$3,225,719	$6,034,995	$10,919,891	$48,533
2013	233	$1,568,454	$3,196,121	$7,058,890	$11,823,464	$50,744
Average	245	$1,754,042	$3,782,824	$6,374,614	$11,911,479	$48,579

Source: NMFS SEFSC Coastal Fisheries Logbook for landings and NMFS Accumulated Landings System for prices. Landings and revenue from State waters by vessels without federal permits are not included.

Table 3.3.2. Average number of vessels, ex-vessel revenue from wreckfish, ex-vessel revenue from all species harvested by same vessels, and average total ex-vessel revenue per vessel, 2009-2013. All revenue estimates are in 2013 dollars.

Year	Number of vessels that harvested wreckfish (> 0 lbs)	Dockside revenue from wreckfish	Dockside revenue from 'other species' jointly harvested with wreckfish	Dockside revenue from 'other species' harvested on trips without wreckfish	Total dockside revenue all trips	Average total dockside revenue per vessel
2009	7	$563,663	$7,631	$392,777	$964,071	$137,724
2010	7	$750,153	$12,278	$814,122	$1,576,553	$225,222
2011	7	$926,627	$48,449	$835,865	$1,810,941	$258,706
2012	5	$730,360	$37,927	$1,050,484	$1,818,771	$363,754
2013	4	$741,738	$27,350	$1,053,324	$1,822,412	$455,603
Average	6	$742,508	$26,727	$829,314	$1,598,550	$288,202

Source: NMFS SEFSC Wreckfish Logbook for landings on wreckfish trips and wreckfish dealer reports for wreckfish price information; NMFS SEFSC Coastal Fisheries Logbook and NMFS Accumulated Landings System for prices for information on trips without wreckfish landings. Landings and revenue from State waters by vessels without federal permits are not included.

Business Activity

The commercial harvest and subsequent sales and consumption of fish generates business activity as fishermen expend funds to harvest the fish and consumers spend money on goods and services, such as gag or wreckfish purchased at a local fish market and served during restaurant visits. These expenditures spur additional business activity in the region(s) where the harvest and purchases are made, such as jobs in local fish markets, grocers, restaurants, and fishing supply establishments. In the absence of the availability of a given species for purchase, consumers would spend their money on substitute goods and services. As a result, the analysis presented below represents a distributional analysis only; that is, it only shows how economic effects may be distributed through regional markets and should not be interpreted to represent the impacts if these species are not available for harvest or purchase.

Estimates of the average annual business activity associated with the commercial harvest of gag, and all species harvested by the vessels that harvested these gag, were derived using the model developed for and applied in NMFS (2011) and are provided in **Table 3.3.3**. This business activity is characterized as 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 results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models to address individual species are not available. For example, the results provided here apply to a general reef fish category rather than just gag or wreckfish, and a harvester job is "generated" for approximately every $44,000 in ex-vessel revenue. These results ignore the fact that the same group of vessels were responsible for the separate species groupings (gag vessels vs. wreckfish vessels) and also contrast with the information provided in **Section 3.3.1.** which show the actual number of harvesters (vessels) with recorded harvests of the respective species (245 vessels for gag and 6 vessels for wreckfish).

Table 3.3.3. Average annual business activity associated with the commercial harvest of gag and wreckfish. All monetary estimates are in 2013 dollars.

Species	Average Ex-vessel Value (millions)	Total Jobs	Harvester Jobs	Output (Sales) Impacts (millions)	Income Impacts (millions)
Gag	$1,754,042	306	40	$23,095	$9,843
- all species harvested on all trips by same vessels*	$11,911,479	2,075	271	$156,832	$66,841
Wreckfish	$742,508	129	17	$9,776	$4,167
- all species harvested on all trips by same vessels*	$1,598,550	278	36	$21,047	$8,970

*including gag or wreckfish, respectively.

3.3.2 Economic Description of the Recreational Sector

Information on the recreational harvest of gag, aggregate grouper, and wreckfish is contained in the Comprehensive ACL Amendment (SAFMC 2011a; gag, other groupers, and wreckfish) and Regulatory Amendment 14 (SAFMC 2013b; gag), and is incorporated herein by reference. The following sections provide updated information on angler effort, permits, economic value, and the business activity associated with the harvest of these species.

Angler Effort

Recreational effort derived from the Marine Recreational Information Program (MRIP) database can be characterized in terms of the number of trips as follows:

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

Other measures of effort are possible, such as the number of catch trips (the number of individual angler trips that catch a particular species regardless of target intent), and directed trips (the number of individual angler trips that either targeted or caught a particular species), among other measures. Estimates of the average number of target trips for the shore, charter, and private/rental boat modes in the South Atlantic for 2009-2013 are provided in **Table 3.3.4** and the average number of catch trips are provided in **Table 3.3.5**

Table 3.3.4. Average number of recreational target trips, by mode, 2009-2013.

	Florida	Georgia	North Carolina	South Carolina	Total
	Shore Mode				
Gag	464	0	0	0	464
Aggregate Grouper*	464	0	0	0	464
Wreckfish	0	0	0	0	0
	Charter Mode				
Gag	109	0	0	0	109
Aggregate Grouper*	116	0	50	233	399
Wreckfish	0	0	0	0	0
	Private/Rental Mode				
Gag	22,710	291	415	0	23,416
Aggregate Grouper*	27,125	291	542	0	27,958
Wreckfish	0	0	0	0	0
	All Modes				
Gag	23,283	291	415	0	23,989
Aggregate Grouper*	27,705	291	592	233	28,821
Wreckfish	0	0	0	0	0

* Includes gag.
Source: Southeast Regional Office. Note: these estimates may vary from those derived from other sources or estimation methodologies.

Table 3.3.5. Average number of recreational catch trips, by mode, 2009-2013.

	Florida	Georgia	North Carolina	South Carolina	Total
	Shore Mode				
Gag	3,828	8	1,262	0	5,098
Aggregate Grouper*	5,839	8	1,396	0	7,243
Wreckfish	0	0	0	0	0
	Charter Mode				
Gag	1,669	77	1,037	584	3,367
Aggregate Grouper*	10,118	123	3,049	954	14,244
Wreckfish	0	0	5	0	5
	Private/Rental Mode				
Gag	22,710	291	415	0	23,416
Aggregate Grouper*	27,125	291	542	0	27,958
Wreckfish	0	0	0	0	0
	All Modes				
Gag	28,207	376	2,714	584	31,881
Aggregate Grouper*	43,082	422	4,987	954	49,445
Wreckfish	0	0	5	0	5

* Includes gag.
Source: Southeast Regional Office. Note: these estimates may vary from those derived from other sources or estimation methodologies.

Headboat data do not support the estimation of target effort because intended target is not collected, nor catch effort. **Table 3.3.6** contains estimates of the number of headboat angler days for all South Atlantic states for 2009-2013.

Table 3.3.6. Headboat angler days, 2009-2013.

Year	Florida/Georgia	North Carolina	South Carolina	Total
2009	136,420	19,468	40,919	196,807
2010	123,662	21,071	44,951	189,684
2011	124,041	18,457	44,645	187,143
2012	139,623	20,766	41,003	201,392
2013	165,679	20,547	40,963	227,189
Average	137,885	20,062	42,496	200,443

Source: Southeast Region Headboat Survey.

Permits

The for-hire sector is comprised of charter vessels and headboats (party boats). Although charter vessels tend to be smaller, on average, than headboats, the key distinction between the two types of operations is how the fee is determined. On a charter boat trip, the fee charged is for the entire vessel, regardless of how many passengers are carried, whereas the fee charged for a headboat trip is paid per individual angler.

A federal for-hire vessel permit has been required for snapper grouper species and the sector currently operates under an open access system, i.e., the number of permits is not limited. On August 8, 2014, there were 1,446 South Atlantic Charter/Headboat for Snapper Grouper permits. Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel, and vessels may be operated in both capacities. However, only federally permitted headboats are required to submit harvest and effort information to the NMFS Southeast Region Headboat Survey (SRHS). Participation in the SRHS is based on determination by the Southeast Fishery Science Center (SEFSC) that the vessel primarily operates as a headboat. Seventy-seven vessels in the South Atlantic were registered in the SHRS as of April 8, 2014 (K. Brennen, NMFS SEFSC, pers. comm.).

Information on South Atlantic charter boat and headboat operating characteristics is included in Holland et al. (2012) and is incorporated herein by reference.

There are no specific federal permitting or licensing requirements for recreational anglers to fish for or harvest snapper grouper species. Instead, anglers are required to possess either a state recreational fishing permit that authorizes saltwater fishing in general, or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this proposed action.

Economic Value

Economic value can be measured in the form of consumer surplus per fishing trip for anglers (the amount of money that an angler would be willing to pay for a fishing trip in excess of the cost of the trip) and producer surplus per passenger trip for for-hire vessels (the amount of money that a vessel owner earns in excess of the cost of providing the trip). The estimated value of the consumer surplus for a trip on which the angler is allowed to harvest a second grouper is approximately $102 (Carter and Liese 2012; values updated to 2013 dollars), and decreases thereafter (approximately $68 for a third grouper, $50 for a fourth grouper, and $39 for a fifth grouper). Values by specific grouper species are not available.

Estimates of the producer surplus per for-hire passenger trip are not available. Instead, net operating revenues, which are the return used to pay all labor wages, returns to capital, and owner profits, are used as the proxy for producer surplus. The estimated net operating revenue (2013 dollars) is $160.13 per target charter angler trip and $53.01 per target headboat angler trip regardless of species targeted or catch success (C. Liese, NMFS SEFSC, pers. comm.). Estimates of net operating revenue per gag or aggregated grouper trip are not available.

Business Activity

The desire for recreational fishing generates economic activity as consumers spend their income on various goods and services needed for recreational fishing. This spurs economic activity in the region where recreational fishing occurs. In the absence of the opportunity to fish, the income would presumably be spent on other goods and services and these expenditures would similarly generate economic activity in the region where the expenditure occurs. As such, the analysis below represents a distributional analysis only.

Estimates of the business activity (economic impacts) associated with recreational angling for gag were derived using average impact coefficients for recreational angling for all species, as derived from an add-on survey to the MRFSS to collect economic expenditure information, as described and utilized in NMFS (2011). Estimates of the average expenditures by recreational anglers are also provided in NMFS (2011) and are incorporated herein by reference.

Recreational fishing generates business activity (economic impacts). Business activity for the recreational sector is characterized in the form of full-time equivalent jobs, output (sales) impacts (gross business sales), and value-added impacts (difference between the value of goods and the cost of materials or supplies). Estimates of the average gag target effort (2009-2013) and associated business activity (2013 dollars) are provided in **Table 3.3.7**. As discussed above, other measures of gag effort can be estimated, for example, catch effort or directed effort. Estimates of business activity by effort "type" are not available. As a result, estimation of the business activity associated with a different measure of gag fishing activity would utilize the same coefficients (e.g., output impact per trip) used to generate the estimates provided in **Table 3.3.7**. These coefficients are not provided here; however, they are easily generated from the information in **Table 3.3.7** by dividing the measure of impact in the table by the respective number of target trips. For example, the output impact coefficient for the shore mode in Florida is approximately $43 ($19,844/464 = $42.77). If another measure (number of trips) of gag effort for the Florida shore mode, for example, direct effort, were available, the business activity associated with this measure would be calculated by multiplying that estimate of the number of trips by $42.77.

Because gag target effort dominates the total of aggregate grouper target effort, business activity estimates for aggregate grouper target effort are not provided. These estimates, however, can be generated using the methodology presented in the previous paragraph because the impact coefficients cover all species. Estimates for wreckfish were not derived since there were no directed recreational wreckfish trips (**Table 3.3.4**).

The estimates provided in **Table 3.3.7** only apply at the state-level. These numbers should not be added across the region. Addition of the state-level estimates to produce a regional (or national) total could either under- or over-estimate the actual amount of total business activity because of the complex relationship between different jurisdictions and the expenditure/impact multipliers. Neither regional nor national estimates are available at this time.

Estimates of the business activity associated with headboat effort are not available. Headboat vessels are not covered in the MRFSS/MRIP so, in addition to the absence of estimates of target effort, estimation of the appropriate business activity coefficients for headboat effort has not been conducted.

Table 3.3.7. Summary of gag target trips (2009-2013 average) and associated business activity (2013 dollars). Output and value added impacts are not additive.

	Florida	Georgia	North Carolina	South Carolina
	Shore Mode			
Target Trips	464	0	0	0
Output Impact	$19,844	$0	$0	$0
Value Added Impact	$10,995	$0	$0	$0
Jobs	0	0	0	0
	Private/Rental Mode			
Target Trips	22,710	291	415	0
Output Impact	$1,162,123	$14,781	$34,472	$0
Value Added Impact	$654,254	$8,671	$19,542	$0
Jobs	10	0	0	0
	Charter Mode			
Target Trips	109	0	0	0
Output Impact	$85,536	$0	$0	$0
Value Added Impact	$56,297	$0	$0	$0
Jobs	1	0	0	0
	All Modes			
Target Trips	23,283	291	415	0
Output Impact	$1,267,503	$14,781	$34,472	$0
Value Added Impact	$721,546	$8,671	$19,542	$0
Jobs	11	0	0	0

*Because target information is unavailable, associated business activity cannot be calculated.
Source: effort data from the MRFSS/MRIP, economic impact results calculated by NMFS SERO using the model developed for NMFS (2011).

3.4 Social Environment

This section includes a description of the commercial and recreational components of the snapper grouper fishery, with detailed information on gag grouper and wreckfish. The description is based on the geographical distribution of landings and the relative importance of the species for commercial and recreational communities. A spatial approach enables the consideration of fishing communities and consideration of the importance of fishery resources to those communities, as required by National Standard 8.

Socio-cultural values are qualitative in nature making it difficult to measure social valuation of marine resources and fishing activity. The following description includes multiple approaches to examining fishing importance. These spatial approaches focus on the community level (based on the address of dealers or permit holders) and identify importance by "community," defined according to geo-political boundaries (cities). A single county may thus have several communities identified as reliant on fishing

and the boundaries of these communities are not discrete in terms of residence, vessel homeport, and dealer address. For example, a fisherman may reside in one community, homeport his vessel in another, and land his catch in yet another. Furthermore, while commercial fishing data are available at the species level, these data are not available for recreational fishing which must be addressed more generally. Despite these caveats, the analysis identifies where most fishing activity takes place.

To identify the communities of greatest engagement in recreational fishing, a factor analysis was run on a set of predictor variables including the number of federal charter permits, number of vessels designated recreational by owner address, number of vessels designated recreational by homeport (SERO permit office 2008), and recreational fishing infrastructure (MRIP site survey 2010). The communities with the highest factor scores are identified as the communities of greatest recreational fishing engagement. However, this measure does not adjust for population size meaning that larger communities are given more weight over smaller communities. The ranking addresses recreational fishing generally and is not specific to an individual species. Ideally, additional variables quantifying the importance of recreational fishing to a community would be included (such as the amount of recreational landings in a community, number of recreational fishing related businesses, etc.); however, these data are not available at the community level.

One approach to identify communities with the greatest engagement utilizes measures called the regional quotient (rq) to identify commercial reliance. The rq is a way to measure the relative importance of a given species across all communities in the region and represents the proportional distribution of commercial landings of a particular species. This proportional measure does not provide the number of pounds or the value of the catch, data which might be confidential at the community level for many places. The rq is calculated by dividing the total pounds (or value) of a species landed in a given community, by the total pounds (or value) for that species for all communities in the region.

Another type of analysis has been completed which uses the top communities identified in the rq analysis, and applies indices which were created using secondary data from permit and landings information for the commercial sector and permit information for the recreational sector (Jepson and Colburn 2013, Jacob et al. 2013). Fishing engagement is primarily the absolute numbers of permits, landings and value. For commercial fishing, the analysis used the number of vessels designated commercial by homeport and owner address, value of landings and total number of commercial permits for each community. For recreational engagement, the analysis used the number of recreational permits, with vessels designated as recreational by homeport and owners address. Fishing reliance has the same variables as engagement divided by population to give an indication of the per capita influence of this activity.

Using a principal component and single solution factor analysis, each community receives a factor score for each index to compare to other communities. Taking the communities with the highest regional quotients, factor scores of both engagement and reliance for both commercial and recreational fishing were plotted. Two thresholds of one and ½ standard deviation above the mean are plotted onto the graphs to help determine a threshold for significance. The factor scores are standardized, therefore, a score above one is also above one standard deviation. A score above ½ standard deviation is considered engaged or reliant, and with anything above one standard deviation to be very engaged or reliant.

The reliance index uses factor scores that are normalized. The factor score is similar to a z-score in that the mean is always zero, and positive scores are above the mean and negative scores are below the

mean. Like a z-score, the factor score is a relative measure and provides a comparison of how each community fits along the distribution of the scores. Objectively, each community has a score related to the percent of other communities with those similar attributes. For example, a score of 2.0 means the community is two standard deviations above the mean and is among the 2.27% most vulnerable places in the study (normal distribution curve). Reliance score comparisons between communities are relative. However, if the community scores greater than two standard deviations above the mean, this indicated that the community is dependent on the species. By examining the component variables on the reliance index and how they are weighted by factor score, this provides a measurement of commercial reliance. The reliance index provides a way to gauge change over time with these communities but also provides a comparison of one community with another.

These measures are an attempt to quantify the importance of the components of the included fisheries to communities around the South Atlantic coast and suggest where impacts from management actions are more likely to be experienced.

3.4.1 The Snapper Grouper Fishery

The snapper grouper fishery is considered to be of substantial social and cultural importance in the South Atlantic region. The description of the snapper grouper fishery focuses on available geographic and demographic data to identify communities with strong relationships with snapper grouper harvest (i.e., significant landings and revenue), and positive or negative impacts from regulatory change are expected to occur in places with greater landings of snapper grouper species.

The descriptions of South Atlantic communities below include information about the top communities based upon regional quotients of commercial landings and value for all federally managed snapper grouper species. Following are more detailed descriptions of the communities associated with each snapper grouper species or group of species included in this amendment. The broad description of the snapper grouper fishery as a whole at the beginning of this section is included because most fishermen (commercial and recreational) target multiple species in the snapper grouper fishery, and changes to management for one species could affect the fishery as a whole. The areas described are those that would be most likely to experience the effects of proposed actions that could change the snapper grouper fishery and impact the participants and associated businesses and communities within the region. Additionally, the descriptions also include reliance and engagement indices to identify other areas in which snapper grouper species are important, and provide information of how a community overall is involved with commercial and recreational fishing and could experience effects from regulatory actions for any species. The identified communities in this section are referenced in the social effects analyses in **Chapter 4** in order to provide information on how the proposed actions could affect specific areas.

Commercial Snapper Grouper Communities in the South Atlantic

Using the regional quotient to identify snapper grouper communities, **Figure 3.4.1** shows important snapper grouper communities in the South Atlantic. The regional quotients consider combined snapper grouper landings and no communities make up a particularly significant proportion of commercial landings and value. Important North Carolina communities include Winnabow, Wanchese, Morehead City, Beaufort, Sneads Ferry, Shallotte, Wilmington, and Hampstead. The South Carolina communities of Murrells Inlet, Little River, Wadmalaw Island, and McClellanville have significant commercial pounds and value of snapper grouper species. In Florida, identified snapper grouper communities include Key

West, Miami, Mayport, Marathon, Cocoa, Port Orange, Key Largo, Hialeah, Fort Lauderdale, St. Augustine, Fort Pierce, Palm Beach Gardens, and Islamorada. No Georgia communities are identified in the analysis of regional quotients, but areas such as Savannah and Townsend have vessels that may depend on snapper grouper species.

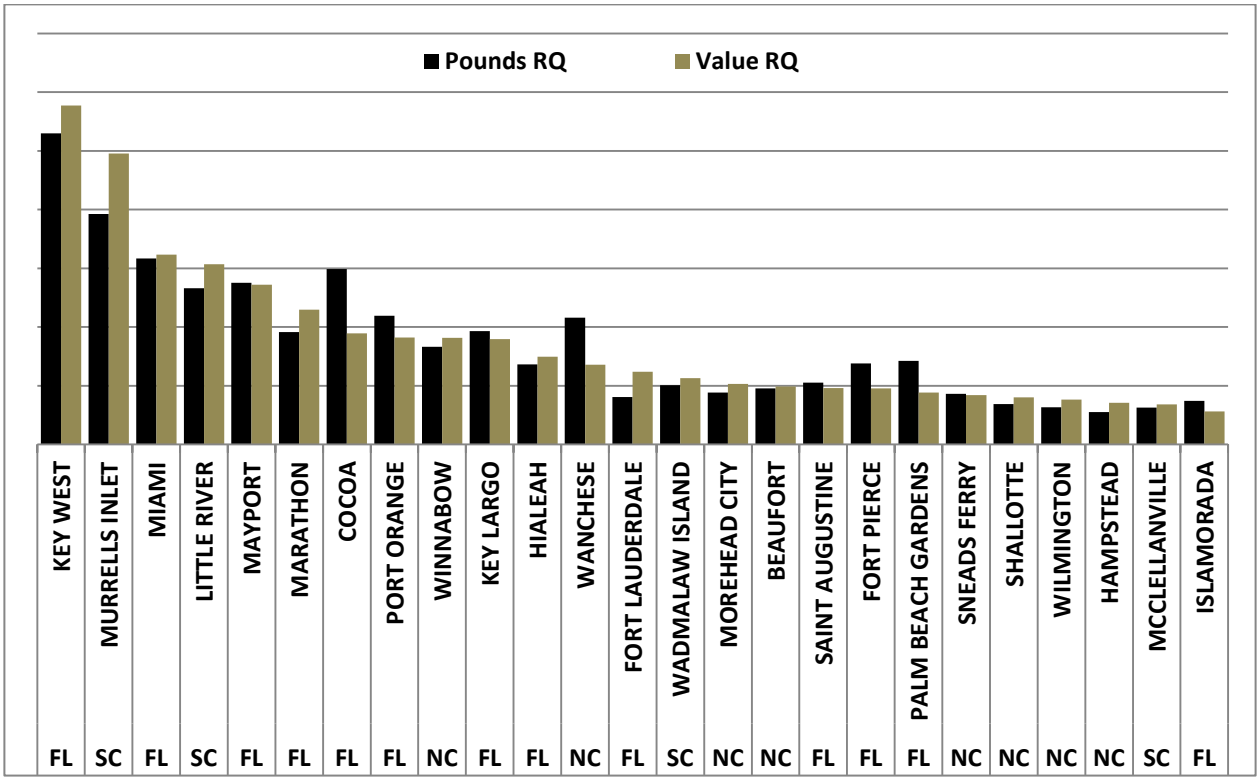

Figure 3.4.1. South Atlantic fishing communities ranked by total 2011 snapper grouper landings RQ. Source: SERO 2014

Gag

Gag is a socially and economically important species for both the commercial and recreational sectors. Regulatory Amendment 14 (SAFMC 2013b) contains a detailed description of communities associated with gag, and is incorporated herein by reference. Most commercial landings of gag occur in South Carolina and North Carolina, with Murrells Inlet, South Carolina, having the highest regional quotient (relative commercial landings and value). Other important commercial communities for gag landings include the South Carolina communities of Little River, Charleston, and McClellanville; the North Carolina communities of Wilmington, Hampstead, Morehead City, Surf City, Wrightsville Beach, Winnabow, Shallotte, Emerald Isle, Sneads Ferry, Beaufort, Carolina Beach, and Atlantic Beach; and the Florida communities of Mayport, Cocoa, St. Augustine, and Fort Pierce. Most of these communities have high levels of engagement and reliance on commercial fishing (Regulatory Amendment 14, SAFMC 2013b). Relative to the rest of the region, Georgia communities have low levels of commercial landings of gag , although some commercial vessels in the community of Townsend may target some gag.

In the recreational component of the gag portion of the snapper grouper fishery, areas with high levels of recreational fishing engagement and reliance that could be affected by management changes to gag include the North Carolina communities of Atlantic Beach, Carolina Beach, Morehead City, and Wanchese; and the South Carolina community of Murrells Inlet (Regulatory Amendment 14, SAFMC

2013b). Relative to the rest of the region, Georgia communities have low levels of recreational landings of gag. However, for-hire businesses and private anglers in communities such as Savannah, Darien, Brunswick, and St. Simons Island may target gag.

Wreckfish

In the 1990s, wreckfish was one of the most important commercial species in the snapper grouper fishery. Participation in the wreckfish portion of the snapper grouper fishery led to derby conditions and subsequently, an individual ITQ through Amendment 5 (SAFMC 1992). Over the next 10-20 years, participation in the wreckfish fishery declined with only a handful of active fishermen. Amendment 20A (SAFMC 2012) transferred wreckfish shares from inactive permit holders to active permit holders, and currently there are six shareholders in Florida and South Carolina (source: http://sero.nmfs.noaa.gov/operations_management_information_services/constituency_services_branch/freedom_of_information_act/common_foia/WreckfishShareholders.htm). Landings are overall split between the harvesters in Florida and South Carolina (personal comm., SERO). Data are not shown to maintain confidentiality.

Amendment 20A to the Snapper Grouper FMP (SAFMC 2012) contains a detailed description of the social environment and the history of the wreckfish portion of the snapper grouper fishery, and is incorporated herein by reference. In general, the areas most associated with the commercial component of the wreckfish fishery are Charleston, South Carolina; Port Orange, Florida; and Key Largo, Florida.

The Comprehensive ACL Amendment (SAFMC 2011a) allocated a portion (5%) of the total ACL for wreckfish to the recreational sector for the first time. Wreckfish requires specialized gear and knowledge, and it is likely that only a small group of recreational fishermen and for-hire businesses target wreckfish, although some incidental catch could occur.

3.4.2 Environmental Justice Considerations

Executive Order 12898 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. The main focus of Executive Order 12898 is to consider "the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories…" This executive order is generally referred to as environmental justice (EJ).

Commercial fishermen, recreational fishermen, and coastal communities could be impacted by the proposed actions in the South Atlantic. However, information on the race and income status for these individuals is not available. Because the proposed action could be expected to impact fishermen and community members in numerous communities in the South Atlantic, census data have been assessed to examine whether any coastal counties have poverty or minority rates that exceed thresholds for raising EJ concerns.

The threshold for comparison used was 1.2 times the state average for the proportion of minorities and population living in poverty (EPA 1999). If the value for the county was greater than or equal to 1.2 times this average, then the county was considered an area of potential EJ concern. Census data for the year 2010 were used. Estimates of the state minority and poverty rates, associated thresholds, and county rates are provided in **Table 3.4.1** note that only counties that exceed the minority threshold and/or the poverty threshold are included in the table**.**

Table 3.4.1. Environmental justice thresholds (2010 U.S. Census data) for counties in the South Atlantic region. Only coastal counties (east coast for Florida) with minority and/or poverty rates that exceed the state threshold are listed.

State	County	Minority Rate	Minority Threshold*	Poverty Rate	Poverty Threshold*
Florida		**47.4**	**56.88**	**13.18**	**15.81**
	Miami-Dade	81.9	-25.02	16.9	-1.09
Georgia		**50**	**60**	**15**	**18**
South Carolina		**41.9**	**50.28**	**15.82**	**18.98**
	Colleton	44.4	5.88	21.4	-2.42
	Georgetown	37.6	12.68	19.3	-0.32
	Hampton	59	-8.72	20.2	-1.22
	Jasper	61.8	-11.52	9.9	9.08
North Carolina		**39.1**	**46.92**	**15.07**	**18.08**
	Bertie	64.6	-17.68	22.5	-4.42
	Chowan	39.2	7.72	18.6	-0.52
	Gates	38.8	8.12	18.3	-0.22
	Hertford	65.3	-18.38	23.5	-5.42
	Martin	48.4	-1.48	23.9	-5.82
	Perquimans	27.7	19.22	18.6	-0.52
	Tyrrell	43.3	3.62	19.9	-1.82
	Washington	54.7	-7.78	25.8	-7.72

*The county minority and poverty thresholds are calculated by comparing the county minority rate and poverty estimate to 1.2 times the state minority and poverty rates. A negative value for a county indicates that the threshold has been exceeded.

While some counties 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. It is anticipated that the impacts from the proposed regulations may impact minorities or the poor, but not through discriminatory application of these regulations.

The actions in this amendment are expected to benefit commercial and recreational fishermen who target and harvest gag and wreckfish. Minimal or no negative impacts are expected for other recreational fishermen, commercial fishermen, and coastal communities. Any negative impacts are not expected to disproportionately affect minorities or the poor.

Finally, the general participatory process used in the development of fishery management measures (e.g., scoping meetings, public hearings, and open South Atlantic Council meetings) 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. Public input from individuals who participate in the fishery has been considered and incorporated into management decisions throughout development of the amendment.

3.5 Administrative Environment

3.5.1 The Fishery Management Process and Applicable Laws

Federal Fishery Management

Federal fishery management is conducted under the authority of the 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 EEZ, an area extending 200 nautical miles (nm) 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, conducting stock assessments, 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 NMFS.

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 nm offshore from the seaward boundary of North Carolina, South Carolina, Georgia, and east Florida to Key West. The South Atlantic Council has thirteen voting members: one from NMFS; 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 South Atlantic Council Committees have full voting rights at the Committee level but not at the full South Atlantic Council level. South Atlantic Council members serve three-year terms and are recommended by state governors and appointed by the Secretary 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 and

legal matters, are open to the public. The South Atlantic Council uses its Scientific and Statistical Committee (SSC) 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 Procedure Act, in the form of "notice and comment" rulemaking.

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 3 nm 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 South Atlantic 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 Atlantic States Marine Fisheries Commission (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 is also represented at the South Atlantic Council level, but does not have voting authority at the South Atlantic 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.

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. The NOAA Office of General Counsel Penalty Policy and Penalty Schedules can be found at http://www.gc.noaa.gov/enforce-office3.html

Chapter 4. Environmental Consequences and Comparison of Alternatives

Alternatives for Action 1

(Preferred alternatives in **bold**)

1. No Action. Retain the current annual catch limits (ACL) and optimum yield (OY) for gag. Optimum Yield (OY) will remain equal to the yield produced by F_{OY} (Amendment 16). If a stock is overfished, F_{OY} remains equal to the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. ABC = 805,000 pounds gutted weight (lbs gw; landings only); OFL = Yield at F_{MSY} = 903,000 lbs gw. The total ACL (Yield at 75%F_{MSY}) will continue to be 694,000 lbs gw. Commercial and recreational allocations will continue to be 51% and 49%, respectively. The directed commercial ACL will continue to be 326,722 lbs gw (reduced from 353,940 lbs gw commercial ACL to account for gag discard mortality from commercial trips that target co-occurring species (i.e., red grouper and scamp) during a gag closure). The recreational ACL will continue to be 340,060 lbs gw. Currently, there are no ACTs for gag.

2. ACL = OY = ABC projected landings from 2015-2019 with P*=0.3. The ACL for 2019 would remain in place until modified.

3 (Preferred). ACL = OY = 0.95*Proposed ABC. The ACL for 2019 would remain in place until modified.

4. ACL = OY = 0.90*Proposed ABC. The ACL for 2019 would remain in place until modified.

5. ACL = OY = 0.80*Proposed ABC. The ACL for 2019 would remain in place until modified.

4.1 Action 1. Revise the annual catch limits (ACL) and optimum yield (OY) for gag

4.1.1 Biological Effects

Alternative 1 (No Action) would retain the current ACLs, including sector ACLs and directed commercial quota (**Table 4.1.1**) that were specified in Amendment 17B to the Snapper Grouper FMP (SAFMC 2010), and modified in Regulatory Amendment 15 to the Snapper Grouper FMP (SAFMC 2013a). Results of the SEDAR 10 (2006) stock assessment indicated that gag was undergoing overfishing and was approaching an overfished condition as of 2004 (last year of data in the stock assessment). Although gag was not overfished, the SEDAR 10 (2006) stock assessment indicated that biomass was less than the biomass that produces the maximum sustainable yield (MSY). The South Atlantic Fishery Management Council (South Atlantic Council) took action to end overfishing of gag through Amendment 16 (SAFMC 2009a). The amendment included measures to reduce the aggregate bag limit for groupers and tilefish, reduce the bag limit for gag or black grouper combined within the aggregate, establish a commercial quota for gag; and prohibit the possession, sale, and purchase of gag and associated shallow water grouper species after the gag quota was met. Furthermore, Amendment 17B (SAFMC 2010) implemented ACLs and accountability measures (AMs) to ensure overfishing of gag does not occur.

Table 4.1.1. Current ABC, ACLs, Sector ACLs, Directed Commercial Quota for Gag

ABC	ACL (yield at 75% F_{MSY})	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
805,000	694,000	353,940	326,722	340,060

All values in pounds gutted weight (lbs gw)

*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

An update to the SEDAR 10 (2006) gag assessment was conducted in 2014 using data through 2012 (SEDAR 10 Update 2014). The estimate of fishing rate from the assessment update indicates the stock was undergoing overfishing during 2010-2012 ($F_{2010-2012}/F_{MSY}$ = 1.23; **Table 4.1.2**). The South Atlantic SSC noted that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing did not occur in 2012 and 2013 (SAFMC SSC report, April 2014). A letter from the National Marine Fisheries Service (NMFS) to the South Atlantic Council Chairman dated September 8, 2014, stated that gag is neither overfished nor undergoing overfishing.

Table 4.1.2. Status determination criteria for gag based on the SEDAR 10 Update assessment and recommendations from the South Atlantic Council's SSC.

Criteria	Deterministic**	Probabilistic
Overfished evaluation SSB/MSST(1-M)	1.13	1.21
Overfished evaluation SSB/MSST(75%)	1.29	1.38
Overfishing evaluation Fcurrent/F_{MSY}	1.23	1.37
MFMT	0.29	0.27
SSB_{MSY} (unit)	4,038,207 lbs ww	1806.8 mt
MSST (1-M)	3,472,942 lbs ww	1546.3 mt
MSST (75%)	3,028,711 lbs ww	1355.1 mt
MSY	938,200 lbs gw	900,400 lbs gw
Y at 75% F_{MSY}	921,100 lbs gw	883,600 lbs gw
ABC Control Rule Adjustment		20%
P-Star		30%

	OFL RECOMMENDATIONS: P*=50%			
Year	**Landed lbs gw**	**Discard lbs gw**	**Landed Number**	**Discard Number**
2015	782,000	107,000	55,000	25,000
2016	765,000	105,000	55,000	24,000
2017	792,000	104,000	57,000	24,000
2018	813,000	104,000	58,000	24,000
2019	825,000	104,000	59,000	24,000

	ABC RECOMMENDATIONS: P*=30%			
Year	**Landed lbs gw**	**Discard lbs gw**	**Landed Number**	**Discard Number**
2015	666,000	90,000	47,000	21,000
2016	671,000	89,000	48,000	21,000
2017	713,000	88,000	51,000	20,000
2018	748,000	89,000	53,000	21,000
2019	773,000	89,000	55,000	21,000

** The SSC recommends using the deterministic values for stock status.

The South Atlantic Council's SSC recommends the acceptable biological catch (ABC) for stocks based on the South Atlantic Council's ABC control rule, which was implemented in 2011 through the Comprehensive ACL Amendment (SAFMC 2011a). The ABC control rule provides a hierarchy of dimensions that are used to characterize uncertainty associated with stock assessments in the South Atlantic. The P* approach, which is a component of the ABC control rule, was used by the SSC to recommend the ABC and the overfishing limit (OFL) values, where P* is equal to the acceptable probability of overfishing. A smaller P* provides a larger buffer against overfishing, resulting in reduced catches. The SSC recommended an OFL with a P* = 0.50, and an ABC based on a P*= 0.30 (**Table 4.1.2**).

Amendment 17B (SAFMC 2010) implemented ACLs and AMs to ensure overfishing of gag does not occur. **Alternative 1 (No Action)** would retain the current AMs, OY, and ACLs, including sector ACLs and directed commercial quota, and would not update harvest parameters for gag using the best scientific information available from the recent stock assessment update.

Alternatives 2-5 would update the ACL for gag based on the ABC recommended by the SSC. **Alternatives 2-5** would also specify sector ACLs based on allocations of 51% for the commercial sector and 49% for the recreational sector, which were established in Amendment 16 (SAFMC 2009a). Additionally, Amendment 16 included a measure to close commercial harvest of all shallow water groupers when the gag quota was met. This measure was removed through Regulatory Amendment 15 (SAFMC 2013a). However, Regulatory Amendment 15 reduced the gag ACL by 27,218 lbs gw to account for discard mortality of gag when fishermen target other co-occurring shallow water groupers after gag is closed (the total ACL reduced by 27,218 lbs gw is termed the "directed quota"). Total dead discards in pounds were calculated by combining the pounds of gag lost to discard mortality from non-target trips with the pounds of gag lost to discard mortality from target trips switching to target other shallow water grouper. The analysis is described in detail in **Appendix E** of Regulatory Amendment 15 (SAFMC 2013a). Because the gag assessment update included landings data through 2012, and the management measure that closes harvest for all shallow water grouper when the gag quota is met was removed in 2013 through Regulatory Amendment 15, **Alternatives 2** through **5** would retain the 27,218 lbs gw reduction in the gag commercial ACL specified in Regulatory Amendment 15.

Retaining the ACL and OY specified in **Alternative 1 (No Action)** would not update harvest parameters for gag using the best scientific information available from the recent stock assessment update. **Alternatives 2-5** would revise the ACL and OY for gag based upon results from the updated gag assessment, and recommendations from the South Atlantic Council's SSC, and have a greater positive biological effect on the stock by reducing the commercial and recreational ACLs.

Alternatives 2-5 would set OY equal to the ACL. National Standard 1 (NS1) 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 the MSY and ACL to OY. The OFL is an annual amount of catch that corresponds to the estimate of maximum fishing mortality threshold applied to a stock; MSY is the long-term average of such catches. The ACL is the limit that triggers AMs and is the management target for the species. 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. 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.

Alternative 2 would set the ACL equal to the ABC; however, the quota would be adjusted for discard mortality (**Table 4.1.3**) and set below the ACL. The NS1 guidelines indicate the ACL may be set close to the ABC if management is effective at controlling fishing mortality below target levels. **Alternative 3 (Preferred)** would set the ACL at 95% of the ABC, and the quota would be set below the ACL to account for discard mortality (**Table 4.1.4**). **Alternatives 3 (Preferred)**, **4**, and **5** would have a greater minor positive biological effect than **Alternative 1 (No Action)** and **Alternative 2** because they would create a buffer between the ACL/OY and the ABC, with **Alternative 5** setting the most conservative ACL at 80% of the ABC (**Tables 4.1.3 – Table 4.1.6**). Creating a buffer between the ACL/OY and ABC would provide greater assurance that overfishing is prevented and the long-term average biomass is near or above the biomass associated with MSY. 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. However, although **Alternatives 2** through **5** would achieve OY by setting ACL equal to OY, there may not be a biological need to set the ACL below the ABC, if scientific and management uncertainty are accounted for.

Table 4.1.3. ABC and ACLs for gag specified under Alternative 2 where ACL = OY = ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	666,000	339,660	312,442	326,340
2016	671,000	671,000	342,210	314,992	328,790
2017	713,000	713,000	363,630	336,412	349,370
2018	748,000	748,000	381,480	354,262	366,520
2019	773,000	773,000	394,230	367,012	378,770

All values in pounds gutted weight (lbs gw)
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Table 4.1.4. ABC and ACLs for gag specified under **Preferred Alternative 3** where ACL = OY = 95%ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	632,700	322,677	295,459	310,023
2016	671,000	637,450	325,100	297,882	312,351
2017	713,000	677,350	345,449	318,231	331,902
2018	748,000	710,600	362,406	335,188	348,194
2019	773,000	734,350	374,519	347,301	359,832

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Table 4.1.5. ABC and ACLs for gag specified under Alternative 4 where ACL = OY = 90%ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	599,400	305,694	278,476	293,706
2016	671,000	603,900	307,989	280,771	295,911
2017	713,000	641,700	327,267	300,049	314,433
2018	748,000	673,200	343,332	316,114	329,868
2019	773,000	695,700	354,807	327,589	340,893

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

Table 4.1.6. ABC and ACLs for gag specified under Alternative 5 where ACL = OY = 80%ABC.

Year	ABC	Total ACL	Commercial ACL (51%)	Directed Commercial Quota*	Recreational ACL (49%)
2015	666,000	532,800	271,728	244,510	261,072
2016	671,000	536,800	273,768	246,550	263,032
2017	713,000	570,400	290,904	263,686	279,496
2018	748,000	598,400	305,184	277,966	293,216
2019	773,000	618,400	315,384	288,166	303,016

All values in lbs gw
*Directed commercial quota = Commercial ACL – 27,218 lbs gw.

The South Atlantic Council and their SSC have established an ABC control rule that takes into consideration scientific and management uncertainty to ensure catches are maintained below OFL. Setting the ACL equal to the ABC (**Alternative 2**) leaves no buffer between the two harvest parameters, which may increase risk that harvest could exceed the ABC. The South Atlantic Council considered alternatives in the Comprehensive ACL Amendment (SAFMC 2011a) and Amendment 24 (SAFMC 2011b) that would set the ACL below the ABC but selected ACL=OY=ABC as their preferred alternative. More recently, the South Atlantic Council has frequently set ACLs for snapper grouper species at the same level as the ABC. However, AMs and ACLs are in place to ensure overfishing of gag does not occur. The NS1 Guidelines recommend a performance standard by which the system of ACLs and AMs can be measured and evaluated. If the ACL is exceeded more than once over the course of four years, the South Atlantic Council would reassess the system of ACLs and AMs for the species. The South Atlantic Council is taking action in a future amendment to enhance the effectiveness of the AMs for gag.

With vastly improved commercial monitoring mechanisms recently implemented, it is unlikely that repeated commercial ACL overages would occur. The Commercial Landings Monitoring System (CLM) came online in June 2012 and is now being used to track commercial landings of federally-managed fish species. This system is able to track individual dealer reports, track compliance with reporting requirements, project harvest closures using five different methods, and analyze why ACLs are exceeded. The CLM performs these tasks by taking into account: (1) spatial boundaries for each stock based on fishing area; (2) variable quota periods such as overlapping years or multiple quota periods in one year; and (3) overlapping species groups for single species as well as aggregated species. Data sources for the CLM system include the Standard Atlantic Fisheries Information System for Georgia and South Carolina,

and the Bluefin Data file upload system for Florida and North Carolina. The CLM system is also able to track dealer reporting compliance with a direct link to the permits database in NMFS Southeast Regional Office (SERO).

Additionally, the Southeast Fisheries Science Center (SEFSC) worked with SERO, the Gulf of Mexico Fishery Management Council (Gulf of Mexico Council), and South Atlantic Council to develop a Joint Dealer Reporting Amendment (GMFMC & SAFMC 2013b), which became effective on August 7, 2014. The Joint Dealer Reporting Amendment requires electronic reporting, increases required reporting frequency for dealers to once per week, and requires a single dealer permit for all finfish dealers in the Southeast Region. The CLM and the new dealer reporting requirements constitute major improvements to how commercial fisheries are monitored, and go beyond monitoring efforts that were in place when the NS1 guidelines were developed. The new CLM quota monitoring system and actions in the Joint Generic Dealer Reporting amendment are expected to provide more timely and accurate data reporting and would thus reduce the incidence of quota overages.

Harvest monitoring efforts in the recreational sector have also been improved. On January 27, 2014, regulations became effective requiring headboats to report their landings electronically once per week (Generic Headboat Amendment, GMFMC & SAFMC 2013a). The SEFSC is also developing an electronic reporting system for charter boats operating the Southeast Region. Once the charterboat reporting system is close to being finalized, the Gulf of Mexico and South Atlantic Councils would develop a joint amendment that would require electronic reporting for charterboats with a set reporting frequency. These recreational harvest monitoring efforts could substantially increase the accuracy and timeliness of in-season reporting and reduce the risk of recreational ACL overages, which would be biologically beneficial for gag. Therefore, there is a low risk of exceeding the commercial and recreational ACLs and **Alternative 2** can be used as part of a successful harvest management system for gag with little risk of overfishing.

Alternatives 1 (No Action)-5 are unlikely to result in any direct adverse impacts on protected species such as endangered or threatened whales, sea turtles, corals, distinct population segments (DPS) of Atlantic sturgeon, or to negatively impact or modify essential fish habitat (EFH), Habitat Areas of Particular Concern (HAPCs), or Coral Habitat Areas of Particular Concern (CHAPCs). Previous Endangered Species Act (ESA) consultations determined the hook-and-line sector of the snapper grouper fishery was not likely to adversely affect coral species, large whales, or any DPS of Atlantic sturgeon. Regardless of the alternative selected, this action is not anticipated to increase the potential for interactions with sea turtles and smalltooth sawfish, which are adversely affected via incidental hook-and-line capture. Although **Alternatives 2-5** would decrease the ACL from the status quo, this option would not change current fishing practices for gag. Total harvest would be constrained by the commercial and recreational ACLs, and AMs would still be used to help prevent overfishing.

4.1.2 Economic Effects

Whenever ACLs are changed, economic effects can be expected if the changes are expected to have an effect on the number of fish or trips that can or would be taken by a sector. When a sector's ACL decreases, it can be expected that there would be negative direct effects for the respective sector. For the commercial sector, a reduction in the ACL would be expected to result in decreased ex-vessel revenue (revenue) from that species and, possibly, fewer trips on which that species is harvested. For the

recreational sector, if the ACL is reduced, overall angler consumer surplus (CS) may be reduced and revenue to for-hire businesses may decline if that species is an important factor in the demand for for-hire services. Although a sector may not harvest its total ACL or, in some instances, may exceed an ACL, this discussion assumes that the ACL is harvested, but not exceeded, each year for all the alternatives considered. This discussion also assumes that price effects do not occur in response to changes in harvest. Finally, this analysis assumes that each of the ACL alternatives include an appropriate ABC buffer. If a particular buffer is unnecessarily conservative, the associated ACL would result in foregone benefits (unnecessarily low allowable harvest, and reduced revenues and angler CS). Alternatively, if a particular buffer is not adequately conservative, the associated ACL would allow excessive harvest and subsequent adjustments with associated adverse economic consequences.

Table 4.1.7 shows the change in harvest (lbs gw) and revenue for **Alternative 2** through **Alternative 5** compared to **Alternative 1 (No Action)** for the commercial sector for gag. These results are based on an average price for gag of $4.93 per lb (2013 dollars), as shown in **Section 3.3.1**.

Table 4.1.7. Expected change in gag harvest (lbs gw) and annual revenue for the commercial sector.

	Alternative 2		**Alternative 3 (Preferred)**		Alternative 4		Alternative 5	
	Lbs	Value	**Lbs**	**Value**	Lbs	Value	Lbs	Value
2015	-14,300	-$70,499	**-31,263**	**-$154,127**	-48,246	-$237,853	-82,212	-$405,305
2016	-11,730	-$57,829	**-28,840**	**-$142,181**	-45,951	-$226,538	-80,172	-$395,248
2017	9,690	$47,772	**-8,491**	**-$41,861**	-26,673	-$131,498	-63,036	-$310,767
2018	27,540	$135,772	**8,466**	**$41,737**	-10,608	-$52,297	-48,756	-$240,367
2019	40,290	$198,630	**20,579**	**$101,454**	867	$4,274	-38,556	-$190,081
Total	51,490	$253,846	**-39,549**	**-$194,977**	-130,611	-$643,912	-312,732	-$1,541,769

Note: Values are in 2013 dollars.

Although **Alternative 2** is projected to result in lower landings and reduced revenue for 2015 and 2016, over the entire time series of 2015 through 2019, **Alternative 2** is projected to result in an increased total revenue from 2015 through 2019 of $253,846, which is an average annual increase in revenue of $50,769 compared to **Alternative 1 (No Action)**. **Preferred Alternative 3** and **Alternatives 4** and **5** would be expected to result in lower total and average annual gag harvests and, as a result, would be expected to result in less revenue than both **Alternative 1 (No Action)** and **Alternative 2**.

In terms of relative economic effects, only **Alternative 2** would be expected to result in positive direct economic effects for the commercial sector compared to **Alternative 1 (No Action)**. From 2015 through 2019, the size of the overall positive economic effect is relatively minor, however. Compared to **Alternative 1 (No Action)**, **Preferred Alternative 3** is expected to result in minor overall direct negative economic effects. The overall direct negative economic effects increase for **Alternatives 4** and **5**, respectively, compared to **Alternative 1 (No Action)**.

Section 3.3.2 contains estimates of the recreational CS for gag. This analysis is based on an average weight of approximately 10.77 lbs gw (Pers. Comm. Jessica Stephen, NMFS SERO, August 22, 2014) and a CS value per fish of $102 (2013 dollars). This CS value is the estimated value of being allowed to land a second gag (see **Section 3.3.2**). Using this CS value may overestimate the change if an increase in

harvest occurs and a portion of the increase is harvested by anglers normally harvesting two fish because the additional fish would be harvested as a third gag and the CS for the third gag caught is estimated to be $68, which is less than the CS for a second gag. Alternatively, using the value of a second fish would be expected to underestimate the change in CS if the increase in harvest occurs on new trips taking their first gag because, although an estimate of the CS for the first fish is not available, it is expected to be higher than the value of a second fish. Comparable considerations of potential over- or underestimation apply if the allowable harvest decreases.

While **Alternative 2** projects lower landings and CS for 2015 and 2016, over the entire time series of 2015 through 2019, **Alternative 2** is projected to have an increase in CS of $468,708 compared to **Alternative 1 (No Action; Table 4.1.8)**. **Preferred Alternative 3** and **Alternatives 4** and **5** would be expected to result in lower total and average annual gag harvests and, as a result, would be expected to result in less CS than both **Alternative 1 (No Action)** and **Alternative 2**.

Table 4.1.8. Expected change in gag harvest (lbs ww), numbers of fish, and consumer surplus for the recreational sector.

	Alternative 2			**Preferred Alternative 3**			Alternative 4			Alternative 5		
	Lbs	Fish	CS	**Lbs**	**Fish**	**CS**	Lbs	Fish	CS	Lbs	Fish	CS
2015	-13,720	-1,274	-$129,939	**-30,037**	**-2,789**	**-$284,473**	-46,354	-4,304	-$439,007	-78,988	-7,334	-$748,076
2016	-11,270	-1,046	-$106,735	**-27,709**	**-2,573**	**-$262,425**	-44,149	-4,099	-$418,124	-77,028	-7,152	-$729,513
2017	9,310	864	$88,173	**-8,158**	**-757**	**-$77,262**	-25,627	-2,379	-$242,707	-60,564	-5,623	-$573,587
2018	26,460	2,457	$250,596	**8,134**	**755**	**$77,035**	-10,192	-946	-$96,526	-46,844	-4,349	-$443,648
2019	38,710	3,594	$366,613	**19,772**	**1,836**	**$187,256**	833	77	$7,889	-37,044	-3,440	-$350,835
Total	49,490	4,595	$468,708	**-37,998**	**-3,528**	**-$359,870**	-125,489	-11,652	-$1,188,475	-300,468	-27,899	-$2,845,658

Note: Values are in 2013 dollars.

As shown in **Section 3.3.2**, target effort by the for-hire component of the recreational sector for gag is very low. As a result, the expected changes in allowable harvest under all of the alternatives for **Action 1** are not expected to result in a change in the number of for-hire trips taken. Therefore, no differences in associated producer surplus (net operating revenue) are expected to occur among the proposed alternatives for this action or, if differences occur, they are expected to be minimal and mirror the direction of the expected changes in CS.

For both the commercial and recreational sectors, compared to **Alternative 1 (No Action)**, **Alternative 2** would be expected to result in the best change in economic benefits (a net increase in commercial revenue and angler CS), followed by **Preferred Alternative 3**, **Alternative 4**, and **Alternative 5**, each of which would be expected to result in a net decrease in economic benefits (commercial revenue and angler CS).

4.1.3 Social Effects

Gag is an important component to the commercial species landed in several North Carolina and South Carolina communities, in addition to potentially being an important recreational species (**Section 3.4.1**).

Changes to the ACL and access to the resource could affect individuals and businesses in these communities.

In general, the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue, assuming harvest does not result in overfishing and long-term management goals are met. Adhering to sustainable harvest through an ACL is assumed to result in net long-term positive social and economic benefits. **Alternative 1 (No Action)**, which specifies an ACL higher than the SSC's catch level recommendation, could be expected to be the most beneficial for fishermen in 2015 and 2016 unless it results in overfishing. **Alternative 1 (No Action),** however, would result in an ACL that is higher than the ABC recommended by the South Atlantic Council's SSC and hence, might not be sustainable. However, the increase in the ACL during 2017-2019 under **Alternative 2** would likely result in greater social benefits for the commercial and recreational fleets than **Alternative 1 (No Action)**. Incorporating a buffer between ABC and ACL under **Alternatives 3 (Preferred)-5**, and decreasing the available quota for gag could have negative effects on fishermen and communities if access to the gag resource is restricted due to triggering AMs if landings reach the ACL.

Additionally, adjustments in an ACL based on updated information from a stock assessment would be the most beneficial in the long term to fishermen and communities because catch limits would be based on the current conditions, even if the updated information indicates that a lower ACL is appropriate to sustain the stock. **Alternatives 2-5** would incorporate new information and recommendations, and would be more beneficial in the long term to communities and fishermen than **Alternative 1 (No Action)**.

4.1.4 Administrative Effects

Under **Action 1 (No Action),** mechanisms are already in place for monitoring and enforcing the current recreational ACL and commercial quota. Alternatives that decrease the catch levels for gag could increase the administrative effects since it would be more likely that AMs would be implemented and action would be needed to inform the public and enforce regulations. However, since the recreational ACL and commercial quota are already being monitored under **Alternative 1** (**No Action**), any increase in the administrative burden from **Alternatives 2** through **5** would be expected to be small. As expected with any changes to regulations, administrative costs could occur associated with disseminating the information and educating the public.

4.2 Action 2. Modify the recreational bag limit for gag within the aggregate bag limit

Alternatives for Action 2
(preferred alternatives in **bold**)

1 Preferred. No Action. Retain the current aggregate grouper bag limit of 3 fish. Within this limit, only one fish can be a gag or black grouper.

2. Increase the gag bag limit to 2 fish within the 3 fish aggregate grouper bag limit. Only one fish within the aggregate can be a black grouper.

3. Increase the gag bag limit to 3 fish within the 3 fish aggregate grouper bag limit. Only one fish within the aggregate can be a black grouper.

4.2.1 Biological Effects

The South Atlantic Council took action to end overfishing of gag through Amendment 16 to the Snapper Grouper FMP (SAFMC 2009a). One action in the amendment reduced the aggregate grouper bag limit from 5 to 3 fish per person per day, and reduced the bag limit of 2 gag and black grouper (combined) to 1 gag or black grouper (combined) within the grouper aggregate bag limit. **Preferred Alternative 1 (No Action)** would retain the aggregate grouper bag limit of 3 fish per person per day, with only 1 gag or black grouper allowed in the aggregate bag (**Table 4.2.1**). Under **Preferred Alternative 1 (No Action)**, there would be a continued positive biological effect on gag from restricting the bag limit to 1 gag or black grouper per person per day within the grouper aggregate.

Amendment 17B to the Snapper Grouper FMP (SAFMC 2010) implemented ACLs and AMs to ensure overfishing of gag does not occur. The recreational ACL for gag is 340,060 lbs gw. In 2015, the recreational ACL would be reduced to 310,023 lbs gw through **Action 1** of this amendment. The updated SEDAR 10 Update (2014) assessment and information included below (**Tables 4.2.4** and **4.2.5**) indicate that the 3-fish aggregate bag limit is only met rarely by recreational anglers; therefore, any negative biological consequences of increasing the gag bag limit under **Alternative 2** and **Alternative 3** are likely to be negligible. Additionally, the gag recreational ACL has not been met during the past 4 fishing years: 23% of the recreational ACL was met in 2013, 52% in 2012, 49.9% in 2011, and 50.5% in 2010. Thus, **Action 2** considers bag limit alternatives that would allow for recreational harvest of gag to increase. If the ACL is met, AMs are in place to ensure overfishing does not occur.

The bag limit analysis for this action uses trip level recreational data. Headboat Survey (HBS) catch-effort data were calculated on a monthly basis, while Marine Recreational Information Program (MRIP) catch-effort data, which were subsetted by mode, were calculated on a per wave basis. Waves were then split proportionally into months for projected landings analyses. The catch-effort data used 2012 and 2013 data, as 2010 and 2011 were statistically greater within the HBS data. Due to low sample sizes (<30 fish per month) in the MRIP catch-effort data for charter and private modes, samples were aggregated across all months in 2012 and 2013 to calculate aggregated annual bag limit increases. Landings per angler (LPA) of gag were low in each year (2012 and 2013) for each mode: Private angler (**Figure 4.2.1**), Charter boat (**Figure 4.2.2**), and Headboat Survey (**Figure 4.2.3**). The increased bag limits were calculated as follows: if less than 1 gag per angler was landed, there was no reduction in the landings. If greater than or equal to 1 gag per angler was landed, the total number of fish was increased to 2 or 3, respectively, for each bag limit analysis. These bag limits represent the upper bounds or maximum

increases that could be expected if anglers that successfully reached their limit historically also reach their limit under the new bag limits. Landings data were based on 2013 landings, and compiled by mode and wave, with waves then proportionally split into months for MRIP data (**Table 4.2.1**), while HBS data were compiled by month (**Table 4.2.2**).

Table 4.2.1. Number of trips and landings (number of gag) under **Preferred Alternative 1 (No Action)** by month for Headboat Survey data.

	2012		2013	
Month	**Trips**	**Landings**	**Trips**	**Landings**
1	122	3	105	10
2	145	0	101	2
3	251	3	93	4
4	301	0	87	1
5	298	435	167	208
6	347	803	193	288
7	202	263	157	254
8	159	189	153	245
9	135	160	94	121
10	108	109	88	115
11	100	44	39	60
12	149	80	72	72

Table 4.2.2. Number of trips and landings (number of gag) under **Preferred Alternative 1 (No Action)** by wave for MRIP data.

	Private				Charter			
Wave	**2012**		**2013**		**2012**		**2013**	
	Trips	Landings	Trips	Landings	Trips	Landings	Trips	Landings
1	9	0	12	0	21	0	20	0
2	13	0	5	0	19	0	2	0
3	23	13	16	12	12	9	6	11
4	21	9	11	6	6	8	3	1
5	28	11	8	2	12	7.2	2	0
6	15	6	5	0	10	1	6	0

The final model assumed zero landings from January through April, due to the Shallow Water Grouper spawning closure. Due to low sample sizes, data were combined across all waves and years for MRIP data to calculate the estimated percentage increase from the new bag limits. The final model projects the landings, percentage of recreational ACL, projected closure date, and days open for each of the proposed recreational ACLs in Action 1 for the status quo (equivalent to a bag limit of 1), 2 gag bag limit, and 3 gag bag limit (**Table 4.2.3**).

Table 4.2.3. Projected landings of gag (lbs gw) under proposed bag limits.

ACL	Bag Limit	Projected			
		Closure date	Days Open*	Landings	% ACL
ACL = ABC: 326,340 lb gw	Status Quo	12/31	245	98,582	30%
	Gag Bag limit = 2			133,587	41%
	Gag Bag limit = 3			168,592	52%
ACL = 95%ABC: 310,023 lb gw	**Status Quo**	**12/31**	**245**	**98,582**	**32%**
	Gag Bag limit = 2			**133,587**	**43%**
	Gag Bag limit = 3			**168,592**	**54%**
ACL = 90%ABC 293,706 lb gw	Status Quo	12/31	245	98,582	34%
	Gag Bag limit = 2			133,587	45%
	Gag Bag limit = 3			168,592	57%
ACL = 80%ABC 261,072 lb gw	Status Quo	12/31	245	98,582	38%
	Gag Bag limit = 2			133,587	51%
	Gag Bag limit = 3			168,592	65%

*120 days correspond to the 4-month spawning season closure

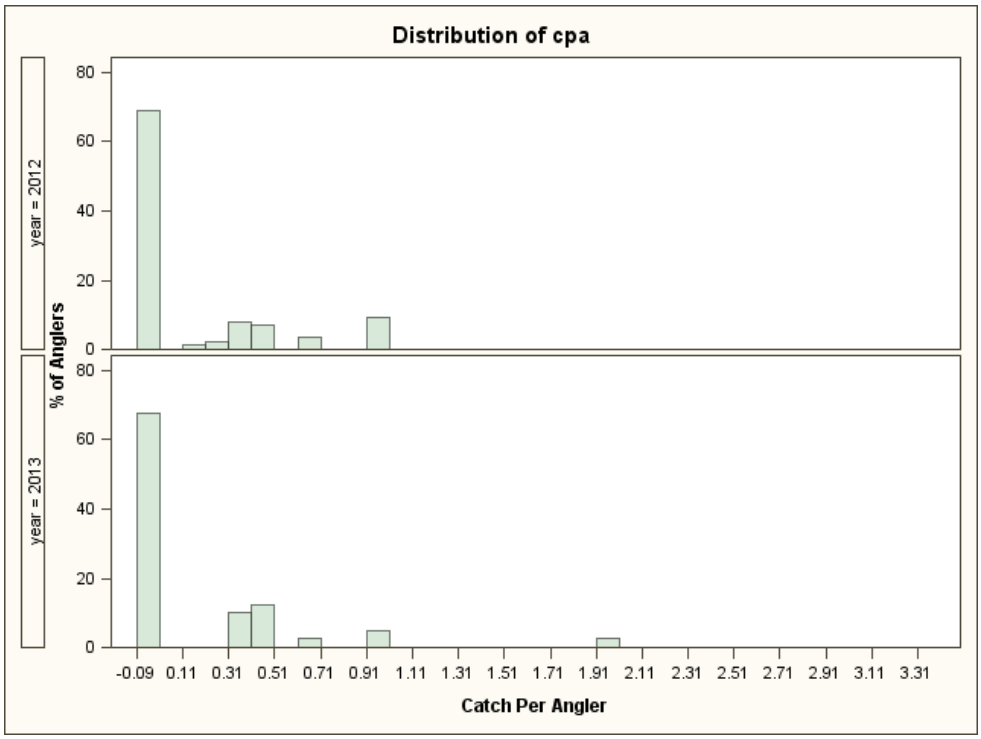

Figure 4.2.1. MRIP landings per angler (LPA) by year for the private mode

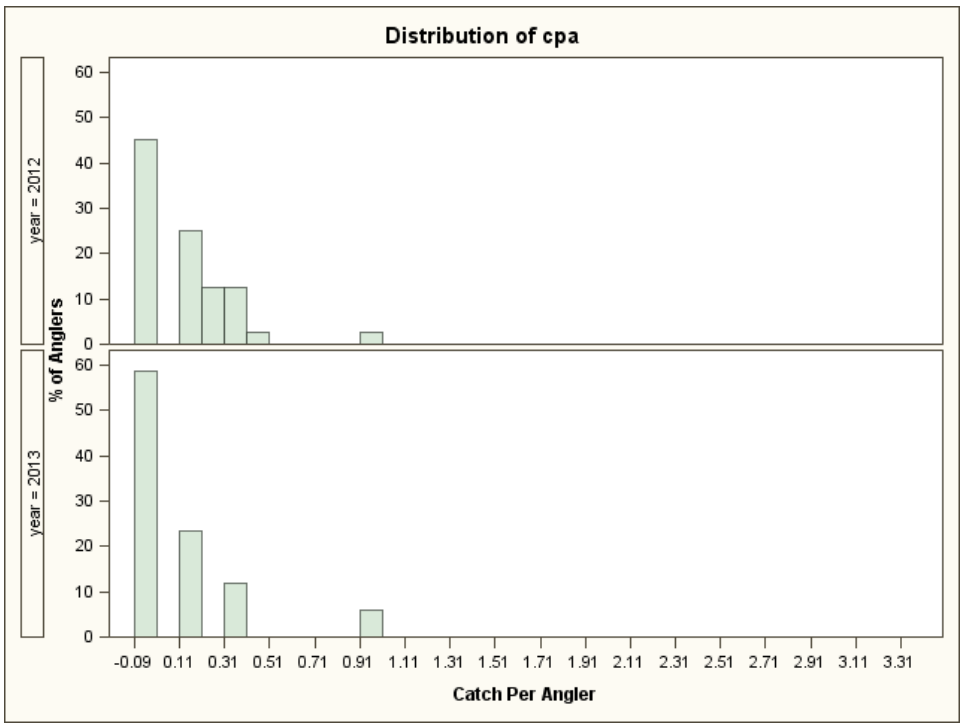

Figure 4.2.2. MRIP landings per angler (LPA) by year for the charter mode

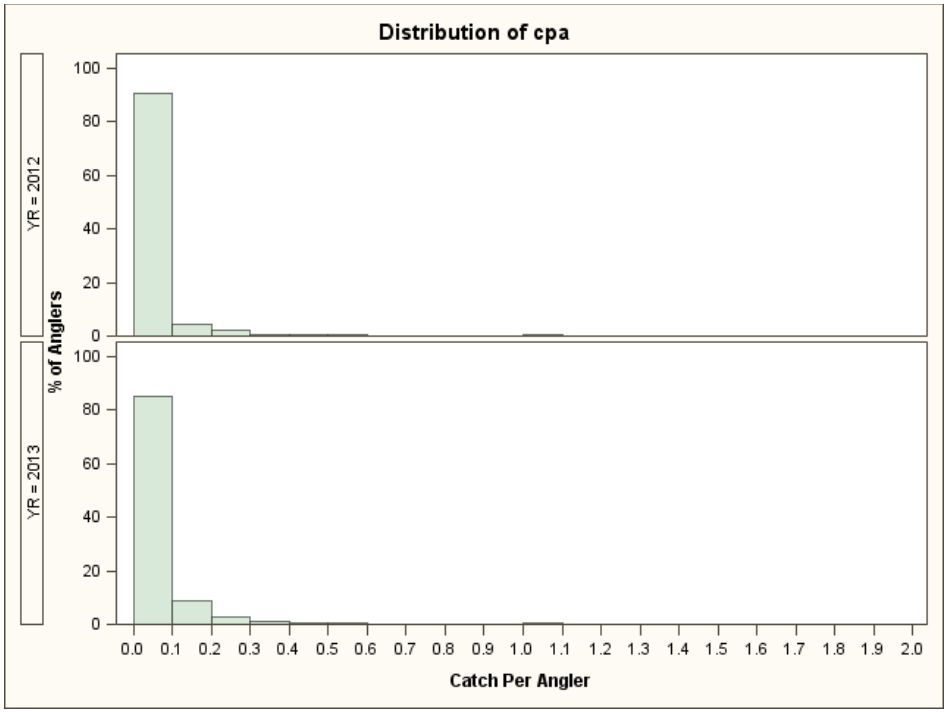

Figure 4.2.3. Landings per angler (LPA) by year for the Headboat Survey.

From 31% to 53% of the trips that caught an aggregate species landed an aggregate species (**Tables 4.2.4** and **4.2.5**). The LPA for all aggregate trips was less than one for HBS and MRIP data sources. When adjusting for positive trips, LPA increases, but is still ≤ 1. The total number of trips that caught the maximum aggregate limit per angler (LPA ≥ 3) was 3% for MRIP and <1% for HBS trips. The low LPA

indicates that fishermen are either not encountering the fish in the aggregate or are discarding the fish due to regulations other than the bag limit (e.g., spawning season closures, size limits).

The percentage of trips catching aggregate species that landed gag was 7-19% for MRIP trips and 15-24% for HBS trips (**Tables 4.2.4** and **4.2.5**). Average LPA for gag was less than 0.1, and the LPA for positive gag trips averaged 0.47 for MRIP trips and 0.13 for HBS trips. Trips landing black grouper were less than trips landing gag and had lower LPAs than gag. The percentage of aggregate trips that landed gag and/or black grouper was low (MRIP trips: 11-23%, HBS trips: 18-29%). The percentage of trips where the LPA for gag and black grouper were ≥ 1 were also low (MRIP: < 3%, HBS: <1%). Only 2 MRIP trips reported catching both black grouper and gag, while 13-28 HBS trips (<1%) caught both species. The low LPA for gag and/or black grouper trips indicates that it is unlikely that the increase in the gag bag limit within the 3 fish grouper aggregate would have much effect on black grouper landings.

Overall, from 2009-2013, the top five aggregate species landed for MRIP trips were: blueline tilefish, red grouper, gag, scamp, and snowy grouper. In 2012 and 2013, black grouper replaced snowy grouper as the fifth most commonly caught species. The top five species landed for HBS trips from 2009-2013 were blueline tilefish, scamp, gag, red grouper, and sand tilefish. In 2009 and 2011, rock hind replaced sand tilefish as the fifth most commonly caught species. The species listed above are the species most likely to be affected if the bag limit for gag is increased within the aggregate grouper bag; however, the low gag LPA suggests that there likely will be little effect on the catch of these species if the bag limit for gag is changed within the grouper aggregate because the current bag limit for gag is infrequently met.

Table 4.2.4. Number of trips that caught a species in aggregate grouper bag limit and the average landings per angler per trip (LPA) by year from the MRIP data.

		2009	2010	2011	2012	2013
Aggregate	Trips that caught an aggregate fish	145	448	278	446	359
	Positive aggregate trips (landed an aggregate fish)	72	139	96	167	118
	Trips that with aggregate LPA ≥ 3	3	8	5	16	12
	Average aggregate LPA, all aggregate trips (max = 3)	0.45	0.29	0.29	0.34	0.33
	Average aggregate LPA, positive trips (max = 3)	0.90	0.92	0.84	0.90	1.0
Gag	Trips that landed gag	27	38	28	52	24
	Trips that discarded gag	38	121	93	154	78
	% aggregate trips that landed gag	19%	8%	10%	12%	7%
	Average gag LPA, all aggregate trips (max = 1)	0.07	0.05	0.05	0.05	0.03
	Average gag LPA, positive trips (max = 1)	0.40	0.53	0.50	0.43	0.47
Black grouper	Trips landed black grouper	6	11	7	18	16
	% all aggregate trips that landed black grouper	4%	2%	3%	4%	4%
	Average black grouper LPA, all aggregate trips (max = 1)	0.03	0.01	0.02	0.02	0.02
	Average black grouper LPA, positive trips (max = 1)	0.65	0.33	0.78	0.46	0.43
Gag and black grouper	Trips landed gag and/or black grouper	33	48	35	69	40
	% all aggregate trips that landed gag and/or black grouper	23%	11%	13%	15%	11%
	Trips where gag/ black grouper LPA ≥ 1	3	10	8	13	6
	Trips landing both gag and black grouper	0	1	0	1	0
	Average gag/black grouper LPA, all aggregate trips	0.10	0.05	0.07	0.07	0.05
	Average gag/black grouper LPA, positive trips	0.44	0.50	0.56	0.45	0.45

Table 4.2.5. Number of trips that caught a species in aggregate grouper bag limit and the average landings per angler per trip (LPA) by year from the HBS data.

		2009	2010	2011	2012	2013
Aggregate	Trips that caught an aggregate fish	4967	4916	3772	4572	4423
	Positive aggregate trips (landed an aggregate fish)	2583	2344	1988	1926	2007
	Trips with aggregate LPA ≥ 3	23	12	32	47	20
	Average aggregate LPA, all aggregate trips (max = 3)	0.13	0.13	0.16	0.13	0.12
	Average aggregate LPA, positive trips (max = 3)	0.24	0.28	0.31	0.30	0.27
Gag	Trips that landed gag	1177	1122	922	674	663
	Trips that discarded gag	2048	1760	1428	1855	913
	% aggregate trips that landed gag	24%	23%	24%	15%	15%
	Average gag LPA, all aggregate trips (max = 1)	0.03	0.03	0.03	0.02	0.02
	Average gag LPA, positive trips (max = 1)	0.12	0.14	0.14	0.13	0.10
Black grouper	Trips landed black grouper	138	138	176	163	240
	% all aggregate trips that landed black grouper	3%	3%	5%	4%	5%
	Average black grouper LPA, all aggregate trips (max = 1)	0.003	0.003	0.006	0.004	0.007
	Average black grouper LPA, positive trips (max = 1)	0.10	0.12	0.13	0.12	0.13
Gag and black grouper	Trips landed gag and/or black grouper	1293	1240	1085	823	865
	% all aggregate trips that landed gag and/or black grouper	26%	25%	29%	18%	20%
	Trips where gag/black grouper LPA≥ 1	18	19	15	20	6
	Trips landing both gag and black grouper	22	20	13	14	38
	Average gag/black grouper LPA	0.03	0.04	0.04	0.02	0.02
	Average gag/black grouper LPA, positive trips	0.12	0.14	0.14	0.13	0.11

Alternative 2 and **Alternative 3** would increase the gag bag limit to two and three gag per person per day within the 3-grouper aggregate bag limit, respectively, to help achieve the recreational ACL proposed in **Action 1**. The black grouper bag limit would remain at one per person per day within the aggregate bag limit. Increasing the bag limit to 2 or 3 fish gag per person per day would have less biological benefits than retention of the measures under **Preferred Alternative 1 (No Action)**. However, ACLs and AMs are in place to ensure overfishing does not occur. Currently, the recreational ACL is not being met, and **Table 4.2.3** indicates that the proposed recreational ACLs for gag under **Action 1** would not be met under the bag limits proposed under **Alternative 2** or **Alternative 3**. Furthermore, an amendment is being developed by the South Atlantic Council (Amendment 34 to the Snapper Grouper FMP) that could place more stringent measures on the recreational AM for gag to further ensure ACLs are not exceeded and overfishing does not occur. Therefore, in comparison to **Preferred Alternative 1 (No Action),** negative biological effects to the gag stock are not expected under **Alternative 2** or **Alternative 3**.

Alternatives 2 and **3** would possibly reduce harvest of groupers and tilefish by allowing for the increased harvest of gag in the 3-fish aggregate grouper bag limit. However, since the 3-fish grouper aggregate is rarely met and most fishermen do not catch 1 gag within the 3-fish aggregate, any change in in harvest of other groupers and tilefish within the aggregate is expected to be small under **Alternative 2** and **Alternative 3**. Furthermore, **Alternatives 2** and **3** would change the allowance of 1 gag or black grouper within the 3 fish aggregate grouper bag limit to 1 black grouper within the grouper aggregate, which could potentially increase the black grouper harvest. However, the low landings per angler for gag and/or black grouper trips (**Table 4.2.4**) indicates that it is unlikely that the increase in the black grouper bag limit under **Alternatives 2** and **3** within the 3-fish grouper aggregate would have much effect on black grouper landings. Thus, **Alternative 2** and **Alternative 3** are expected to have minimal negative

biological effects for gag, and minimal positive biological effects for grouper and tilefish when compared to **Preferred Alternative 1 (No Action)**. **Table 4.2.6** lists the number of fish allowed in the current aggregate grouper bag limit under **Preferred Alternative 1 (No Action)**, and **Tables 4.2.7** and **4.2.8** list the aggregate bag limit under **Alternative 2** and **Alternative 3**, respectively.

Table 4.2.6. Current aggregate bag limit (**Preferred Alternative 1 No Action**).

Aggregate bag limit includes:	Gag*, black grouper*, golden tilefish**, snowy grouper***, misty grouper, red grouper, scamp, yellowedge grouper, yellowfin grouper, yellowmouth grouper, blueline tilefish, sand tilefish, coney, graysby, red hind, and rock hind
*	Maximum of 1 gag or black grouper (but not both) per person/day
**	Maximum of 1 golden tilefish per person/day
***	Maximum of 1 snowy grouper per vessel/day

Table 4.2.7. Aggregate bag limit under Alternative 2.

Aggregate bag limit includes:	Gag*, black grouper**, golden tilefish***, snowy grouper****, misty grouper, red grouper, scamp, yellowedge grouper, yellowfin grouper, yellowmouth grouper, blueline tilefish, sand tilefish, coney, graysby, red hind, and rock hind
*	Maximum of 2 gag per person/day
**	Maximum of 1 black grouper per person/day
***	Maximum of 1 golden tilefish per person/day
****	Maximum of 1 snowy grouper per vessel/day

Table 4.2.8. Aggregate bag limit under Alternative 3.

Aggregate bag limit includes:	Gag*, black grouper*, golden tilefish**, snowy grouper***, misty grouper, red grouper, scamp, yellowedge grouper, yellowfin grouper, yellowmouth grouper, blueline tilefish, sand tilefish, coney, graysby, red hind, and rock hind
*	Maximum of 3 gag per person/day
**	Maximum of 1 black grouper per person/day
***	Maximum of 1 golden tilefish per person/day
****	Maximum of 1 snowy grouper per vessel/day

Alternatives 1 (No Action, Preferred) through **3** are unlikely to have adverse effects on listed coral species, large whales, or any DPS of Atlantic sturgeon. Previous ESA consultations determined the hook-and-line sector of the fishery was not likely to adversely affect coral species, large whales, or any DPS of Atlantic sturgeon. Regardless of the alternative selected, this action is not anticipated to increase the potential for interactions with sea turtles or smalltooth sawfish. None of the alternatives considered are expected to negatively impact or modify EFH, EFH HAPCs, or CHAPCs.

4.2.2 Economic Effects

The bag limit analysis (see **Table 4.2.3**), which takes into account the possible ACLs from **Action 1**, indicates that the entire recreational ACL is not expected to be caught under any of the proposed alternatives under **Action 2**. Allowing recreational fishermen to keep as many fish as possible without exceeding their sector ACL could increase both CS for the fishermen, and NOR for the for-hire portion of the sector.

The analysis presented in this section uses the same assumptions presented in **Section 4.2.1** in regards to how the expected effects of the proposed increased bag limits were calculated: if the historic trip caught less than 1 gag per angler, there would be no increase in harvest if the bag limit is increased based on the rationale is that if a trip did not reach the limit before, increasing the limit would not be expected to change the harvest performance. If 1 or more gag per angler was caught, the total number of fish was increased to 2 or 3, respectively, for the appropriate alternative based on the rationale that a successful trip would continue to be successful at the higher limit. Note that this approach may result in the upper bound or maximum increase in the harvest that could be expected under each alternative. Consequently, the associated changes in CS may also represent the maximum increase that could be expected. In reality, although a trip may have caught the gag limit before, not all fish caught over the limit would necessarily be legal-sized fish that could be retained under an increase in the bag limit. Also, this approach assumes no interactive effects of the dual bag limitation of either 1 gag or 1 black grouper on the catch rates of gag (i.e., did this restriction cause anglers who already harvested a black grouper to alter their fishing behavior resulting in reduced catch of gag). Because the incidence of trips landing black grouper was so low (averaging less than 5% in both sectors; see **Tables 4.2.4** and **4.2.5**), the effect of this assumption is expected to be minor.

Additionally, it is noted that the current recreational ACL for gag is under-harvested and it is possible that changing the gag bag limit could increase the number of trips taken, thus increasing the number of trips where one or more fish are caught. It is possible that the current bag limit for black grouper and gag may be limiting the number of trips with any level of gag harvest and, by severing the gag-black grouper connection, there may be an increase in trips landing a gag. Thus, there could be an increase in trips with gag in total, as well as an increase in trips with multiple gag. However, it is not possible to estimate any change in the number of trips that may be taken that land gag.

The bag limit analysis discussed in **Section 4.2.1** (see **Table 4.2.3**) indicates that by increasing the bag limit for gag as proposed in **Alternatives 2** and **3**, the recreational sector would not be expected to reach its ACL regardless of the proposed ACL scenarios **Action 1**. As a result, for each proposed bag limit, the level of harvest would be unaffected by the ACL selected under **Action 1**. In addition to the assumptions described in the previous paragraph, this analysis assumes the CS for a second gag is $102 (2013 dollars) and $68 for a third gag (see **Section 3.3.2**), and that the average weight of a recreationally-caught gag is 10.77 lbs. **Alternatives 2** and **3** would change the allowance of 1 gag or black grouper within the 3-fish aggregate grouper bag limit to 1 black grouper within the grouper aggregate, which could potentially increase the black grouper harvest. However, the low catch per angler for gag and/or black grouper trips (**Table 4.2.4**) indicates that it is unlikely that the increase in the black grouper bag limit under **Alternatives 2** and **3** within the 3-fish grouper aggregate would not have much effect on black grouper landings. Thus changes in black grouper landings would be expected to be minimal and have minimal economic effects. Using these parameters, it is estimated that an increase in the gag bag limit from 1 fish

to 2 fish (**Alternative 2**) would result in 3,250 more fish harvested and a maximum expected increase in CS of $331,524 (2013 dollars). Similarly, if the bag limit goes from a 1-fish to 3-fish bag limit (**Alternative 3**), it is estimated that an additional 6,500 fish would be harvested compared to **Preferred Alternative 1 (No Action)** with a maximum expected increase in CS of $552,539.

For the for-hire sector, gag target effort is very low (see **Table 3.3.4**). As a result, no change in for-hire demand would be expected to occur in response to any of the proposed changes in the gag bag limit and, hence, no increase in net operating revenue to the for-hire sector would be expected. However, if any increase in for-hire target effort occurs, the increase, and associated increase in benefits, would be expected to be minor.

Based on the assumptions of the bag limit analysis, and relative to **Preferred Alternative 1 (No Action)**, **Alternative 3** is expected to have a greater increase in economic benefits (CS) than would be expected under **Alternative 2**. The overall increase in CS for recreational trips is expected to be minor.

4.2.3 Social Effects

In general, the social effects of modifying the aggregate bag limit and establishing a bag limit for gag would be associated with the expected biological costs (if any) of each alternative, as well as the effects on current recreational fishing opportunities. The expected effects on recreational fishermen and for-hire businesses under **Preferred Alternative 1 (No Action)**, **Alternative 2**, and **Alternative 3** would depend on any resulting changes in access to the resource through estimated season length, in addition to opportunities to reach the recreational ACL (see **Appendix F).**

Recreational fishing differs from commercial fishing in that it is generally more focused on the experience rather than landings, and overall benefits to the recreational sector come from increased and/or consistent fishing opportunities. Benefits of management actions that are expected to increase recreational fishing opportunities can come from economic benefits, such as positive effects on the for-hire sector, and also from improved recreational fishing experiences.

The model in **Appendix F** shows that the bag limits in **Alternatives 2** and **3** would not be expected to shorten the season length under any of the ACLs proposed in **Action 1**, and it can be assumed that gag fishing opportunities under current conditions would be the same for **Alternatives 2** and **3**. However, **Appendix F** also suggests that only a portion of the recreational gag ACL would be reached under the proposed bag limits in **Alternatives 2** and **3**. If the OY is defined as the ACL for gag, not harvesting a portion of the ACL due to the bag limits could result in foregone benefits to recreational fishermen, and economic benefits for businesses and communities associated with the recreational gag sector. Conversely, there may be benefits to not harvesting the entire ACL, such as leaving fish for future fishing opportunities in addition to the potential biological benefits of lower removals of gag.

As noted in **Section 4.2.1**, changes in the bag limit under **Alternatives 2** and **3** are not expected to have much effect on black grouper landings (**Table 4.2.4**). Therefore, recreational fishing opportunities for black grouper are expected to stay the same under all alternatives in this action.

4.2.4 Administrative Effects

Under **Preferred Action 1 (No Action),** mechanisms are already in place for monitoring and enforcing the current recreational ACL, and any increase in the administrative burden from **Alternative 1 (No Action, Preferred)** through **Alternative 3** would be expected to be small. If the ACL is exceeded for any of the species within the grouper aggregate, AMs are triggered to ensure overfishing does not occur. As expected with any changes to regulations, administrative costs could occur associated with disseminating the information and educating the public.

4.3 Action 3. Revise the annual catch limits (ACL) and optimum yield (OY) for wreckfish

Alternatives for Action 3
(preferred alternatives in **bold**)

1. No Action. Retain the current annual catch limit (ACL) and optimum yield (OY) for wreckfish. The wreckfish ABC=ACL=OY=235,000 pounds whole weight (lbs ww). Commercial and recreational allocations will remain equal to 95% and 5%, respectively. The commercial ACL will continue to be 223,250 lbs ww. The recreational ACL will continue to be 11,750 lbs ww. Currently, there are no annual catch targets (ACTs) for wreckfish.

2. Preferred. ACL = OY = Proposed ABC. The ACL for 2020 would remain in place until modified.

3. ACL = OY = 0.95*Proposed ABC. The ACL for 2020 would remain in place until modified.

4. ACL = OY = 0.90*Proposed ABC. The ACL for 2020 would remain in place until modified.

5. ACL = OY = 0.80*Proposed ABC. The ACL for 2020 would remain in place until modified.

4.3.1 Biological Effects

At their April/May 2014 meeting, the Scientific and Statistical Committee (SSC) accepted the benchmark assessment as representing the best scientific information available on the current status of wreckfish in South Atlantic waters and considered the assessment appropriate for management decisions. The assessment indicates wreckfish is neither overfished nor experiencing overfishing. The SSC recommended an OFL based on P* of 0.50, and an ABC based on a P* = 0.275 (**Table 4.3.1**).

Alternative 1 (No Action) would retain the current ACL, equal to the ABC=OY=ABC of 235,000 lbs ww, that was analyzed and specified in the final rule for the Comprehensive ACL Amendment (SAFMC 2011a). Sector allocations for the commercial and recreational ACLs are 95% (223,250 lbs ww) and 5% (11,750 lbs ww), respectively. The amount of wreckfish that are allocated to recreational fishermen is very small, (approximately 300-350 fish), as wreckfish average weight is 30 to 40 lbs ww. However, since ACLs for wreckfish were implemented in 2012, the recreational ACL has not been met.

Table 4.3.1. Status determination criteria for wreckfish based on the recent assessment and recommendations from the South Atlantic Council's SSC.

Criteria	Deterministic**	Probabilistic
Overfished evaluation	**No** ($SSB/75\%SSB_{MSY}$=2.11)	
Overfishing evaluation	**No** (F/F_{MSY}=0.583)	
MFMT	0.065	
SSB_{MSY} (unit)	1,809 tons (3,988,000 lbs ww)	
MSST (75%)	1,357 tons (2,992,000 lbs ww)	
MSST (1-M)	1,743 tons (3,843,000 lbs ww)	
MSY	279,000 lbs ww	
Y at 75% F_{MSY} (1000 lbs)		
ABC Control Rule Adjustment		22.5%
P-Star		27.5%
OFL (1000 lbs)	Projections at $F=F_{MSY}$	
ABC RECOMMENDATIONS: Projections at P*, 5 years		

ABC Projections (P*=27.5%)	
Year	**Landings (1000 Lbs)**
2014	443,800 lbs ww
2015	433,000 lbs ww
2016	423,700 lbs ww
2017	414,200 lbs ww
2018	406,300 lbs ww
2019	396,800 lbs ww
2020	389,100 lbs ww

OFL Projections		
Year	**Yield at F_{MSY} (1000 lbs)**	
	Deterministic	**Probabilistic (P*=50%)**
2014	439,700 lbs ww	571,500 lbs ww
2015	429,400 lbs ww	553,300 lbs ww
2016	419,700 lbs ww	536,700 lbs ww
2017	410,600 lbs ww	521,900 lbs ww
2018	402,000 lbs ww	507,300 lbs ww
2019	394,000 lbs ww	493,700 lbs ww
2020	386,600 lbs ww	481,200 lbs ww

Deterministic Projections at $F=75\%F_{MSY}$	
Year	**Yield at $75\%F_{MSY}$ (1000 lbs)**
2014	329,700 lbs ww
2015	326,700 lbs ww
2016	323,700 lbs ww
2017	320,800 lbs ww
2018	318,100 lbs ww
2019	315,500 lbs ww
2020	313,100 lbs ww

** The SSC recommends using the deterministic values for stock status.

Estimates of yield and productivity for fish stocks are available as both equilibrium and static values. Equilibrium values represent the yield expected, on average, over a long period of time from a given management strategy. An example of an equilibrium value is the maximum sustainable yield (MSY). Static values represent the yield that can be taken at any given point in time, and may be more or less than

the equilibrium values. Examples are the yield estimated by stock assessment projections and presented as the result of a particular exploitation rate applied at a particular time. The important quantities in determining both static or equilibrium yield from a population are the amount of fish in the population, usually presented in stock biomass (weight), and the fishing pressure or rate of removal, usually presented as a rate (i.e., fishing mortality rate or F).

Alternatives 2 (Preferred)-5 are based on the stock assessment projections and are short-term yields in excess of equilibrium expectations. They represent windfall conditions that are typically short lived, as the natural tendency of the population is to return to, and vary around, the estimated equilibrium conditions for a given exploitation rate. Therefore, as the extra yield and stock biomass is removed, or "fished down", population abundance diminishes toward MSY, the equilibrium value. This is why the projected wreckfish ABCs for 2015-2020 decrease. However, there is risk to this "fishing down" approach, because if managers overshoot the equilibrium biomass target, population biomass could drop below this level and create an overfished situation.

Like **Alternative 1 (No Action)**, **Alternatives 2 (Preferred)-5** would set OY equal to the ACL. National Standard 1 (NS 1) establishes the relationship between conservation and management measures, preventing overfishing, and achieving OY from each stock, stock complex, or fishery. The long-term objective is to achieve OY through annual achievement of an ACL.

The biological effects of **Alternatives 2 (Preferred)** through **Alternative 5** (**Tables 4.3.2-4.3.5**) would be slightly more adverse than under **Alternative 1 (No Action)** because they would increase the ACL and OY for wreckfish based upon a percentage of the updated ABC (100% to 80%, respectively). However, a new assessment has been conducted for wreckfish, and the South Atlantic Council's SSC has increased their catch level recommendations indicating that there is not a biological need to retain the ACL at the levels specified under **Alternative 1 (No Action)**. Thus, compared to **Alternative 1 (No Action)**, increasing the ACL under **Alternative 2 (Preferred)-5** would not be expected to negatively impact the health of the wreckfish stock because the catch levels would be set at levels that the South Atlantic Council's SSC consider to be sustainable. **Alternative 2 (Preferred)** would set the ACL equal to the SSC's recommendation for the updated ABC. The preferred alternative for ACL specified for wreckfish in the Comprehensive ACL Amendment also set ACL equal to the ABC. The NS1 guidelines indicate the ACL may typically be set very close to the ABC. **Alternatives 3**, **4**, and **5** would have a greater positive biological effect than **Preferred Alternative 2** because they would also create a buffer between the ACL/OY and ABC, with **Alternative 5** setting the most conservative ACL at 80% of the ABC. A buffer between the ACL/OY and ABC would provide greater assurance that overfishing is prevented and the long-term average biomass is near or above SSB_{MSY}. However, as mentioned for gag under **Action 1**, commercial monitoring mechanisms have been improved and a Joint Dealer Reporting Amendment (GMFMC & SAFMC 2013b), which became effective on August 7, 2014, requires dealers to report landings electronically each week. Furthermore, overages of the commercial ACL are not expected because an individual transferable quota (ITQ) program is in place where there is a limited number of quota shares and a cap on the number of wreckfish quota shares a single entity may own. Under the ITQ program, commercial wreckfish landings are tracked closely, due to mandatory reporting requirements. Thus, it is unlikely that the ACL would be exceeded, and there may not be a biological need to set the ACL below the ABC.

Alternative 1 (No Action), **Preferred Alternative 2**, and **Alternatives 3-5** are unlikely to result in any direct adverse impacts on protected species such as endangered or threatened whales, sea turtles,

corals, or any DPS of Atlantic sturgeon. Regardless of the alternative selected, this action is not anticipated to increase the potential for interactions with sea turtles or smalltooth sawfish. Although **Preferred Alternative 2** and **Alternatives 3-5** would increase the ACL from the status quo, this option would not change current fishing practices for wreckfish. Total harvest would be constrained by the commercial and recreational ACLs, and AMs would still be used to help prevent overfishing. Furthermore, an ITQ system is in place to constrain commercial harvest. It is unlikely that any of the alternatives would result in significantly increased fishing effort in the snapper grouper fishery; therefore, no adverse biological impacts on protected species is expected under this action and none of the alternatives considered are expected to negatively impact or modify EFH, EFH HAPCs, or CHAPCs.

Table 4.3.2. ABC and ACLs for wreckfish specified under **Alternative 2 (Preferred)** where ACL = OY = ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	433,000	411,350	21,650
2016	423,700	423,700	402,515	21,185
2017	414,200	414,200	393,490	20,710
2018	406,300	406,300	385,985	20,315
2019	396,800	396,800	376,960	19,840
2020	389,100	389,100	369,645	19,455

Table 4.3.3. ABC and ACLs for wreckfish specified under Alternative 3 where ACL = OY = 95%ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	411,350	390,783	20,568
2016	423,700	402,515	382,389	20,126
2017	414,200	393,490	373,816	19,675
2018	406,300	385,985	366,686	19,299
2019	396,800	376,960	358,112	18,848
2020	389,100	369,645	351,163	18,482

Table 4.3.4. ABC and ACLs for wreckfish specified under Alternative 4 where ACL = OY = 90%ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	389,700	370,215	19,485
2016	423,700	381,330	362,264	19,067
2017	414,200	372,780	354,141	18,639
2018	406,300	365,670	347,387	18,284
2019	396,800	357,120	339,264	17,856
2020	389,100	350,190	332,681	17,510

Table 4.3.5. ABC and ACLs for wreckfish specified under Alternative 5 where ACL = OY = 80%ABC.

Year	New ABC lbs ww	ACL	Commercial ACL (95%)	Recreational ACL (5%)
2015	433,000	346,400	329,080	17,320
2016	423,700	338,960	322,012	16,948
2017	414,200	331,360	314,792	16,568
2018	406,300	325,040	308,788	16,252
2019	396,800	317,440	301,568	15,872
2020	389,100	311,280	295,716	15,564

4.3.2 Economic Effects

See **Section 4.1.2** for a general discussion of the economic effects of changing the ACL for a species.

Table 4.3.6 shows the change in harvest and revenue for **Preferred Alternative 2** through **Alternative 5** compared to **Alternative 1 (No Action)** for wreckfish harvest by the commercial sector. These results are based on an average price for wreckfish of $3.61 per lb (2013 dollars), as shown in **Section 3.3.1**.

Table 4.3.6. Expected change in wreckfish harvest (lbs ww) and annual revenue for the commercial sector.

	Preferred Alternative 2		Alternative 3		Alternative 4		Alternative 5	
	Lbs	Value	Lbs	Value	Lbs	Value	Lbs	Value
2015	**188,100**	**$679,041**	167,533	$604,794	146,965	$530,544	105,830	$382,046
2016	**179,265**	**$647,147**	159,139	$574,492	139,014	$501,841	98,762	$356,531
2017	**170,240**	**$614,566**	150,566	$543,543	130,891	$472,517	91,542	$330,467
2018	**162,735**	**$587,473**	143,436	$517,804	124,137	$448,135	85,538	$308,792
2019	**153,710**	**$554,893**	134,862	$486,852	116,014	$418,811	78,318	$282,728
2020	**146,395**	**$528,486**	127,913	$461,766	109,431	$395,046	72,466	$261,602
Total	**1,000,445**	**$3,611,606**	883,449	$3,189,251	766,452	$2,766,892	532,456	$1,922,166

Note: Values are in 2013 dollars.

Preferred Alternative 2 is projected to result in a total increase in revenue from 2015 through 2020 of $3,611,606, or an average annual increase in revenue of $601,934 compared to **Alternative 1 (No Action)**. **Alternatives 3-5**, would be expected to result in a smaller increase in total harvest and total revenue than **Preferred Alternative 2**; however, compared to **Alternative 1 (No Action)**, **Alternatives 3-5** would be expected to result in higher total revenues from 2015 through 2020.

In terms of relative economic effects, **Preferred Alternative 2** would be expected to result in the highest positive direct economic effects for the commercial sector compared to **Alternative 1 (No Action)**. Compared to **Alternative 1 (No Action)**, **Alternatives 3** through **5** are also expected to result in overall positive direct economic effects. From 2015 through 2020, the magnitude of the overall positive economic effects for each of the alternatives compared to **Alternative 1 (No Action)** is moderate.

Section 3.3.2 contains estimates of the recreational CS for grouper species. Although wreckfish is a grouper-like species, it takes considerably more effort and expense to catch than most other more commonly harvested grouper species. However, an estimate of the CS for wreckfish is not available. As a result, the economic effects analysis information presented in **Table 4.3.7** uses the CS value of being allowed to land a generic second grouper ($102; 2013 dollars). However, due to the rarity of recreational wreckfish landings, no recorded targeted effort, and minimal recorded catch effort (see **Table 3.3.5**), the generic CS value for catching a second grouper may under- or over-estimate the actual effects of the proposed alternatives.

Table 4.3.7. Expected change in wreckfish harvest (lbs ww), numbers of fish, and consumer surplus for the recreational sector.

	Preferred Alternative 2			Alternative3			Alternative 4			Alternative 5		
	Lbs	**Fish**	**CS**	Lbs	Fish	CS	Lbs	Fish	CS	Lbs	Fish	CS
2015	**9,900**	**330**	**$33,660**	8,818	294	$29,981	7,735	258	$26,299	5,570	186	$18,938
2016	**9,435**	**315**	**$32,079**	8,376	279	$28,478	7,317	244	$24,878	5,198	173	$17,673
2017	**8,960**	**299**	**$30,464**	7,925	264	$26,945	6,889	230	$23,423	4,818	161	$16,381
2018	**8,565**	**286**	**$29,121**	7,549	252	$25,667	6,534	218	$22,216	4,502	150	$15,307
2019	**8,090**	**270**	**$27,506**	7,098	237	$24,133	6,106	204	$20,760	4,122	137	$14,015
2020	**7,705**	**257**	**$26,197**	6,732	224	$22,889	5,760	192	$19,584	3,814	127	$12,968
Total	**52,655**	**1,755**	**$179,027**	46,498	1,550	$158,093	40,341	1,345	$137,159	28,024	934	$95,282

Note: Values are in 2013 dollars.

Preferred Alternative 2 is projected to result in the largest total increase in CS from 2015 through 2020, a total of $179,027 and an average annual value of $29,838, compared to **Alternative 1 (No Action)**. **Alternatives 3-5**, would also be expected to result in increased wreckfish landed and associated CS compared to **Alternative 1 (No Action)**.

Although some wreckfish target effort may occur, none has been recorded for the for-hire sector through the recreational data collection programs in the Southeast. As a result, none of the alternatives under **Action 3** are expected to result in a change in the number of for-hire trips taken. Therefore, no differences in associated producer surplus (net operating revenue) are expected to occur among the proposed alternatives for this action or, if differences occur, they are expected to be minimal and mirror the direction of the expected changes in CS.

For both the commercial and recreational sectors, the order of alternatives resulting in the most to least positive direct economic effects compared to **Alternative 1 (No Action)** is **Preferred Alternative 2**, **Alternative 3**, **Alternative 4**, and **Alternative 5**. Positive direct economic effects to the commercial sector are moderate, while the positive effects for the recreational sector would be considered minimal.

4.3.3 Social Effects

Information about the social dimensions of the wreckfish portion of the snapper grouper fishery is described in **Section 3.4**. As described in **Section 4.1.3**, the higher the ACL, the greater the short-term

social and economic benefits that would be expected to accrue. **Preferred Alternative 2** would be expected to provide the highest level of benefits to fishermen, followed (in order) by **Alternative 3**, **Alternative 4**, and **Alternative 5**. The ACL level in **Alternative 1 (No Action)** would be expected to result in the fewest benefits to wreckfish fishermen.

4.3.4 Administrative Effects

Under **Action 1 (No Action)**, mechanisms are in place for monitoring the current recreational ACL and commercial quota. Alternatives that result in lower catch levels for wreckfish could increase the administrative effects since it would be more likely that AMs would be implemented and action would be needed to inform the public and enforce regulations. However, since the recreational ACL and commercial quota are already being monitored under **Alternative 1** (**No Action**), any increase in the administrative burden from **Alternatives 2 (Preferred)** through **5** would be expected to be small. As expected with any changes to regulations, administrative costs could occur associated with disseminating the information and educating the public.

Chapter 5. Reasoning for Council's Choice of Preferred Alternatives

5.1 Action 1. Revise the annual catch limits (ACL) and optimum yield (OY) for gag

Alternatives for Action 1

(Preferred alternatives in **bold**)

1. No Action. Retain the current annual catch limits (ACL) and optimum yield (OY) for gag. Optimum Yield (OY) will remain equal to the yield produced by F_{OY} (Amendment 16). If a stock is overfished, F_{OY} remains equal to the fishing mortality rate specified by the rebuilding plan designed to rebuild the stock to SSB_{MSY} within the approved schedule. After the stock is rebuilt, F_{OY} = a fraction of F_{MSY}. ABC = 805,000 pounds gutted weight (lbs gw; landings only); OFL = Yield at F_{MSY} = 903,000 lbs gw. The total ACL (Yield at 75%F_{MSY}) will continue to be 694,000 lbs gw. Commercial and recreational allocations will continue to be 51% and 49%, respectively. The directed commercial ACL will continue to be 326,722 lbs gw (reduced from 353,940 lbs gw commercial ACL to account for gag discard mortality from commercial trips that target co-occurring species (i.e., red grouper and scamp) during a gag closure). The recreational ACL will continue to be 340,060 lbs gw. Currently, there are no ACTs for gag.

2. ACL = OY = ABC projected landings from 2015-2019 with P*=0.3. The ACL for 2019 would remain in place until modified.

3 Preferred. ACL = OY = 0.95*Proposed ABC. The ACL for 2019 would remain in place until modified.

4. ACL = OY = 0.90*Proposed ABC. The ACL for 2019 would remain in place until modified.

5. ACL = OY = 0.80*Proposed ABC. The ACL for 2019 would remain in place until modified.

Snapper Grouper Advisory Panel (AP) Comments and Recommendations

The Snapper Grouper AP reviewed Regulatory Amendment 22 at their October 2014 meeting. The AP approved the motion below. When the AP discussed the amendment, the South Atlantic Fishery Management Council's (South Atlantic Council) preferred alternative was **Alternative 2**. The AP recommended keeping the ABC equal to ACL and OY because a trip limit is in place for gag, a step down in the trip limit was recently implemented, Regulatory Amendment 22 includes an adjustment for gag dead discards that sets the quota below the ACL, the recreational sector ACL is not being met, and updates to accountability measures are being proposed in Amendment 34 to the Snapper Grouper FMP. The AP felt that these measures should help to prevent the gag ACL from being exceeded.

MOTION: RECOMMEND ALTERNATIVE 2 AS PREFERRED FOR ACTION 1

Action 1. Revise the annual catch limits (ACL) and optimum yield (OY) for gag

Alternative 2. ACL = OY = ABC projected landings from 2015-2019 with P*=0.3. The ACL for 2019 would remain in place until modified.

APPROVED BY AP

Law Enforcement Advisory Panel (LEAP) Comments and Recommendations

The LEAP received the draft document for their review and recommendations via email on

December 10, 2014. None of the LEAP members had any comments or recommendations on the amendment.

Scientific and Statistical Committee (SSC) Comments and Recommendations

The SSC reviewed the gag stock assessment update at their April 2014 meeting. The SSC recommended the assessment as the best scientific information available and considered it could be used for management of the gag resource in the South Atlantic. The SSC stated that revisions in the data and methods were reasonable and the assessment could be used for catch level recommendations. Regarding stock status, the SSC report states:

Stock Status: Not Overfished but Overfishing is occurring (-5.0%): After considering a plot of F/F_{MSY} with confidence intervals from the MCB runs, the large amount of uncertainty in the values of F coupled with the fact that there is a higher degree of certainty that the F rates are not lower than they are, has caused the SSC to recommend using the geometric mean F over the last 3 years when determining stock status. However, the SSC wants to note that the regulatory closure in 2012 may have prevented overfishing from occurring. Also, F_{MSY} is equivalent to the F that produces SPR of 57%, which may be considered very conservative.

Regarding the next assessment of gag, the SSC recommended that it be conducted within the next 3-4 years and at least as a 'Standard Assessment'. However, the possible addition of the video index and a different approach to indices development might require a benchmark assessment. The SSC made no recommendation on setting the ACL as this is a management determination.

South Atlantic Fishery Management Council's (South Atlantic Council) Choice for Preferred Alternative

The South Atlantic Council initiated development of Regulatory Amendment 22 at their June 2014 meeting in response to the completion of stock assessments for gag and wreckfish. The South Atlantic Council selected **Alternative 2** (ACL = OY = ABC projected landings from 2015-2019) as the preferred for Action 1 when the amendment was approved for public hearings in September 2014. The South Atlantic Council has frequently chosen to set the ACL at the same level as ABC for other snapper grouper stocks. During discussions at the December 2014 South Atlantic Council meeting, however, the South Atlantic Council opted to set the ACL below the acceptable biological catch (ABC) due to concerns over the status of the gag stock in the South Atlantic. Even though the U.S. Report to Congress on the Status of Stocks indicates that the gag resource in the South Atlantic is not overfished and overfishing is not occurring, several South Atlantic Council members stated concern over the level of management uncertainty (NMFS determined that the gag stock in the South Atlantic is not undergoing overfishing based on the fact that the fishing mortality rate for 2012, and the projected fishing mortality rate in 2013 based on the actual landings, suggested that overfishing ended in 2012). Council members shared personal observations on decreased abundance of gag relative to the 1980s and 1990s, a marked increase in effort (both commercial and recreational), and an increase in demand for gag. In addition, South Atlantic Council members also stated that stakeholders have repeatedly expressed concern over the status of the gag stock in the region. One South Atlantic Council member did caution, however, that being conservative and setting the ACL below the ABC would effectively only impact the commercial sector because recreational landings have consistently been below the recreational ACL. After further discussion, a motion to set the ACL at 90% of the ABC (**Alternative 4**) was briefly considered. Subsequently, a substitute motion was made to set the ACL at 95% of the ABC (**Preferred Alternative 3**). The director of the Southeast Fisheries Science Center urged the South Atlantic Council to also

consider the level of scientific uncertainty in the stock assessment, particularly the difference in fishing mortality rates between the terminal year of the assessment (2012) and that averaged over the last three years of available data that went into the assessment model. Namely, if only the three-year average fishing mortality rate is considered, then the gag stock would be considered to be undergoing overfishing. However, the fishing mortality rate in 2012 was substantially lower, thus indicating that overfishing probably ended in 2012 (see discussion under SSC's Comments and Recommendations). In addition, setting the ACL at the same level as the ABC presumes that commercial landings can be monitored very precisely; however, while there have recently been vast improvements in the ability to monitor commercial landings, management uncertainty still exists and should be considered when setting ACLs.

The South Atlantic Council concluded that **Preferred Alternative 3** best meets the purpose and need to adjust the gag ACL in response to the recent stock assessment while minimizing, to the extent practicable, adverse socio-economic impacts. **Preferred Alternative 3** also meets the objectives of the Snapper Grouper FMP, as amended, while complying with the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and other applicable law.

5.2 Action 2. Modify the recreational bag limit for gag within the aggregate bag limit

Alternatives for Action 2
(preferred alternatives in **bold**)

1 Preferred. No Action. Retain the current aggregate grouper bag limit of 3 fish. Within this limit, only one fish can be a gag or black grouper.

2. Increase the gag bag limit to 2 fish within the 3 fish aggregate grouper bag limit. Only one fish within the aggregate can be a black grouper.

3. Increase the gag bag limit to 3 fish within the 3 fish aggregate grouper bag limit. Only one fish within the aggregate can be a black grouper.

Snapper Grouper AP Comments and Recommendations

The Snapper Grouper AP reviewed Regulatory Amendment 22 at their October 2014 meeting. The AP made the following comments and approved the motion below.

- It does not make sense to increase the gag bag limit. There is some support from recreational divers, but hook and line fishermen are not catching these fish. In Florida, gag are caught in spring and late summer. There is concern that recreational harvest for the gag portion of the snapper grouper fishery could close in the future as a result of an increase in the recreational bag limit.
- Need to have better information on recreational landings before increasing the gag bag limit.

MOTION: RECOMMEND ALTERNATIVE 1 (NO ACTION) AS PREFERRED FOR ACTION 2
Action 2. Modify the recreational bag limit for gag within the aggregate bag limit
APPROVED BY AP

Law Enforcement AP Comments and Recommendations

The LEAP received the draft document for their review and recommendations via email on December 10, 2014. None of the LEAP members had any comments or recommendations on the amendment.

SSC Comments and Recommendations

The SSC reviewed the gag bag limit analysis at their October 2014 meeting. The following statements are from the SSC Report:

Overall, the Committee found the analysis to be sound, the presentation informative, and after discussion accepted the methodology to represent the best scientific information available. The Committee provided the following suggestions for future analyses:

1. *Since changes in angler behavior are not explicitly accounted for in the analysis, the assumption that everyone who met the bag limit in the past will meet the new, increased bag limit might not be realistic. In fact, assuming everyone will meet an increased bag limit is actually a very liberal assumption with regard to catch rates. Therefore, the SSC suggested that future analyses consider other alternatives and provide sensitivity analyses to such assumptions. Assumptions must also be evaluated in more detail, on a species by species basis.*
2. *The SSC requests that SEFSC comments on management analyses, such as bag limit evaluations, be provided in the briefing materials when such analyses are reviewed by the SSC.*
3. *The SSC recommends providing adequate time for SSC review of management evaluations in future amendment planning.*

The SSC supports reviewing management analyses as applied to specific stocks through an ad hoc sub-committee when such analyses must be considered outside of the regular SSC scheduled meetings. This approach can be applied when the general analytical methods has been previously reviewed and endorsed by the Committee, as is the case with bag limit evaluations. The sub-committee will meet via webinar or conference call and report its findings in writing to the SSC for review before they are provided to the Council.

South Atlantic Fishery Management Council's (South Atlantic Council) Choice for Preferred Alternative

The South Atlantic Council did not select a preferred alternative under Action 2 until after public hearings were held in order to have the benefit of public input during their deliberations. At their December 2014 meeting, the South Atlantic Council considered **Alternative 2** as a possible preferred. That alternative would have increased the gag bag limit within the 3 grouper aggregate to 2 fish per person per day. Supporters of that alternative considered a possible increase to the gag bag limit as a neutral action that would not impact the resource (based on the analyses) but would potentially allow recreational fishermen the opportunity to harvest more fish. Other members voiced their support for "giving back" to the recreational fishing community and increasing access to the gag resource by allowing a larger bag limit. They saw this as a situation where the increase in the bag limit would not impact the resource and, in fact, would still "leave fish in the water" since analyses indicated that the recreational ACL would not be met under any of the bag limit options considered.

The South Atlantic Council ultimately selected **Alternative 1 (No Action)** as their preferred. South Atlantic Council members in support of not taking action to modify the gag bag limit were skeptical that increasing the bag limit would have any effect at all since the recreational ACL has not been met in several years and they questioned the rationale of increasing a bag limit that is rarely caught. In addition, the very high level of uncertainty in monitoring recreational landings was cited as a reason to not make any modifications to the gag bag limit. Further, as mentioned in the discussion for the previous action, South Atlantic Council members spoke of their concern for the gag resource and stated their preference to not make any modifications to management measures at this time. During the discussion, South Atlantic Council members briefly talked of possibly modifying the spawning season closure as an option to provide more access to the gag resource and ensure the recreational ACL is being harvested. Action to modify the spawning season closure would be taken in another amendment to the Snapper Grouper FMP in 2015.

The South Atlantic Council concluded that **Preferred Alternative 1 (No Action)** best meets the purpose and need to assess the need to modify the recreational bag limit for gag and ensure that it is set at a level that promotes sustainable harvest of the resource. **Preferred Alternative 1 (No Action)** also 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 Action 3. Revise the annual catch limits (ACL) and optimum yield (OY) for wreckfish

Alternatives for Action 3
(preferred alternatives in **bold**)

1. No Action. Retain the current annual catch limit (ACL) and optimum yield (OY) for wreckfish. The wreckfish ABC=ACL=OY=235,000 pounds whole weight (lbs ww). Commercial and recreational allocations will remain equal to 95% and 5%, respectively. The commercial ACL will continue to be 223,250 lbs ww. The recreational ACL will continue to be 11,750 lbs ww. Currently, there are no annual catch targets (ACTs) for wreckfish.

2. Preferred. ACL = OY = Proposed ABC. The ACL for 2020 would remain in place until modified.

3. ACL = OY = 0.95*Proposed ABC. The ACL for 2020 would remain in place until modified.

4. ACL = OY = 0.90*Proposed ABC. The ACL for 2020 would remain in place until modified.

5. ACL = OY = 0.80*Proposed ABC. The ACL for 2020 would remain in place until modified.

Snapper Grouper AP Comments and Recommendations

The Snapper Grouper AP reviewed Regulatory Amendment 22 at their October 2014 meeting. The AP recommended **Alternative 2** as preferred. The rationale for their recommendation is that there is an individual transferable quota (ITQ) program in place and it is unlikely that the wreckfish ACL would be exceeded. The AP made the following comments and approved the motion below.

- There are currently only 3 fishermen fishing for wreckfish. In the last 3 years the ACL has been landed. Also in the last 3 years, the recreational sector has had no landings. Why have a recreational ACL set that high? It is taking fish away from the public.
- The Comprehensive ACL Amendment set the initial ACL for wreckfish. At the time, the South Atlantic Council was concerned that the recreational sector was targeting wreckfish (deep dropping) and there should be an ACL. However, there are few or no intercepts through Marine Recreational Information Program.

MOTION: RECOMMEND ALTERNATIVE 2 AS PREFERRED FOR ACTION 3
Action 3. Revise the annual catch limits (ACL) and optimum yield (OY) for wreckfish
Alternative 2. ACL = OY = Proposed ABC. The ACL for 2020 would remain in place until modified.
APPROVED BY AP

Law Enforcement AP Comments and Recommendations

The LEAP received the draft document for their review and recommendations via email on December 10, 2014. None of the LEAP members had any comments or recommendations on the amendment.

SSC Comments and Recommendations

The SSC reviewed the wreckfish assessment at their April 2014 meeting. In general, the SSC found it to be an improvement over the Depletion Corrected Average Catch analysis conducted previously but noted that the current assessment is still a relatively data poor assessment. The SSC accepted the wreckfish benchmark assessment as representing the best scientific information available on the current status of wreckfish in South Atlantic waters and considered it appropriate for South Atlantic Council management decisions. Below are some of the specific comments and discussion points, taken directly from the SSC report:

-The question of where recruitment is coming from is critical to this assessment, but there is circumstantial evidence suggesting that the local spawning stock is producing the recruits that are entering the South Atlantic fishery. Juveniles are not commonly seen in the South Atlantic. Mostly are seen in the Eastern Atlantic and some off the northeast US. It is very likely that juveniles in the Eastern Atlantic are undergoing fishing mortality but levels are unknown.

- Another large point of uncertainty is the fact that 33% of the landings were confidential. However, an alternative run was done with a trend from the actual data and the model was insensitive to these changes.

- Members of the Committee expressed concern that the assessment's estimate of MSY was heavily influenced by landings history. Wreckfish CPUE has been extremely consistent through the history of the ITQ despite wide fluctuations in landings and research indicates that the magnitude of landings has been driven almost exclusively by economic rather than biological factors. If fisheries-dependent stock assessment models assume MSY and MEY (maximum economic yield) are equivalent, then resulting estimates may significantly underestimate MSY, particularly for transient stocks.

South Atlantic Council's Choice for Preferred Alternative

The South Atlantic Council initiated development of Regulatory Amendment 22 at their June 2014 meeting in response to the completion of stock assessments for gag and wreckfish. The South Atlantic Council selected **Alternative 2** (ACL = OY = Proposed ABC. The ACL for 2020 would remain in place until modified.) as their preferred for Action 3 when the amendment was approved for public hearings in September 2014. The South Atlantic Council has frequently chosen to set the ACL at the same level as ABC for other snapper grouper stocks. In the case of wreckfish, South Atlantic Council members expressed no concerns over the status of the stock provided by the stock assessment and SSC recommendations. Further, the commercial wreckfish portion of the snapper grouper fishery is managed under an individual transferable quota program and there are currently very few fishermen who target the species. Thus, it is unlikely that the total ACL would be exceeded.

The South Atlantic Council concluded that **Preferred Alternative 2** best meets the purpose and need to adjust the wreckfish ACL in response to the recent stock assessment while minimizing, to the extent practicable, adverse socio-economic impacts. **Preferred Alternative 2** also meets the objectives of the Snapper Grouper FMP, as amended, while complying with the requirements of the Magnuson-Stevens Act and other applicable law.

Chapter 6. Cumulative Effects

6.1 Affected Area

The immediate impact area would be the federal 200-nautical 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 (South Atlantic Council) area of jurisdiction. In light of the available information, the extent of the boundaries would depend upon the degree of fish immigration/emigration and larval transport, whichever has the greatest geographical range. Therefore, the proper geographical boundary to consider effects on the biophysical environment is larger than the entire South Atlantic exclusive economic zone (EEZ). The range of the affected species is described in **Section 3.2**. The most measurable and substantial effects would be limited to the South Atlantic region.

6.2 Past, Present, and Reasonably Foreseeable Actions Impacting the Affected Area

For this action, the cumulative effects analysis (CEA) includes an analysis of actions and events dating back to 1983 when the original snapper grouper fishery management plan (FMP) was implemented, and through what is expected to take place approximately before or within 2015-2016.

Past Actions

Snapper grouper regulations in the South Atlantic were first implemented in 1983. See **Appendix D** of this document for a detailed history of management for the snapper grouper fishery, and for specific actions relating to gag and wreckfish.

Present Actions

In addition to snapper grouper fishery management issues being addressed in this amendment, other snapper grouper amendments have been developed concurrently and are in the process of approval and implementation.

At their December 2013 meeting, the South Atlantic Council began development of Regulatory Amendment 21 to the Snapper Grouper FMP (SAFMC 2014a), which would consider redefining the minimum stock size threshold for species, including gag, with small natural mortality rates. The South Atlantic Council approved Regulatory Amendment 21 at their March 2014 meeting. The proposed rule published on August 1, 2014, and the comment period ended on September 3, 2014. The final rule for Regulatory Amendment 21 published in the *Federal Register* on October 7, 2014 (79 FR 60379), with an effective date of November 6, 2014.

The South Atlantic Council requested development of Regulatory Amendment 14 to the Snapper Grouper FMP (SAFMC 2013b) at their September 2013 meeting. Actions included in Regulatory Amendment 14 are: changes in the fishing years for greater amberjack and black sea bass; changes in

AMs for vermilion snapper and black sea bass; and modification of the gag trip limit. The South Atlantic Council approved Regulatory Amendment 14 at their September 2013 meeting. The proposed rule was published in the *Federal Register* on April 25, 2014, with a comment period ending May 27, 2014 (79 FR 22936). The final rule published on November 7, 2014, with an effective date on December 8, 2014.

Regulatory Amendment 20 to the Snapper Grouper FMP (SAFMC 2014b) considers management measures for snowy grouper based on a recent assessment, which indicates overfishing of the stock has been ended and the stock is rebuilding. Additionally, in part, considers modifications to the snowy grouper bag limit within the recreational aggregate grouper and tilefish bag limit. The South Atlantic Council initiated development of the amendment at their March 2014 meeting, and reviewed a draft in June 2014. Public hearings took place in August 2014, the amendment was approved for formal review at the September 2014 South Atlantic Council meeting.

At their September 2012 meeting, the South Atlantic Council requested development of Regulatory Amendment 17 to the Snapper Grouper FMP to consider MPAs to provide additional protection for speckled hind and warsaw grouper. This action was previously considered in Comprehensive Ecosystem-Based Amendment 3. The South Atlantic Council discussed the regulatory amendment in September 2013. At the December 2013 meeting, Council requested the Snapper Grouper Advisory Panel review Regulatory Amendment 17 and bring any recommendations to the South Atlantic Council in June 2014**.** At their June 2014 meeting, the South Atlantic Council retired Regulatory Amendment 17 and decided to use Amendment 36 to establish Spawning Special Management Zones (SMZ) to enhance protection for snapper grouper species including warsaw grouper and speckled hind. The amendment was reviewed by the South Atlantic Council at their December 2014 meeting. Public hearings are planned for April/May and August 2015.

Additionally, in December 2012, the National Marine Fisheries Service (NMFS) issued a proposal to list 82 coral species as threatened or endangered, including five species found in the South Atlantic region, with a proposal to reclassify two *Acropora* species (elkhorn and staghorn coral) as endangered. Further, on September 10, 2014, NMFS listed 20 new coral species under the ESA, five of those species occur in the Caribbean (including Florida) and all of these are listed as threatened. The two previously listed *Acropora* coral species remain protected as threatened. In addition, on July 10, 2014, NMFS published a final rule designating critical habitat for the Northwest Atlantic Ocean Loggerhead Sea Turtle distinct population segments in the *Federal Register* (79 FR 39856). The final rule, effective August 11, 2014, designates 38 marine areas within the Atlantic Ocean and Gulf of Mexico which contain the physical or biological features essential for the conservation of the loggerhead sea turtle

The South Atlantic Council has recently completed or is developing amendments for coastal migratory pelagic species, spiny lobster, golden crab, dolphin-wahoo, shrimp, and octocorals. See the South Atlantic Council's Web site at http://www.safmc.net/ for further information on South Atlantic Council-managed species.

Reasonably Foreseeable Future Actions

The Joint Commercial Logbook Reporting Amendment would require electronic reporting of landings information by federally-permitted commercial vessels, which would increase the timeliness and accuracy of landings data.

The Joint Charter Boat Reporting Amendment would require charter vessels to regularly report their landings information electronically each week. Including charter boats in the recreational harvest reporting system would further improve the agency's ability to monitor recreational catch rates in-season.

At their June 2012 meeting, the South Atlantic Council further discussed Amendment 22 to the Snapper Grouper FMP to consider measures such as a tag program to allow harvest of red snapper as the stock rebuilds. Scoping of Amendment 22 was conducted during January and February 2011. At their September 2012 meeting, the South Atlantic Council stated their intent to further develop Amendment 22 in 2013 focusing on a recreational tag program for red snapper, golden tilefish, snowy grouper and wreckfish. In June 2013, the South Atlantic Council changed the focus of Amendment 22 to a recreational tag program to monitor harvest of species with small ACLs. The South Atlantic Council will determine whether to proceed with development of this amendment at their March 2015 meeting.

The South Atlantic Council initiated development of the Comprehensive Accountability Measures (AM) and Dolphin Allocation Amendment at their September 2013 meeting. In December 2013, the South Atlantic Council changed the range of actions to only include AMs for snapper grouper species and golden crab, and sector allocations for dolphin. The South Atlantic Council reviewed drafts of the amendment at the December 2013, March 2014, and June 2014 meetings. Public hearings took place in August 2014, and the South Atlantic Council took final action to approve the amendment for formal review in December 2014.

Amendment 26 (included in the Comprehensive Ecosystem-Based Amendment 3) is currently being developed and may propose changes to the bycatch data collection programs in all the fisheries in the South Atlantic.

Expected Impacts from Past, Present, and Future Actions

Regulatory Amendment 22 alone would not result in significant cumulative impacts on the human environment. When combined with the impacts of past, present, and future actions affecting the snapper grouper fishery, specifically gag and wreckfish, minor cumulative impacts are likely to accrue, such as a longer fishing season, increased management control for designated fishing zones, and socioecomic benefits associated with improved management strategies. The South Atlantic Council amendments intended to increase the frequency of reporting by dealers and fishermen are likely to benefit the human environment through more timely biological protections and unnecessary delay in data availability, leading to more stable market conditions. Actions in Regulatory Amendment 22 that address the gag and wreckfish segment of the snapper grouper fishery, together or separately, are not expected to result in significant cumulative adverse biological or socioeconomic effects. All of the proposed, or recently implemented management actions affecting gag and wreckfish within the snapper grouper fishery are intended to improve management of the snapper grouper resource, while minimizing, to the maximum extent practicable adverse social and economic impacts.

6.3 Consideration of Climate Change and Other Non-Fishery Related Issues

Climate Change

The Environmental Protection Agency's climate change webpage (http://www.epa.gov/climatechange/) provides basic background information on measured or anticipated effects from global climate change. A compilation of scientific information on climate change can be found in the United Nations Intergovernmental Panel on Climate Change's Fifth Assessment Report (IPCC 2013). Those findings are incorporated here by reference and are summarized. Global climate change can affect marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, sea level rise, and through 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 carbon dioxide emissions may affect a wide range of organisms and ecosystems. These influences could negatively affect biological factors such as productivity, species distributions and range, recruitment, larval and juvenile survival, migration, community structure, timing of biological events, prey availability, and susceptibility to predators (Osgood 2008).

In the southeast, general impacts of climate change have been predicted through modeling, with few studies on specific effects to species. Warming sea temperature trends in the southeast have been documented, and animals must migrate to cooler waters, if possible, if water temperatures exceed survivable ranges (Needham et al. 2012). Higher water temperatures may also allow invasive species to establish communities in areas they may not have been able to survive previously. An area of low oxygen, known as the dead zone, forms in the northern Gulf of Mexico (Gulf) each summer, which has been increasing in recent years. Climate change may contribute to this increase by increasing rainfall that in turn increases nutrient input from rivers. This increased nutrient load causes algal blooms that, when decomposing, reduce oxygen in the water (Kennedy et al. 2002, Needham et al. 2012). Other potential impacts of climate change to the southeast include increases in hurricanes, decreases in salinity, altered circulation patterns, coral bleaching and sea level rise (Osgood 2008). The combination of warmer water and expansion of salt marshes inland with sea-level rise may increase productivity of estuarine-dependent species in the short term. However, in the long term, this increased productivity may be temporary because of loss of fishery habitats due to wetland loss (Kennedy et al. 2002). Actions from this amendment are not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing.

Weather Variables

Hurricane season is from June 1 to November 30, and accounts for 97% of all tropical activity affecting the Atlantic basin. These storms, although unpredictable in their annual occurrence, can devastate areas when they occur. Although these effects may be temporary, those fishing-related businesses whose profitability is marginal may go out of business if a hurricane strikes.

Deepwater-Horizon Oil Spill

On April 20, 2010, an explosion occurred on the Deepwater Horizon MC252 oil rig, resulting in the release of an estimated 4.9 million barrels of oil into the Gulf. In addition, 1.84 million

gallons of Corexit 9500A dispersant were applied as part of the effort to constrain the spill. The cumulative effects from the oil spill and response may not be known for several years.

The oil spill affected more than one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The impacts of the Deepwater Horizon MC252 oil spill on the physical environment are expected to be significant and may be long-term. Oil is dispersed on the surface, and because of the heavy use of dispersants, oil is also documented as being suspended within the water column, some even deeper than the location of the broken well head. Floating and suspended oil washed onto shore in several areas of the Gulf, as well as non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are more persistent in the environment and can be transported hundreds of miles. Oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant also consume oxygen; this could lead to further oxygen depletion. Zooplankton that feed on algae could also be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow.

The highest concern is that the oil spill may have impacted spawning success of species that spawn in the summer months, either by reducing spawning activity or by reducing survival of the eggs and larvae. Effects on the physical environment, such as low oxygen, could lead to impacts on the ability of larvae and post-larvae to survive, even if they never encounter oil. In addition, effects of oil exposure may create sub-lethal effects on the eggs, larva, and early life stages. The stressors could potentially be additive, and each stressor may increase the susceptibility to the harmful effects of the other.

The oil from the spill site was not detected in the South Atlantic region, and does not likely pose a threat to the South Atlantic species addressed in this amendment. However, the effects of the oil spill on snapper grouper species would be taken into consideration in future Southeast Data Assessment and Review assessments. Indirect and inter-related effects on the biological and ecological environment of the snapper grouper fishery in concert with the Deepwater Horizon MC252 oil spill are not well understood. Changes in the population size structure could result from shifting fishing effort to specific geographic segments of populations, combined with any anthropogenically induced natural mortality that may occur from the impacts of the oil spill. The impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators may be significant in the future.

6.4 Overall Impacts Expected from Past, Present, and Future Actions

The proposed management actions are summarized in **Chapter 2** of this document. Detailed discussions of the magnitude and significance of the impacts of the preferred alternatives on the human environment appear in **Chapter 4** of this document. None of the impacts of the action in this regulatory amendment, in combination with past, present, and future actions have been determined to be significant. The additive effects, beneficial and adverse, on the species and the fishery are not expected to result in a significant level of cumulative impacts.

The proposed actions would not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places as these are not in the South Atlantic EEZ. This action is not likely to result in direct, indirect, or cumulative effects to unique areas, such as significant scientific, cultural, or historical resources, park land, prime farmlands, wetlands, wild and

scenic rivers, or ecologically critical areas as the proposed action is not expected to substantially increase fishing effort or the spatial and/or temporal distribution of current fishing effort within the South Atlantic region. 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 these national marine sanctuaries because the actions are not expected to result in appreciable changes to current fishing practices.

6.5 Monitoring and Mitigation

The effects of the proposed actions are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. The proposed actions relate to the harvest of two indigenous species in the Atlantic, and the activity being altered does not itself introduce non-indigenous species, and is not reasonably expected to facilitate the spread of such species through depressing the populations of native species. Additionally, it does not propose any activity, such as increased ballast water discharge from foreign vessels, which is associated with the introduction or spread on non-indigenous species.

None of the beneficial or adverse impacts from the proposed management action (as summarized in **Chapter 2** of this document) have been determined to be significant. See **Chapter 4** for the detailed discussions of the magnitude of the impacts of the preferred alternatives on the human environment. The action in Regulatory Amendment 22 would not have significant biological, social, or economic effects because even though the action could extend fishing opportunities, AMs are also considered, and are in place to ensure overfishing does not occur. Therefore, the cumulative effects of the action proposed in Regulatory Amendment 22 are not expected to affect the magnitude bycatch, diversity and ecosystem structure of fish communities, or safety at sea of fishermen targeting snapper grouper species, and other species managed by South Atlantic Council. Based on the cumulative effects analysis presented herein, the proposed action would not have any significant adverse cumulative impacts compared to, or combined with, other past, present, and foreseeable future actions.

Chapter 7. List of Preparers

Table 7.1.1. List of preparers of the document.

Name	Organization	Title
Myra Brouwer	SAFMC	IPT Lead/Fishery Scientist
Mary Janine Vara	NMFS/SF	IPT Lead/Fishery Biologist
Brian Cheuvront	SAFMC	Economist
Kari MacLauchlin	SAFMC	Social Scientist
Jack McGovern	NMFS/SF	Fishery Biologist
Jessica Stephen	NMFS/SF	Data Analyst
Stephen Holiman	NMFS/SF	Economist
Monica Smit-Brunello	NOAA/GC	Attorney

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, SEFSC=Southeast Fisheries Science Center

Table 7.1.2. List of interdisciplinary plan team members for the document.

Name	Organization	Title
Myra Brouwer	SAFMC	IPT Lead/Fishery Scientist
Mary Janine Vara	NMFS/SF	IPT Lead/Fishery Biologist
Gregg Waugh	SAFMC	Deputy Executive Director
Brian Cheuvront	SAFMC	Economist
Mike Errigo	SAFMC	Fishery Biologist
Kari MacLauchlin	SAFMC	Social Scientist
Roger Pugliese	SAFMC	Fishery Biologist
Chip Collier	SAFMC	Fishery Biologist
Larry Perruso	NMFS/SEFSC	Economist
Jack McGovern	NMFS/SF	Fishery Biologist
Jessica Stephen	NMFS/SF	Data Analyst
Anik Clemens	NMFS/SF	Technical Writer Editor
Stephen Holiman	NMFS/SF	Economist
Jennifer Lee	NMFS/PR	Fishery Biologist
Monica Smit-Brunello	NOAA/GC	Attorney
David Keys	NMFS/SF	Regional NEPA Coordinator

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, EFH = Essential Fish Habitat, GC = General Counsel, Eco=Economics, NEPA = National Environmental Policy Act, SEFSC=Southeast Fisheries Science Center, OLE = Office of Law Enforcement

Chapter 8. Agencies and Persons Consulted

Responsible Agency
NMFS, Southeast Region
263 13th Avenue South
St. Petersburg, Florida 33701
(727) 824-5301 (TEL)
(727) 824-5320 (FAX)

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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