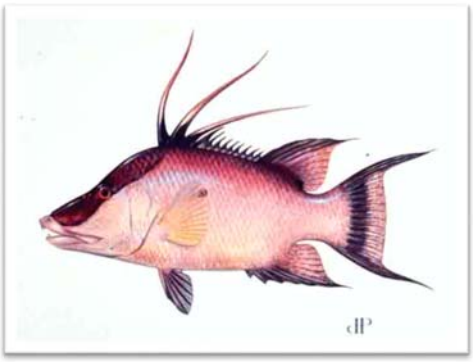
Amendment 37 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region



Modification to the hogfish fishery management unit, fishing level specifications for the two South Atlantic hogfish stocks, rebuilding plan for the Florida Keys/East Florida stock, and establishment/revision of management measures for both stocks

November 26, 2015

Environmental Impact Statement Regulatory Impact Review Regulatory Flexibility Analysis Fishery Impact Statement

A publication of the South Atlantic Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number FNA10NMF4410012

Abbreviations and Acronyms Used in the FMP

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

Amendment 37 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region

Proposed action:	The purpose for the action is to: modify the management unit for hogfish, specify fishing levels for the Georgia-North Carolina (GA-NC) and Florida Keys/East Florida (FLK/EFL) stocks of hogfish, and modify or establish management measures. For the FLK/EFL stock of hogfish, establish a rebuilding plan to increase hogfish biomass to sustainable levels.
Lead agency:	FMP Actions – South Atlantic Fishery Management Council Environmental Assessment – National Marine Fisheries Service (NMFS) Southeast Regional Office
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Background

The Florida Fish and Wildlife Conservation Commission completed a stock assessment for hogfish in 2014 (SEDAR 37 2014). The South Atlantic Council's SSC reviewed the assessment and provided fishing level recommendations in October 2014. The Council received the SSC's recommendations at their December 2014 meeting. Based on genetic evidence the SSC supported treating hogfish in the South Atlantic as two stocks: Georgia-North Carolina (GA-NC) and Florida Keys/East Florida (FLK/EFL). Each assessment was then evaluated with regard to fishing level recommendations. The SSC developed catch level recommendations for the GA-NC stock using the Only Reliable Catch Stocks (ORCS) approach, as outlined in Level 4 of the Council's ABC control rule. For the FLK/EFL stock, the SSC considered the benchmark assessment to represent the best available science and recommended it for use in management. The Southeast Fisheries Science Center (SEFSC) concurred with this determination. The assessment results indicated the FLK/EFL stock is undergoing overfishing and is overfished and, therefore, in need of a rebuilding plan.

Amendment 37 would address specifying the boundary between the FLK/EFL stock managed by the South Atlantic Council, and the Gulf of Mexico stock, managed by the Gulf Council. This demarcation needs to take place to aid in enforcing regulations and for proper tracking of the ACLs for each stock. Amendment 37 also includes actions to specify Acceptable Biological Catch (ABC), Annual Catch Limits (ACLs), and Optimum Yield (OY) for both stocks, establish a rebuilding plan for the FLK/EFL stock, and implement or modify management measures for both stocks to attain the desired level of harvest.

Purpose for Actions

The *purpose* of this amendment is to modify the management unit for hogfish, specify fishing levels based on Scientific and Statistical Committee recommendations for the Georgia-North Carolina and Florida Keys/East Florida stocks of hogfish, and modify or establish management measures. For the Florida Keys/East Florida stock of hogfish, establish a rebuilding plan to increase hogfish biomass to sustainable levels within a specified time period based on results of the recent stock assessment conducted with data through 2012.

Need for Actions

The *need* for this amendment is to align the management boundaries for hogfish with the best available science (i.e., genetic information), and end overfishing and rebuild the Florida Keys/East Florida stock of hogfish while minimizing, to the extent practicable, adverse social and economic effects.

Action 1.

Alternative 1. No Action.

Alternative 2.

Summary of Effects

Biological Effects

Economic Effects

Social Effects

Action 2.

Alternative 1 (No Action).

Alternative 2.

Summary of Effects

Biological Effects

Economic Effects

Social Effects

Chapter 1. Introduction

1.1 What Actions Are Being Proposed in this Amendment?

Amendment 37 includes 11 actions to address:

- Modification of the hogfish fishery management unit
- Specification of ABC, ACL, and OY for the GA-NC stock
- Management and Accountability Measures for the GA-NC stock
- Specification of fishing levels and rebuilding plan for the FLK/EFL stock
- Management and Accountability Measures for the FLK/EFL stock

South Atlantic Fishery Management Council

- Responsible for conservation and management of fish stocks in the South Atlantic Region
- Consists of 13 voting members who are appointed by the Secretary of Commerce, 1 representative from each of the 4 South Atlantic states, the Southeast Regional Director of NMFS, and 4 non-voting members
- Responsible for developing fishery management plans and amendments under the Magnuson-Stevens Act; recommends actions to NMFS for implementation
- Management area is from 3 to 200 nautical miles off the coasts of North Carolina, South Carolina, Georgia, and east Florida through Key West. For CMP species, the South Atlantic Council manages through the Mid-Atlantic Region

1.2 Who is Proposing the Amendment?

The South Atlantic Council develops the amendment and submits it to the National Marine Fisheries Service (NMFS) who, on behalf of the Secretary of Commerce, ultimately approves, disapproves, or partially approves, and implements the actions in the amendment through the development of regulations. NMFS is a line office of the National Oceanic and Atmospheric Administration. The South Atlantic Council and NMFS are also responsible for making this document available for public comment. The draft environmental impact statement (EIS) will be made available to the public during the scoping process, public hearings, and in South Atlantic Council meeting briefing books. The final EIS/amendment will be published for public comment during the notice of availability and proposed rule stages of the rulemaking process. The public hearing draft and final EIS/amendment may be found online at: (insert link when available)

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 Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP, SAFMC 1983) (**Figure 1.3.1**). Hogfish is one of fifty-nine species managed by the Council under the Snapper Grouper FMP.

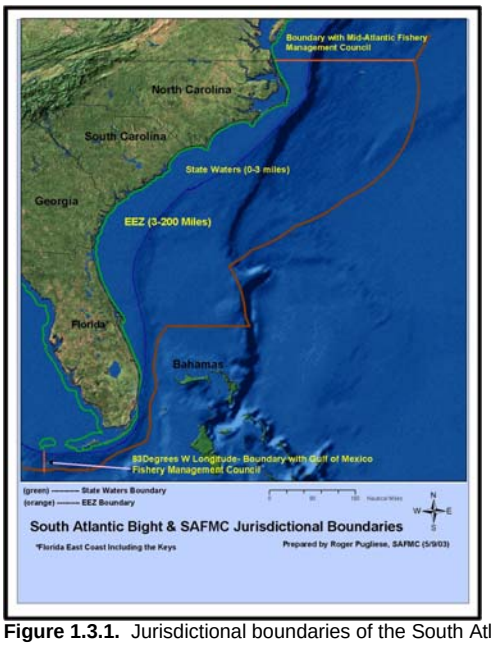


Figure 1.3.1. Jurisdictional boundaries of the South Atlantic Fishery Management Council.

1.4 Why are the Council and NMFS Considering Action?

The Florida Fish and Wildlife Conservation Commission completed a stock assessment for hogfish in 2014 (SEDAR 37 2014). The South Atlantic Council's SSC reviewed the assessment and provided fishing level recommendations in October 2014. The Council received the SSC's recommendations at their December 2014 meeting. Based on genetic evidence the SSC supported treating hogfish in the South Atlantic as two stocks: Georgia-North Carolina (GA-NC) and Florida Keys/East Florida (FLK/EFL). Each assessment was then evaluated with regard to fishing level recommendations. The SSC developed catch level recommendations for the GA-NC stock using the Only Reliable Catch Stocks (ORCS) approach, as outlined in Level 4 of the Council's ABC control rule. For the FLK/EFL stock, the SSC considered the benchmark assessment to represent the best available science and recommended it for use in management. The Southeast Fisheries Science Center (SEFSC) concurred with this determination. The assessment results indicated the FLK/EFL stock is undergoing overfishing and is overfished and, therefore, in need of a rebuilding plan.

Amendment 37 would address specifying the boundary between the FLK/EFL stock, managed by the South Atlantic Council, and the Gulf of Mexico stock, managed by the Gulf Council. This demarcation needs to take place to aid in enforcing regulations and for proper tracking of the ACLs for each stock. Amendment 37 also includes actions to specify Acceptable Biological Catch (ABC), Annual Catch Limits (ACLs), and Optimum Yield (OY) for both stocks, establish a rebuilding plan for the FLK/EFL stock, and implement or modify management measures for both stocks to attain the desired level of harvest.

Purpose for Actions

The *purpose* of this amendment is to modify the management unit for hogfish, specify fishing levels based on the South Atlantic Fishery Management Council's Scientific and Statistical Committee recommendations for the Georgia-North Carolina and Florida Keys/East Florida stocks of hogfish, and modify or establish management measures. For the Florida Keys/East Florida stock of hogfish, this amendment would establish a rebuilding plan to increase hogfish biomass to sustainable levels within a specified time period based on results of the recent stock assessment conducted with data through 2012.

Need for Actions

The *need* for this amendment is to align the management boundaries for hogfish with the best available science (i.e., genetic information), and end overfishing and rebuild the Florida Keys/East Florida stock of hogfish while minimizing, to the extent practicable, adverse social and economic effects.

1.5 What are Annual Catch Limits (ACLs) and Accountability Measures (AMs) and Why are they Required?

A reauthorization of the Magnuson-Stevens Act in 2007 required implementation of new tools to end and prevent overfishing to achieve the optimum yield from a fishery. The tools are ACLs and AMs. An ACL is the level of annual catch of a stock that, if met or exceeded, triggers some corrective action. The AMs are the corrective action, and they are management controls to prevent ACLs from being exceeded and to correct overages of ACLs if they occur. Two examples of AMs include an in-season closure if catch is projected to reach the ACL and reducing the ACL by an overage that occurred the previous fishing year. Amendment 37 includes alternatives that would revise the current ACLs and AMs for hogfish

Definitions

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

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

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

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

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

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

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

1.6 How Does the Council Determine the Annual Catch Limits?

ACLs are derived from the overfishing limit (OFL) and the ABC **(Figure 1.6.1)**. The Council's Scientific and Statistical Committee (SSC) determines the OFL from the stock assessment and the ABC (based on the Council/SSC's ABC control rule), and recommends those to the Council. The OFL is an estimate of the catch level above which overfishing is occurring. The ABC is defined as the level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty.

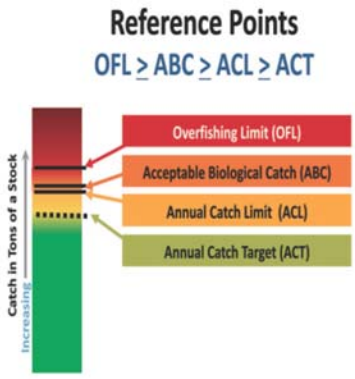


Figure 1.6.1. The relationship of the reference points to each other.

1.7 How is the Council Modifying the Overfishing Definition for Hogfish and Other Snapper Grouper Species?

The Magnuson-Stevens Act 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:

50 C.F.R § 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:

50 C.F.R. § 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.

MFMT Method - Overfishing occurring if fishing mortality exceeds the MFMT

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

The "current" fishing mortality rate for an assessed stock corresponds to the last year of data used in the assessment. Therefore, use of the "current fishing mortality" rate may not reflect the true status of the stock in years following a stock assessment, particularly if actions are taken to constrain effort and harvest.

OFL Method - Overfishing occurring if annual landings exceed the OFL

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

Overfishing Definition for the FLK/EFL stock of hogfish and other assessed snapper grouper stocks in the South Atlantic region

Each of the two methods for determining overfishing has benefits and drawbacks with MFMT being a better estimate of overfishing status in a year in which a stock is assessed and OFL a better estimate of overfishing status in years when a current estimate of fishing mortality is not available. Therefore, the Council proposes the use of both the MFMT and OFL as metrics to determine the overfishing status of the FLK/EFL stock of hogfish and (insert list of SG species for which this definition should apply).

For the FLK/EFL stock of hogfish and (insert list of SG species for which this definition should apply), overfishing will be determined on an annual basis by the MFMT and OFL methods. The estimate of F_{MSY} (MFMT) for an assessed stock is a single value, while the corresponding OFL values increase as the stock rebuilds. If either the MFMT (during an assessment year) or the OFL method (during a non-assessment year) is exceeded, the stock will be considered to be undergoing overfishing. Two examples are below:

(NOTE TO IPT: examples below are for bueline tilefish. Do we need specific ones for hogfish?)
Example 1. As a stock assessment was not conducted in 2014, the Council does not receive an updated estimate of fishing mortality that can be compared to F_{MSY} (MFMT). The OFL for 2015 is 54,612 lbs ww and provides the basis for the overfishing definition. Total landings in 2015 are 32,000 lbs ww and below the OFL (54,612 lbs ww). Overfishing in 2015 is not occurring.

Example 2. A SEDAR assessment is completed in 2015 and provides an updated estimate of fishing mortality that can be compared to the MFMT. The assessment changes the F_{MSY} (MFMT) value to 0.205. The current estimate of the fishing mortality, termed $F_{CURRENT}$, is 0.302. Landings in 2015 are 32,000 lbs ww, below OFL. However, even though landings are below OFL, $F_{CURRENT}$ is greater than MFMT. Overfishing in 2015 is occurring.

Chapter 2. Proposed Actions and Alternatives

2.1 Action 1. Modify the Fishery Management Unit for hogfish

Alternative 1 (No action). Do not establish separate stocks of hogfish in the South Atlantic. There is a Gulf of Mexico stock and South Atlantic stock of hogfish separated at the jurisdictional boundary between the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council:
The boundary coincides with the line of demarcation between the Atlantic Ocean and the Gulf of Mexico, which begins at the intersection of the outer boundary of the EEZ, as specified in the Magnuson-Stevens Act, and 83°00′ W. long., proceeds northward along that meridian to 24°35′ N. lat., (near the Dry Tortugas Islands), thence eastward along that parallel, through Rebecca Shoal and the Quicksand Shoal, to the Marquesas Keys, and then through the Florida Keys to the mainland at the eastern end of Florida Bay, the line so running that the narrow waters within the Dry Tortugas Islands, the Marquesas Keys and the Florida Keys, and between the Florida Keys and the mainland, are within the Gulf of Mexico.

Preferred Alternative 2. Modify the snapper grouper fishery management unit (FMU) to specify two separate stocks of hogfish: (1) a Georgia through North Carolina (GA-NC) stock from the Georgia/Florida state boundary to the North Carolina/Virginia state boundary, and (2) a Florida Keys/East Florida (FLK/EFL) stock from the Florida/Georgia state boundary south to:

Sub-alternative 2a. The South Atlantic/Gulf of Mexico Council boundary.
Sub-alternative 2b. The Monroe/Collier County line.
Preferred Sub-alternative 2c. A line just south of Cape Sable running due west (25^0 09'.000 North Latitude).

(insert new figure)

Figure 2.1.1. Proposed **Sub-alternative 2c** boundary: a line due west from a point just south of Cape Sable on Florida's west coast (25º09'.000 N lat.).

Comparison of Alternatives

Alternative 1 (No Action) would make no changes to specify separate stocks of hogfish within the snapper grouper fishery management unit (FMU) and would, therefore, fail to recognize the latest scientific information on those stocks. **Alternative 2** would specify the boundaries for the GA-NC stock of hogfish and the sub-alternatives would define the boundary between the FLK/EFL stock of hogfish managed by the South Atlantic Fishery Management Council (South Atlantic Council), and the Gulf of Mexico stock managed by the Gulf of Mexico

Fishery Management Council (Gulf Council). **Sub-alternative 2a** would use the jurisdictional boundary between the South Atlantic and Gulf Councils but would not fit the biological demarcation of the two stocks so that a portion of the FLK/EFL stock would remain within the Gulf Council's jurisdiction. **Sub-alternative 2b** uses the Monroe/Collier County line to differentiate the two stocks. This boundary would result in a better fit to the areas in which the two stocks are contained, but there could be negative law enforcement issues associated with different regulations for hogfish in the two areas. The Monroe/Collier County line was used in the SEDAR 37 (2014) assessment to differentiate between the FLK/EFL stock of hogfish and that in the West Florida shelf. **Preferred Sub-alternative 2c** considers a point just south of Cape Sable as a starting point for the boundary line to differentiate the two stocks. According to local law enforcement officials, this would be a good demarcation point because "it is far enough north of the Keys and far enough South of Naples and Marco Island so that Monroe is not simply shifting the regulatory problem north to Collier County."

Commercial landings for annual catch limit (ACL) monitoring by the Southeast Fisheries Science Center (SEFSC) and the National Marine Fisheries Service (NMFS) Southeast Regional Office are assigned to region based on captain-reported catch area. Headboat landings for ACL monitoring are assigned to an area fished; for vessels in Monroe County, landings are assigned to a region based on port. Marine Recreational Information Program (MRIP) hogfish landings for recreational ACL monitoring are based on reported catch area, with Monroe County landings re-assigned ('post-stratified') from the Gulf of Mexico to the South Atlantic, consistent with decisions made in SEDAR 37 (2014). Minor changes to regional boundaries such as those being considered in **Action 1** may facilitate enforcement of management regulations but would not impact approaches to ACL monitoring. Thus, ACL monitoring for hogfish would remain consistent with past approaches with regard to the assignment of landings to region in Monroe County; these approaches are consistent with those used in SEDAR 37 (2014).

2.2 Action 2. Specify Maximum Sustainable Yield (MSY) for the GA-NC and the Florida Keys/ East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not define MSY for the GA-NC or the FLK/EFL stocks of hogfish. Currently, MSY equals the yield produced by F_{MSY}. $F_{30\%SPR}$ is used as the F_{MSY} proxy for hogfish in the South Atlantic.

Preferred Alternative 2. MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy ($F_{30\%SPR}$). MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.

Preferred Sub-alternative 2a. GA-NC stock of hogfish.

Preferred Sub-alternative 2b. FLK/EFL stock of hogfish.

Alternatives	Equation	F_{MSY}	MSY Values (lbs whole weight)
Alternative 1 (No Action)	MSY is not defined for the GA-NC stock or the FLK/EFL stock	unknown	unknown
Alternative 2 (Preferred)	**MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy. MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.**	**Sub-alt 2a: GA-NC = unknown Sub-alt 2b: FLK/EFL = 0.138**	**GA-NC = unknown FLK/EFL = 346,095**

Comparison of Alternatives

Maximum Sustainable Yield (MSY) is the largest long-term average catch that can be taken from a stock or stock complex under prevailing ecological and environmental conditions. MSY for snapper grouper species was initially specified in Amendment 11 (SAFMC 1998) to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP). For hogfish, Amendment 11 defined MSY as the yield produced when fishing at a rate that will produce MSY where $F_{30\%SPR}$ is used as the F_{MSY} proxy. At that time, MSY was unknown for hogfish due to a lack of data. When a stock assessment is conducted; however, the model produces estimates of MSY. In the case of hogfish, a stock assessment could only be conducted for the FLK/EFL stock; hence, an estimate of MSY is available for the FLK/EFL stock but not the GA-NC stock. The South Atlantic Council needs to take action to adopt the new definition and value for MSY. Selecting a definition for MSY would allow for any subsequent revisions to that value when the stock assessment is updated or a new assessment is performed without the Council having to take action. **Preferred Alternative 2** would provide

the South Atlantic Council with that option. SEDAR 37 (2014) produced estimates for F_{MSY} and the yield at F_{MSY} for the FLK/EFL stock. Those values are 0.138 and 346,095 lbs ww, respectively, and correspond to **Preferred Sub-alternative 2b (Table 2.2.1)**.

Table 2.2.1. Hogfish recommendations for the Florida Keys/East Florida stock of hogfish. Note: values are in metric tons.

Criteria	Deterministic	Probabilistic
Overfished evaluation	Yes, F/Fmsy= 1.593	1.440
Overfishing evaluation	Yes, SSB/MSST= 0.466	0.494
MFMT (Fmsy)	0.138	0.140
SSBmsy (male & female mature biomass, units not reported)	1,043.44	1,033.725
MSST (male & female mature biomass, units not reported)	856.664	848.688
MSY (1000 lb)	156.986	156.973
Y at 75% Fmsy (1000 lb)	Not reported	Not reported
ABC Control Rule Adjustment	22.5%	
P-Star (Prebuild)	27.5% (72.5%)	
OFL (1000 lb)		
ABC RECOMMENDATIONS: Projection results at the recommended P* were not available when this report was finalized. The projection report will be included as an appendix to this report.		

Source: SSC report, October 2014.

For the GA-NC stock of hogfish, the MSY value is still unknown (**Preferred Sub-alternative 2a**) because a stock assessment could not be performed. However, should data become available to conduct an assessment on that stock, **Preferred Alternative 2** would allow the South Atlantic Council to adopt the new MSY value without having to prepare an additional amendment to do so.

2.3 Action 3. Specify Minimum Stock Size Threshold (MSST) for the GA-NC and the Florida Keys/ East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not define minimum stock size threshold (MSST) for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish. MSST for hogfish in the South Atlantic is equal to SSB_{MSY} ((1-M) or 0.5, whichever is greater).

Alternative 2. Minimum Stock Size Threshold **(**MSST) = SSB_{MSY} ((1-M) or 0.5, whichever is greater).

Sub-alternative 2a. For the GA-NC stock of hogfish.

Sub-alternative 2b. For the FLK/EFL stock of hogfish.

Alternative 3. Minimum Stock Size Threshold (MSST) = 50% of SSB_{MSY}

Sub-alternative 3a. For the GA-NC stock of hogfish.

Sub-alternative 3b. For the FLK/EFL stock of hogfish.

Preferred Alternative 4. Minimum Stock Size Threshold (MSST) = 75% of SSB_{MSY}

Preferred Sub-alternative 4a. For the GA-NC stock of hogfish.

Preferred Sub-alternative 4b. For the FLK/EFL stock of hogfish.

Alternatives	MSST Equation	M	MSST Values (lbs whole weight)
1 (No Action)	MSST = SSB_{MSY} ((1-M) or 0.5, whichever is greater).	0.25	unknown
2	MSST = SSB_{MSY} ((1-M) or 0.5, whichever is greater).	0.179	GA-NC = unknown FLK/EFL = 1,888,621
3	MSST = 50% of SSB_{MSY}	0.179	GA-NC = unknown FLK/EFL = 1,150,195
4 (Preferred)	**MSST = 75% of SSB_{MSY}**	**0.179**	**GA-NC = unknown** **FLK/EFL = 1,725,293**

Comparison of Alternatives

The Minimum Stock Size Threshold (MSST) is the level below which a stock is considered overfished. MSST for hogfish in the South Atlantic is currently specified as MSST = SSB_{MSY}*((1-M) or 0.5, whichever is greater) where SSB_{MSY} is the spawning stock biomass at the MSY level and M is the natural mortality rate. MSST has not been specified for the GA-NC and

FLK/EFL stocks (**Alternative 1 (No Action)**). Regulatory Amendment 21 to the Snapper Grouper FMP, effective November 6, 2014, changed the definition for MSST for select snapper grouper species (red snapper, blueline tilefish, gag, black grouper, yellowtail snapper, vermilion snapper, red porgy, and greater amberjack) with low natural mortality (M) from MSST = SSB_{MSY}*((1-M) or 0.5, whichever is greater) to MSST = 75% SSB_{MSY}. Other Snapper Grouper FMP amendments changed MSST to 75% SSB_{MSY} for snowy grouper, golden tilefish, and red grouper because natural mortality rate is very low (Amendments 15A, 15B, and 24, respectively). When the natural mortality rate is low (i.e., less than 0.25), even small fluctuations in biomass due to natural variations not related to fishing mortality may cause a stock to vary between an overfished or rebuilt condition. When a species is identified as overfished, the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires that a plan be implemented to rebuild the stock. Redefining MSST for these species was done to help prevent unnecessary overfished designations when small drops in biomass are due to natural variation in recruitment or other environmental variables, and ensure that rebuilding plans are applied to stocks when truly appropriate. Natural mortality for the FLK/EFL stock of hogfish is estimated at 0.179, which is within the range of natural mortality values for species addressed in Regulatory Amendment 21, Amendment 15A, Amendment 15B, and Amendment 24 (0.08 – 0.23). **Alternative 2** would retain the current MSST formula (SSB_{MSY} *(1-M) or 0.5, whichever is greater) but apply it to each of the two hogfish stocks. **Alternative 3** would specify MSST for the GA-NC and FLK/EFL stocks, allowing MSST to be set at 50% of the SSB_{MSY}, which would result in a lower threshold than that proposed under **Preferred Alternative 4** (75% SSB_{MSY}).

2.4 Action 4. Establish Annual Catch Limits (ACLs) for the GA-NC stock of hogfish

Alternative 1 (No action). Do not establish ACLs for the GA-NC stock of hogfish. The current ABC for the entire stock of hogfish is 137,824 lbs ww and ACL = OY = ABC. The commercial ACL = 49,469 lbs ww (36.69%) and the recreational ACL = 85,355 lbs ww (63.31%).

Alternative 2. Establish an ACL for the GA-NC stock. Specify commercial and recreational ACLs using re-calculated sector allocations based on proposed modifications to the management unit (~~81.91%~~ 69.1% commercial and ~~18.09%~~ 30.9% recreational). The ABC for the GA-NC stock = ~~28,161~~ 35,716 pounds whole weight (lbs ww).

Sub-alternative 2a. ACL = OY = ABC

Sub-alternative 2b. ACL = OY = 95% ABC

Sub-alternative 2c. ACL = OY = 90% ABC

Comparison of Alternatives

Because the SEDAR 37 stock assessment was not deemed applicable to the GA-NC stock of hogfish, the South Atlantic Council's Scientific and Statistical Committee applied Level 4 of the ABC Control Rule to arrive at an ABC recommendation for the GA-NC stock of hogfish. Based on methodology in *Calculating Acceptable Biological Catch for Stocks That Have Reliable Catch Data Only* (Only Reliable Catch Stocks – ORCS) (Berkson et al. 2011), the South Atlantic Council's SSC recommended an approach to compute the Acceptable Biological Catch (ABC) for unassessed stocks with only reliable catch data. The approach involves selection of a "catch statistic", a scalar to denote the risk of overexploitation for the stock, and a scalar to denote the management risk level. The SSC provides the first two criteria for each stock, and the South Atlantic Council specifies their risk tolerance level for each stock. **Table 2.4.1** presents the values and scalars used in the calculation.

Table 2.4.1. The South Atlantic's Scientific and Statistical Committee (SSC) Acceptable Biological Catch (ABC) recommendation for the GA-NC stock of hogfish.

Statistic	Value
Risk of Overexploitation	Moderately High
Associated Scalar	1.25
Range of Years	1999-2007
Year of Max Landings	2006
Catch Statistic	40,818 lbs ww
Council Risk Scalar (Preferred from Am 29)	0.7
Proposed ABC	**35,716 lbs ww**

Hogfish are currently managed as a unit stock within the South Atlantic Council's area of jurisdiction. Hence, **Alternative 1 (No Action)** contains the Acceptable Biological Catch (ABC) and Annual Catch Limits (ACLs) for the entire stock and sector allocations based on the South Atlantic Council's approved allocation formula. Since **Action 1** proposes to split the hogfish stock into two based on recent genetic evidence and since the SEDAR 37 stock assessment was not deemed applicable for the GA-NC portion of the stock, **Alternative 2** proposes an ABC based on the South Atlantic Council's ABC Control Rule for stocks with only reliable catch (ORCS approach) and sub-alternatives that would set the total annual catch limit for the GA-NC stock using different buffers to account for management uncertainty. **Sub-alternative 2a** sets the ABC at the same level of catch as the ACL at the Optimum Yield (OY) whereas **Sub-alternative 2b** and **Sub-alternative 2c** propose 5% and 10% buffers, respectively.

Table 2.4.2 shows the proposed total ACL and sector ACLs for the GA-NC hogfish stock. Sector allocations differ from those under **Alternative 1 (No Action)** because splitting the stock renders it necessary to re-calculate sector allocations using the appropriate landings figures for the relevant geographic area. That is, only landings from Georgia and the Carolinas were used to derive sector allocations based on the existing allocation formula whereas sector allocations under **Alternative 1 (No Action)** were computed using commercial and recreational landings for the four South Atlantic states.

The recreational ACL is presented in both pounds whole weight (lbs ww) and in numbers of fish for each proposed alternative. Recreational ACL in numbers of fish was obtained by dividing the recreational ACL in pounds by the average weight of an individual fish. The latter was obtained from recreational landings as estimated by the Marine Recreational Information Program (MRIP).

Table 2.4.1. Commercial and recreational ACLs provided by Sub-alternatives 2a-2c. Recreational ACL converted from pounds to numbers using an average weight of 10.60 lbs ww per fish.

Sub-alternative	Total ACL	Rec ACL (lbs)	Rec ACL (numbers)	Comm ACL (lbs)
2a	35,716	11,025	1,040	24,691
2b	33,930	10,474	988	23,456
2c	32,144	9,923	936	22,222

2.5 Action 5. Establish a rebuilding plan for the Florida Keys/East Florida (FLK/EFL) stock of hogfish

Alternative 1 (No Action). Do not establish a rebuilding plan the Florida Keys/East Florida (FLK/EFL) stock of hogfish. The current ABC for the entire stock of hogfish is 137,824 lbs ww

Alternative 2. Define a rebuilding plan where the rebuilding strategy for the Florida Keys/East Florida (FLK/EFL) stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 10 years with a 50% probability of rebuilding success. The Overfishing Limit (OFL) is the yield at F_{MSY}. The Spawning Stock Biomass (SSB_{MSY}) is 2,300,391 lbs ww. Year 1 = ~~2016.~~ 2017

Year	F	SSB (lbs)	Probability of SSB > SSB_{MSY}	ABC (lbs)	Discards (lbs)	~~Rec ACL (lbs)~~	~~Rec ACL (numbers)~~	~~Comm ACL (lbs)~~
2017	0.087	466,101	0	48,026	595	~~42,599~~	~~19,906~~	~~5,427~~
2018	0.087	615,078	0	61,994	768	~~54,989~~	~~25,696~~	~~7,005~~
2019	0.087	780,517	0	77,363	958	~~68,621~~	~~32,066~~	~~8,742~~
2020	0.087	958,225	0.001	93,826	1,162	~~83,224~~	~~38,890~~	~~10,602~~
2021	0.087	1,145,995	0.01	111,135	1,376	~~98,577~~	~~46,064~~	~~12,558~~
2022	0.087	1,341,203	0.049	129,008	1,597	~~114,430~~	~~53,472~~	~~14,578~~
2023	0.087	1,540,211	0.125	147,103	1,821	~~130,480~~	~~60,972~~	~~16,623~~
2024	0.087	1,739,110	0.224	165,076	2,044	~~146,422~~	~~68,422~~	~~18,654~~
2025	0.087	1,934,221	0.327	182,603	2,261	~~161,969~~	~~75,686~~	~~20,634~~
2026	0.087	2,122,134	0.421	199,389	2,469	~~176,858~~	~~82,644~~	~~22,531~~
2027	0.087	2,300,212	0.5	215,211	2,664	~~190,892~~	~~89,202~~	~~24,319~~

Source: cite new projections and include as appendix.

Preferred Alternative 3. Define a rebuilding plan where the rebuilding strategy for the Florida Keys/East Florida (FLK/EFL) stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 10 years with a 72.5% probability of rebuilding success. The Overfishing Limit (OFL) is the yield at F_{MSY}. The Spawning Stock Biomass (SSB_{MSY}) is 2,300,391 lbs ww. Year 1 = ~~2016.~~ 2017

Year	F	SSB (lbs)	Probability of SSB > SSB_{MSY}	ABC (lbs)	Discards (lbs)	~~Rec ACL (lbs)~~	~~Rec ACL (numbers)~~	~~Comm ACL (lbs)~~
2017	0.07	466,101	0	38,367	595	~~33,580~~	~~15,692~~	~~4,787~~
2018	0.069	623,334	0	49,449	777	~~43,280~~	~~20,224~~	~~6,169~~
2019	0.068	801,673	0	61,982	982	~~54,249~~	~~25,350~~	~~7,733~~
2020	0.068	997,357	0.001	75,710	1,206	~~66,265~~	~~30,965~~	~~9,445~~
2021	0.068	1,208,116	0.014	90,469	1,446	~~79,182~~	~~37,001~~	~~11,287~~
2022	0.067	1,430,997	0.067	106,059	1,698	~~92,827~~	~~43,377~~	~~13,232~~
2023	0.067	1,661,827	0.167	122,197	1,957	~~106,952~~	~~49,977~~	~~15,245~~
2024	0.067	1,896,011	0.293	138,566	2,219	~~121,279~~	~~56,672~~	~~17,287~~
2025	0.067	2,129,079	0.417	154,851	2,477	~~135,532~~	~~63,332~~	~~19,319~~
2026	0.068	2,356,761	0.525	170,750	2,728	~~149,448~~	~~69,835~~	~~21,302~~
2027	0.068	2,575,569	0.613	186,018	2,968	~~162,811~~	~~76,079~~	~~23,207~~

Source: cite new projections and include as appendix
Note: Projections for various F scenarios were completed using Stock Synthesis (SS3). Under a constant F scenario, the F values vary over the span of the projection due to changes in the stock's vulnerable biomass and age composition.

Alternative 4. Define a rebuilding plan where the rebuilding strategy for the Florida Keys/East Florida (FLK/EFL) stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 7 years with a 50% probability of rebuilding success. The Overfishing Limit (OFL) is the yield at F_{MSY}. The Spawning Stock Biomass (SSB_{MSY}) is 2,300,391 lbs ww. Year 1 = ~~2016.~~ 2017

Year	F	SSB (pounds)	Probability of SSB > SSB_{MSY}	ABC (lbs)	Discards (lbs)	~~Rec ACL (numbers)~~	~~Rec ACL (lbs)~~	~~Comm ACL (lbs)~~
2017	0.027	466,101	0	14,352	595	~~12,561~~	~~5,870~~	~~1,791~~
2018	0.027	643,910	0	19,342	801	~~16,929~~	~~7,911~~	~~2,413~~
2019	0.027	853,516	0	25,157	1,042	~~22,019~~	~~10,289~~	~~3,138~~
2020	0.027	1,092,682	0.002	31,751	1,315	~~27,790~~	~~12,986~~	~~3,961~~
2021	0.027	1,359,505	0.03	39,049	1,618	~~34,177~~	~~15,971~~	~~4,872~~
2022	0.027	1,650,910	0.133	46,953	1,945	~~41,095~~	~~19,203~~	~~5,858~~
2023	0.027	1,962,295	0.306	55,333	2,293	~~48,430~~	~~22,631~~	~~6,903~~
2024	0.027	2,288,307	0.494	64,049	2,654	~~56,058~~	~~26,195~~	~~7,991~~

Source: cite new projections and include as appendix.

Alternative 5. Define a rebuilding plan where the rebuilding strategy for the Florida Keys/East Florida (FLK/EFL) stock of hogfish sets ABC equal to the yield at a constant fishing mortality

rate that rebuilds the stock in 7 years with a 72.5% probability of rebuilding success. The Overfishing Limit (OFL) is the yield at F_{MSY}. The Spawning Stock Biomass (SSB_{MSY}) is 2,300,391 lbs ww. Year 1 = ~~2016.~~ 2017

Year	F	SSB (pounds)	Probability of SSB > SSB_{MSY}	ABC (lbs)	Discards (lbs)	~~Rec ACL (numbers)~~	~~Rec ACL (lbs)~~	~~Comm ACL (lbs)~~
2017	0.022	466,101	0	11,858	595	~~10,379~~	~~4,850~~	~~1,479~~
2018	0.022	646,051	0	15,774	804	~~13,806~~	~~6,451~~	~~1,968~~
2019	0.022	859,315	0	20,469	1,049	~~17,915~~	~~8,372~~	~~2,554~~
2020	0.022	1,103,904	0.002	25,906	1,328	~~22,674~~	~~10,595~~	~~3,232~~
2021	0.022	1,378,000	0.031	32,042	1,639	~~28,045~~	~~13,105~~	~~3,997~~
2022	0.022	1,678,512	0.145	38,810	1,976	~~33,968~~	~~15,873~~	~~4,842~~
2023	0.022	2,000,728	0.329	46,106	2,335	~~40,354~~	~~18,857~~	~~5,752~~
2024	0.022	2,339,124	0.523	53,809	2,710	~~47,096~~	~~22,007~~	~~6,713~~

Source: cite new projections and include as appendix.

In the tables above, the terminal Spawning Stock Biomass (SSB) in the rebuilding projections may not equal or exceed the base run estimate of SSB_{MSY} because the SSB estimates in the projections were generated from multiple bootstrap iterations in order to incorporate uncertainty into the projections. Therefore, the actual SSB_{MSY} that the projections are rebuilding to is not the estimate from the base run but the median (or other type of estimate in the case of the 72.5% probability of success runs) from the bootstrap distribution.

Table 2.5.1 below provides a summary of the alternatives for **Action 5**.

Table 2.5.1. A summary of the various rebuilding scenarios (Alternatives 1-5) for the Florida Keys/East Florida (FLK/EFL) stock of hogfish.

Alternatives	F rate strategy	F rate	Year 1 ABC (lbs)	Rebuilt stock (years)	Probability of rebuilt stock
1 (No action)	Do not specify a rebuilding plan. The current ABC for the entire stock of hogfish is 137,824 lbs ww				
2	Constant	0.087	48,026	10	50%
3 (Preferred)	**Constant**	**0.070 (year 1)**	38,367	**10**	**72.5%**
4	Constant	0.027	14,352	7	50%
5	Constant	0.022 (year 1)	11,858	7	72.5%

Comparison of Alternatives

The last year of data in the hogfish assessment report (SEDAR 37 2014) was 2012. Projections for various fishing mortality (F) scenarios were completed using Stock Synthesis (SS3) base model configurations for the Florida Keys/East Florida (FLK/EFL) hogfish stock

(SEDAR 37 2014). Projection results were based on year 1 = 2016 and extending through 2026, or to the point of stock rebuilding if a scenario did not result in rebuilding within 10 years.

The recreational fishery for hogfish was closed on August 24, 2015 due to an increase in landings observed during Wave 2 of the MRIP survey. As a result, preliminary landings for 2015 are above the landings level assumed in the stock projections raising concerns that the projections may no longer represent the Best Scientific Information Available. Therefore, the South Atlantic Council requested updated projections for the East Florida/Florida Keys hogfish stock using the most recent landings estimates. The new revised projections (**Appendix X**) included the most recent landings and charged year 1 to 2017 to reflect the likely implementation date of management actions. The projected OFLs and ABCs assume the current minimum size limit (12 inches fork length).

Since the stock assessment for the FLK/EFL stock falls under Tier 1 of the ABC control rule, the SSC recommended a P* = 0.275 with a probability of rebuilding success of 72.5%, which corresponds to the values shown under **Preferred Alternative 3**. **Alternative 2** would rebuild the stock in the required 10 years but at a lower probability of success than that recommended by the SSC whereas **Alternatives 4** and **5** would rebuild the stock in 7 years with 50% and 72.5% probabilities of rebuilding success, respectively. Since the stock would rebuild in a shorter time period, **Alternatives 4** and **5** would implement lower ABCs (and consequently lower ACLs) than alternatives that rebuild the stock in the required 10 years.

The recreational ACL for the Florida Keys/East Florida (FLK/EFL) stock of hogfish is given in both pounds and numbers for **Alternatives 2-5** because the South Atlantic Council wants to specify recreational ACLs in numbers of fish since that is how the Marine Recreational Information Program (MRIP) presents recreational landings estimates. To convert the recreational ACL in pounds to numbers of fish, the annual average weight of an individual fish was used. Average weights were obtained by (insert brief descriptions of appropriate methodology)

2.6 Action 6. Establish Annual Catch Limits (ACLs) for the Florida Keys/East Florida (FLK/EFL) stock of hogfish

Alternative 1 (No action). Do not establish ACLs for the Florida Keys/East Florida (FLK/EFL) hogfish stock. The current Acceptable Biological Catch (ABC) for the entire stock of hogfish is 137,824 lbs ww and Annual Catch Limit (ACL) = OY = ABC. The commercial annual catch limit (ACL) = 49,469 lbs ww (36.69%) and the recreational annual catch limit (ACL) = 85,355 lbs ww (63.31%).

Preferred Alternative 2. Establish annual catch limits (ACLs) for the Florida Keys/East Florida (FLK/EFL) stock of hogfish. Specify commercial and recreational ACLs for 2017-2025. ACLs will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL. Specify commercial and recreational ACLs using re-calculated sector allocations based on proposed modifications to the management unit (~~24.29%~~ 9.6% commercial and ~~75.71%~~ 90.4% recreational).

Preferred Sub-alternative 2a. ACL = OY = ABC

Sub-alternative 2b. ACL = OY = 95% ABC

Sub-alternative 2c. ACL = OY = 90% ABC

Comparison of Alternatives

Hogfish are currently managed as a unit stock within the South Atlantic Council's area of jurisdiction. Hence, **Alternative 1 (No Action)** contains the Acceptable Biological Catch (ABC) and Annual Catch Limits (ACLs) for the entire stock and sector allocations based on the South Atlantic Council's approved allocation formula. Since **Action 1** proposes to split the hogfish stock into two based on recent genetic evidence, **Alternative 2** proposes a total annual catch limit for the FLK/EFL stock using different buffers to account for management uncertainty. **Preferred Sub-alternative 2a** sets the ABC at the same level of catch as the ACL at the Optimum Yield (OY) whereas **Sub-alternative 2b** and **Sub-alternative 2c** propose 5% and 10% buffers, respectively.

Table 2.6.2 shows the proposed total ACL and sector ACLs for the FLK/EFL hogfish stock. Sector allocations differ from those under **Alternative 1 (No Action)** because splitting the stock renders it necessary to re-calculate sector allocations using the appropriate landings figures for the relevant geographic area. That is, only landings from Florida were used to derive sector allocations based on the existing allocation formula whereas sector allocations under **Alternative 1 (No Action)** were computed using commercial and recreational landings for the four South Atlantic states.

The recreational ACL is presented in both pounds whole weight (lbs ww) and in numbers of fish for each proposed alternative based on the South Atlantic Council's preferred rebuilding plan alternative under **Action 5**. Recreational ACL in numbers of fish was obtained by dividing the recreational ACL in pounds by the average weight of an individual fish. The latter was obtained (insert brief description of methodology used to obtain av wt)

Table 2.6.2. Sector ACLs in pounds and numbers (recreational) for **Sub-alternatives 2a-2c** in **Action 6** and based on ABC projections from **Preferred Alternative 3** in **Action 5** where ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 10 years with a 72.5% probability of rebuilding success. Recreational ACL in numbers of fish is based on average weight of 1.76 lbs ww.

Preferred Sub-alternative 2a: ACL=OY=ABC				
Year	**Total ACL (lbs)**	**Rec ACL (lbs)**	**Rec ACL (numbers)**	**Commercial ACL (lbs)**
2017	38,367	34,670	19,699	3,697
2018	49,449	44,685	25,389	4,764
2019	61,982	56,010	31,824	5,972
2020	75,710	68,415	38,872	7,295
2021	90,469	81,752	46,450	8,717
2022	106,059	95,840	54,455	10,219
2023	122,197	110,423	62,741	11,774
2024	138,566	125,215	71,145	13,351
2025	154,851	139,931	79,506	14,920
2026	170,750	154,298	87,669	16,452
2027	186,018	168,095	95,509	17,923
Sub-alternative 2b: ACL=OY= 95%ABC				
2017	36,449	32,937	18,714	3,512
2018	46,977	42,450	24,120	4,526
2019	58,883	53,210	30,233	5,673
2020	71,925	64,995	36,929	6,930
2021	85,946	77,665	44,128	8,281
2022	100,756	91,048	51,732	9,708
2023	116,087	104,902	59,604	11,185
2024	131,638	118,954	67,588	12,683
2025	147,108	132,935	75,531	14,174
2026	162,213	146,583	83,286	15,629
2027	176,717	159,690	90,733	17,027
Sub-alternative 2c: ACL=OY=90%ABC				
2017	34,530	31,203	17,729	3,327
2018	44,504	40,216	22,850	4,288
2019	55,784	50,409	28,642	5,375
2020	68,139	61,574	34,985	6,565
2021	81,422	73,577	41,805	7,845
2022	95,453	86,256	49,009	9,197
2023	109,977	99,381	56,466	10,596
2024	124,709	112,694	64,031	12,016
2025	139,366	125,938	71,556	13,428
2026	153,675	138,868	78,903	14,807
2027	167,416	151,286	85,958	16,130

2.7 Action 7. Establish a recreational Annual Catch Target (ACT) for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not establish recreational annual catch targets (ACTs) for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish. The current ACT is 59,390 lbs ww and applies to hogfish throughout the South Atlantic Council's jurisdiction. The ACT = recreational ACL*(1-PSE) or ACL*0.5, whichever is greater, and where Percent Standard Error (PSE) = average PSE 2005-2009.

Year	Hogfish PSE
2005	28.7
2006	34.3
2007	23.9
2008	30.9
2009	29.5
Average	29.5

Source: NMFS Office of Science and Technology MRIP Domain Catch Totals (2015)

Preferred Alternative 2. Establish an annual catch target (ACT) for the GA-NC stock of hogfish for the recreational sector.

Sub-alternative 2a. ACT = recreational ACL*(1-PSE) or ACL*0.5, whichever is greater.

Preferred Sub-alternative 2b. ACT =85% recreational ACL.

Sub-alternative 2c. ACT = 75% recreational ACL.

Year	Hogfish PSE (GA-NC)
2010	61.9
2011	67.3
2012	63.1
2013	56.1
2014	n/a
Average	**62.1%**

Source: NMFS Office of Science and Technology MRIP Domain Catch Totals (2015)

Preferred Alternative 3. Establish an annual catch target (ACT) for the Florida Keys/East Florida (FLK/EFL) stock of hogfish for the recreational sector.

Sub-alternative 3a. ACT = recreational ACL*(1-PSE) or ACL*0.5, whichever is greater.

Preferred Sub-alternative 3b. ACT =85% recreational ACL.

Sub-alternative 3c. ACT = 75% recreational ACL.

Year	Hogfish PSE East FL-FL Keys
2010	30.5
2011	22.0
2012	24.7
2013	14.7
2014	10.7
Average	**20.5**

Source: NMFS Office of Science and Technology MRIP Domain Catch Totals (2015)

Comparison of Alternatives

The National Standard 1 guidelines recommend the use of ACTs to prevent ACLs from being exceeded. For species without in-season management control to prevent the ACL from being exceeded, managers may utilize ACTs that are set below ACLs so that catches do not exceed the ACLs. If an ACT is specified as part of the system of accountability measures (AMs) for hogfish, an ACT control rule that accounts for management uncertainty may be utilized for setting the ACT. The objective for establishing an ACT and related AMs is to prevent the ACL from being exceeded. In managing the snapper grouper fishery; however, the South Atlantic Council has chosen not to use ACTs to trigger AMs because it is anticipated that improvements in reporting will significantly reduce management uncertainty.

Since the ACT is typically set lower and would be reached sooner than the ACL for any given species, using an ACT rather than the ACL as a trigger for AMs in the recreational sector may prevent an ACL overage. This more conservative approach, would likely help to ensure that recreational data uncertainties do not cause or contribute to excessive ACL overages for vulnerable species. Using recreational ACTs rather than the ACLs to trigger recreational AMs may not eliminate ACL overages completely; however, using such a strategy for the recreational sector may reduce the need to compensate for very large overages.

The updated framework procedure included in Amendment 17B to the Snapper Grouper FMP (SAFMC 2010b) allows for the timely establishment and adjustment of ACTs (and ACLs) if the South Atlantic Council and NOAA Fisheries determine they are necessary.

The NS1 guidelines recommend a performance standard by which the efficacy of any system of ACLs and AMs can be measured and evaluated. According to the guidelines:

> *…if catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness (74 FR 3178).*

If an evaluation concludes that the ACL is being chronically exceeded for any one species or species group, and post-season AMs are repeatedly needed to correct for ACL overages, adjustments to management measures would be made. As stated previously, the updated

framework procedure implemented through Amendment 17B (SAFMC 2010b) could be utilized to modify management measures such as bag limits, trip limits, seasonal closures, and gear prohibitions in a timely manner. Using the regulatory amendment process to implement such changes, if needed, is the most timely method of addressing issues associated with repeated ACL overages through permanent regulations.

Table 2.7.1 shows recreational Annual Catch Targets (ACTs) for the GA-NC stock of hogfish based on the proposed recreational ACL alternatives in **Action 4**.

Table 2.7.1. Recreational Annual Catch Targets (in pounds and numbers) for the GA-NC stock of hogfish for each of the Recreational ACL sub-alternatives in Action 4.

	ACL=ABC		ACL=95%ABC		ACL=90%ABC	
	lbs	num	lbs	num	lbs	num
ACT=rec ACL (1-PSE) or rec ACL*0.5, whichever is greater	5,513	520	5,237	494	4,961	468
ACT=85%rec ACL (Preferred)	**9,371**	**884**	**8,903**	**840**	**8,434**	**796**
ACT=75%recACT	8,269	780	7,855	741	7,442	702

Table 2.7.2 shows recreational Annual Catch Targets (ACTs) for the Florida Keys/ East Florida (FLK/EFK) stock for the **Alternative 3** sub-alternatives, including **Preferred Sub-alternative 3b**. Recreational ACTs are specified in numbers of fish based on **Preferred Sub-alternative 2a** under **Action 6**.

Table 2.7.2. Recreational Annual Catch Targets (ACTs; numbers of fish) under consideration for the Florida Keys/East Florida (FLK/EFL) stock of hogfish based on **Preferred Sub-alternative 2a** under **Action 6**.

			ACT=rec ACL (1-PSE)		ACT=85%recACL (Preferred)		ACT=75%recACL	
Year	**Rec ACL (numbers)**	**Rec ACL (lbs)**	**numbers**	**pounds**	**numbers**	**pounds**	**numbers**	**pounds**
2017	19,699	34,670	15,661	27,563	16,744	29,470	14,774	26,003
2018	25,389	44,685	20,184	35,524	21,581	37,982	19,042	33,513
2019	31,824	56,010	25,300	44,528	27,050	47,609	23,868	42,008
2020	38,872	68,415	30,904	54,390	33,042	58,153	29,154	51,312
2021	46,450	81,752	36,928	64,993	39,483	69,489	34,838	61,314
2022	54,455	95,840	43,291	76,193	46,286	81,464	40,841	71,880
2023	62,741	110,423	49,879	87,787	53,329	93,860	47,055	82,818
2024	71,145	125,215	56,560	99,546	60,473	106,433	53,359	93,911
2025	79,506	139,931	63,208	111,245	67,580	118,941	59,630	104,948
2026	87,669	154,298	69,697	122,667	74,519	131,154	65,752	115,724
2027	95,509	168,095	75,929	133,636	81,182	142,881	71,631	126,071

2.8 Action 8. Increase the commercial and recreational minimum size limit for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not increase the commercial and recreational minimum size limit for hogfish. The current minimum size limit for hogfish is 12 inches fork length (FL) for both the commercial and recreational sectors in federal waters of the South Atlantic Region, and state waters of South Carolina, North Carolina, and Florida. There is no minimum size limit for hogfish in state waters of Georgia.

Preferred Alternative 2. Increase the commercial and recreational minimum size limit for the GA-NC stock of hogfish in the South Atlantic Region.

Sub-alternative 2a. 16 inches FL
Sub-alternative 2b. 17 inches FL
Sub-alternative 2c. 18 inches FL
Sub-alternative 2d. 19 inches FL
Preferred Sub-alternative 2e. 20 inches FL
Sub-alternative 2f. Increase the minimum size limit from 12" to 15" in year 1, to 18" in year 2, and to 20" in year 3.

Preferred Alternative 3. Increase the commercial and recreational minimum size limit for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic Region.

Sub-alternative 3a. 14 inches FL
Preferred Sub-alternative 3b. 15 inches FL
Sub-alternative 3c. 16 inches FL
Sub-alternative 3d. 17 inches FL
Sub-alternative 3e. Increase the minimum size limit from 12" to 14" in year 1 and to 16" in year 3.

Comparison of Alternatives

The current minimum size limit for commercial and recreational harvest of hogfish in the South Atlantic is 12 inches fork length (FL). **Preferred Alternatives 2** and **3** include sub-alternatives for minimum size limits for the GA-NC stock and the FLK/EFL stock, respectively. Sib-alternatives under **Preferred Alternative 2** contain a wider range of size limit options because hogfish off Georgia and the Carolinas attain larger sizes than those found off Florida.

2.9 Action 9. Establish a commercial trip limit for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not establish a commercial trip limit for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish in the South Atlantic Region. Currently there is no commercial trip limit for hogfish in the South Atlantic Region.

Alternative 2. Establish a commercial trip limit for the GA-NC stock of hogfish in the South Atlantic Region.

Sub-alternative 2a. 100 lbs per trip.
Sub-alternative 2b. 250 lbs per trip.
Sub-alternative 2c. 500 lbs per trip.
Sub-alternative 2d. 750 lbs per trip.

Alternative 3. Establish a commercial trip limit for the Florida Keys/East Florida stock of hogfish in the South Atlantic Region.

Sub-alternative 3a. 25 lbs per trip.
Sub-alternative 3b. 50 lbs per trip.
Sub-alternative 3c. 100 lbs per trip.
Sub-alternative 3d. 150 lbs per trip.
Sub-alternative 3e. 200 lbs per trip.

NOTE: The commercial ACL for the GA-NC stock ranges from 24,691 to 22,222 lbs ww. The preferred commercial ACL for 2017 for the FLK/EFL stock is 3,697 lbs ww.

Comparison of Alternatives

Commercial trip limit alternatives present a range of trip limit options for each of the hogfish stocks to achieve the necessary reduction in harvest that would maintain landings below the proposed commercial ACLs. **Alternative 2** includes options for a commercial trip limit for the GA-NC stock ranging from 100 to 750 pounds per trip. The range of alternatives was selected based on the distribution of commercial trips in that geographic area. Similarly, **Alternative 3** includes sub-alternatives for commercial trip limits ranging from 25 to 200 pounds per trip for the FLK/EFL stock of hogfish, where commercial harvest is very minimal compared to that of the recreational sector.

2.10 Action 10. Modify and/or establish recreational bag limits for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not modify and/or establish recreational bag limits for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish in the South Atlantic Region. Currently the recreational bag limit is 5 fish per person per day off Florida and there is no recreational bag limit off Georgia, South Carolina, and North Carolina.

Alternative 2. Establish a recreational bag limit for the GA-NC stock of hogfish in the South Atlantic Region.

Sub-alternative 2a. 2 fish per person per day.
Sub-alternative 2b. 1 fish per person per day.
Sub-alternative 2c. 1 fish per vessel per day.

Alternative 3. Modify the recreational bag limit for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic Region.

Sub-alternative 3a. 3 fish per person per day.
Sub-alternative 3b. 2 fish per person per day.
Sub-alternative 3c. 1 fish per person per day.
Sub-alternative 3d. 1 fish per vessel per day.

~~**Alternative 4.** Establish a season for the GA-NC stock of hogfish in the South Atlantic region.~~

~~**Sub-alternative 4a.** May-August~~
~~**Sub-alternative 4b.** July-August~~
~~**Sub-alternative 4c.** May-June~~

~~**Alternative 5.** Establish a season for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic region.~~

~~**Sub-alternative 5a.** May-June~~
~~**Sub-alternative 5b.** July-August~~

NOTE: The recreational ACL for the GA-NC stock ranges from 1,040 to 936 fish. The preferred recreational ACL for the FLK/EFL stock for 2017 is 19,699 fish.

Comparison of Alternatives

Recreational bag limit alternatives present a range of options for each of the hogfish stocks to achieve the necessary reduction in harvest that would maintain landings below the proposed recreational ACLs. **Alternative 2** would establish a recreational bag limit for the GA-NC stock whereas **Alternative 3** addresses bag limit options for the FLK/EFL stock. More sub-alternatives are included under **Alternative 3** compared to **Alternative 2** because the FLK/EFL stock is overfished and undergoing overfishing (SEDAR 37 2014) and a greater reduction in

harvest may be necessary to rebuild that stock. Further, the majority of hogfish in Florida are harvested recreationally.

2.11 Action 11. Establish a recreational fishing season for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). There is no recreational fishing season for hogfish in the South Atlantic. Currently, the recreational fishing year for hogfish is January 1 through December 31.

Alternative 2. Establish a recreational fishing season for the GA-NC stock of hogfish in the South Atlantic region.

Sub-alternative 2a. May-August
Sub-alternative 2b. July-August
Sub-alternative 2c. May-June

Alternative 3. Establish a recreational fishing season for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic region.

Sub-alternative 3a. May-June
Sub-alternative 3b. July-August

Comparison of Alternatives

To achieve the necessary reduction in harvest that would maintain landings below the proposed recreational ACLs, the South Atlantic Council is also considering establishing a recreational season for each of the stocks. **Alternative 2** would establish a recreational season for the GA-NC stock of hogfish whereas **Alternative 3** would address the FLK/EFL stock.

Sub-alternative 2a would establish a 4-month recreational season for the GA-NC stock spanning two MRIP waves. **Sub-alternatives 2b** and **2c** would each establish 2-month seasons, respectively. **Sub-alternatives 3a** and **3b** would also establish 2-month seasons for the FLK/EFL stock comparable to those proposed for the GA-NC stock.

2.12 Action 12. Establish commercial and recreational accountability measures (AMs) for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 1 (No Action). Do not establish AMs for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish. Current commercial and recreational AMs apply to hogfish throughout the South Atlantic Council's area of jurisdiction.

Preferred Alternative 2. If commercial landings reach or are projected to reach the commercial annual catch limit (ACL), NMFS would close the commercial sector for the remainder of the fishing year. On and after the effective date of such a notification, all sale or purchase is prohibited and harvest or possession of hogfish in or from the EEZ would be limited to the recreational bag and possession limit. Additionally, if the commercial ACL is exceeded, NMFS would reduce the commercial ACL in the following fishing year by the amount of the commercial overage, only if hogfish is overfished **and** the total ACL (commercial ACL and recreational ACL) of the respective stock is exceeded.

Preferred Sub-alternative 2a. For the GA-NC stock of hogfish.

Preferred Sub-alternative 2b. For the Florida Keys/East Florida (FLK/EFL) stock of hogfish.

Preferred Alternative 3. If recreational landings reach or are projected to reach the recreational ACL, NMFS would close the recreational sector for the remainder of the fishing year, unless, using the best scientific information available, NMFS determines that a closure is unnecessary.

Sub-alternative 3a. For the GA-NC stock of hogfish if the stock is overfished.

Preferred Sub-alternative 3b. For the GA-NC stock of hogfish regardless of stock status.

Sub-alternative 3c. For the Florida Keys/East Florida (FLK/EFL) stock of hogfish if the stock is overfished.

Preferred Sub-alternative 3d. For the Florida Keys/East Florida (FLK/EFL) stock of hogfish regardless of stock status.

Preferred Alternative 4. If recreational landings exceed the recreational annual catch limit (ACL), then during the following fishing year, recreational landings will be monitored for a persistence in increased landings. If necessary, NMFS would reduce the length of fishing season and the recreational ACL in the following fishing year by the amount of the recreational overage, only if the species is overfished **and** the total ACL (commercial ACL and recreational ACL) of the respective stock is exceeded. The length of the recreational season and recreational ACL will not be reduced if NMFS determines, using the best scientific information available, that a reduction is unnecessary.

Preferred Sub-alternative 4a. For the GA-NC stock of hogfish.

Preferred Sub-alternative 4b. For the Florida Keys/East Florida (FLK/EFL) stock of hogfish.

Comparison of Alternatives

The proposed action would contribute to creating a consistent regulatory environment in the South Atlantic. The Generic AM and Dolphin Allocations Amendment (Amendment 34 to the Snapper Grouper FMP), currently pending approval by the Secretary of Commerce, would make AMs for hogfish consistent with those for other snapper grouper species. However, since this amendment proposes two hogfish stocks, AMs need to be specified for each stock. Current AMs for hogfish throughout the South Atlantic region are below. The South Atlantic Council's preferred alternatives from the Generic AM and Dolphin Allocations Amendment are shown above.

Commercial: If commercial landings, as estimated by the Science and Research Director, reach or are projected to reach the commercial ACL, the Assistant Administrator will file a notification with the Office of the Federal Register to close the commercial sector for the remainder of the fishing year. On and after the effective date of such a notification, all sale or purchase is prohibited and harvest or possession of this species in or from the South Atlantic EEZ is limited to the bag and possession limit. This bag and possession limit applies in the South Atlantic on board a vessel for which a valid Federal commercial or charter vessel/headboat permit for South Atlantic snapper grouper has been issued, without regard to where such species were harvested, i.e., in state or Federal waters. If commercial landings exceed the ACL, and the species is overfished, based on the most recent Status of U.S. Fisheries Report to Congress, the Assistant Administrator will file a notification with the Office of the Federal Register, at or near the beginning of the following fishing year to reduce the ACL for that following year by the amount of the overage in the prior fishing year.

Recreational: If recreational landings, as estimated by the Science and Research Director, exceed the recreational ACL, then during the following fishing year, recreational landings will be monitored for a persistence in increased landings and, if necessary, the Assistant Administrator will file a notification with the Office of the Federal Register, to reduce the length of the following recreational fishing season by the amount necessary to ensure recreational landings do not exceed the recreational ACL in the following fishing year. However, the length of the recreational season will also not be reduced during the following fishing year if the Regional Administrator determines, using the best scientific information available, that a reduction in the length of the following fishing season is unnecessary.

Chapter 3. Affected Environment

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

- **Habitat environment** (Section 3.1)
- **Biological and Ecological environment** (Section 3.2)
- **Economic and Social environment** (Sections 3.3)
- **Administrative environment** (Section 3.4)

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://www.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 55 meters (54 to 180 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 in South Atlantic continental shelf habitats is unknown 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 but is most abundant offshore from northeastern Florida. South of Cape Canaveral 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-meter (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. There are several notable shipwrecks along the southeast coast in state and federal waters including Lofthus (eastern Florida), SS Copenhagen (southeast Florida), Half Moon (southeast Florida), Hebe (Myrtle Beach, South Carolina), Georgiana (Charleston, South Carolina), U.S.S. Monitor (Cape Hatteras, North Carolina), Huron (Nags Head, North Carolina), and Metropolis (Corolla, North Carolina).

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 available information on the distribution of hard bottom habitat in the South Atlantic region, prepared ArcView maps for the four-state project. These maps, which consolidate known distribution of coral, hard/live bottom, and artificial reefs as hard bottom, are available on the South Atlantic Council's online map services provided by the newly developed SAFMC Habitat and Ecosystem Atlas: http://ocean.floridamarine.org/safmc_atlas/. An introduction to the system is found at: http://www.safmc.net/ecosystem-management/mapping-and-gis-data.

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.

Additional information on the habitat utilized by snapper grouper species is included in Volume II of the Fishery Ecosystem Plan (SAFMC 2009b). The FEP can be found at: http://www.safmc.net/ecosystem-management/fishery-ecosystem-plan-1.

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.

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).

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

The potential impacts the actions in this amendment may have on EFH, and EFH-HAPCs are discussed in **Chapter 4** of this document. **Appendix H** has detailed information on EFH and EFH-HAPCs for all Council managed species.

3.2 Biological and Ecological Environment

3.2.1 Fish Populations Affected by this Amendment

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

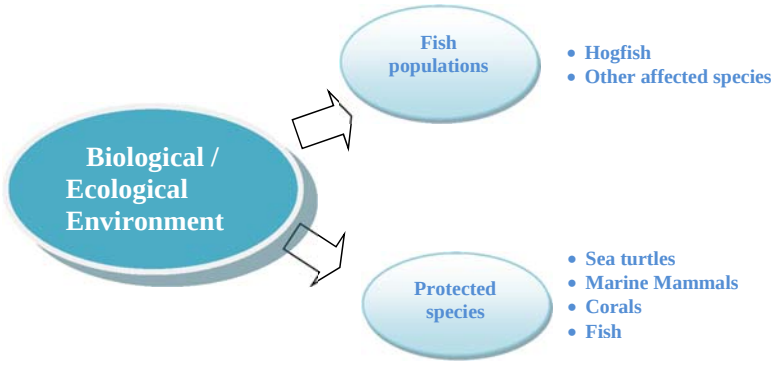


Figure 3.2.1. Two components of the biological environment described in this document.

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.

Hogfish occur in tropical, subtropical and warm temperate waters of the Atlantic Ocean (Brazil to Bermuda), and throughout the Gulf of Mexico and Caribbean Sea. After a planktonic larval phase (30-40 days), juvenile Hogfish settle nearshore in estuaries, seagrass beds or shallow reef habitats (Davis 1976, Colin 1982, Ault et al. 2003), and gradually move offshore with growth (Collins and McBride 2011). Adults are typically associated with hard bottom, reef habitats, and individuals have been observed as deep as 65 m (Collins and McBride 2011). Hogfish are visual predators that feed primarily during daylight hours on benthic invertebrates (Randall and Warmke 1967), so their depth range is likely limited by light availability and food sources.

Hogfish are protogynous hermaphrodites that form harems. All fish mature as females first, and eventually become male if they live long enough. A single male maintains harems of 5 to 15 females (Colin 1982, Munoz et al. 2010) during extended spawning seasons that last for months. Hogfish are pair spawners (Davis 1976, Colin 1982), and spawning occurs daily during the spawning season (McBride and Johnson 2007, Collins and McBride 2008, Munoz et al. 2010). The size (197-727 mm FL) and age (1-11 yr) range at which sexual transition occurs indicates that transition is socially mediated (Collins and McBride 2011). Sex change can take several months (McBride and Johnson 2007), so removal of the dominant male has the potential to significantly affect harem stability and decrease reproductive potential (Munoz et al. 2010).

Hogfish Life History
An Overview

- Extend from Brazil to Bermuda, throughout the Gulf of Mexico and Caribbean Sea.
- Adults are typically associated with hard bottom and reef habitats, as deep as 65 m, with juveniles in nearshore estuaries, seagrass beds or shallow reef habitats.
- Protogynous hermaphrodites, form harems.
- The spawning season extends from December through April.
- Oldest fish reported is 23 years old.

Peak spawning activity for this species has been repeatedly demonstrated to occur during the winter and spring months (Davis 1976, Colin 1982, Claro et al. 1989, McBride and Johnson 2007, Collins and McBride 2008, Munoz et al 2010). These studies have demonstrated that spawning activity occurs predominantly during the months of December through April, and begins (and ends) slightly earlier in the Florida Keys than on the West Florida shelf (Davis 1976, McBride et al. 2008).

Hogfish have been managed as a single stock within the United States since initial regulations were implemented in 1994 by the State of Florida. Landings within the U.S. occur predominantly within state and federal waters adjacent to the state of Florida. Management regulations are consistent between state and federal waters throughout their U.S. range. Genetic data were not available for this species prior to 2013, so previous stock assessments have treated Hogfish as a single stock (Ault et al. 2003). However, recent genetic analyses by Seyoum et al. (2015) have demonstrated distinct stocks between the eastern Gulf of Mexico (WFL), the Florida Keys and southeast Florida (FLK/EFL), and the Carolinas (GA-NC).

Additional life history, biological characteristics, and stock status information for hogfish may be found the Southeast Data, Assessment, and Review (SEDAR) report, SEDAR 37 (2015), which is available on the SEDAR web site http://www.sefsc.noaa.gov/sedar/ and is hereby incorporated by reference (see **Section 3.2.3** of this document for more information on the SEDAR process).

3.2.2 Other Species Affected

Thompson and Switzer (2015) reported on habitat selection and overlap in terms of location, abiotic, and habitat variables of six co-occurring species including gag, lane snapper, gray snapper, black sea bass, white grunt, and hogfish. Results showed that hogfish were the least sympatric with the co-occurring species, with gag and the snappers co-occurring much more commonly (Thompson and Switzer 2015). Bycatch of other species is incidental in the hook-and-line fishery for hogfish, with no bycatch of other co-occurring species expected in the spear fishery for hogfish. For details on the life histories and ecology of co-occurring species, the reader is referred to Volume II of the Fishery Ecosystem Plan (SAFMC 2009b) available at: http://www.safmc.net/ecosystem-management/fishery-ecosystem-plan-1.

An expanded discussion of life history traits, population characteristics, and stock status of snapper grouper species affected by this amendment can be found in **Sections 3.2.1** and **3.3** of the Comprehensive Annual Catch Limit Amendment (SAFMC 2011c), which are hereby incorporated by reference and may be found at https://www.dropbox.com/s/mp3xwedsrarfpjn/Comp%20ACL%20Am%20101411%20FINAL.pdf.

3.2.3 The Stock Assessment 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 available science 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.

3.2.4 Protected Species

There are 49 species, or distinct population segments (DPSs) of species, protected by federal law 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 Marine Mammal Protection Act (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. Information on these, as well as sea turtles and smalltooth sawfish and how they are adversely affected by the snapper grouper fishery are discussed below.

Subsequent to the June 7, 2006, biological opinion, elkhorn and staghorn coral (*Acropora cervicornis* and *Acropora palmata*) were listed as threatened. In a consultation memorandum dated July 9, 2007, NMFS concluded the continued authorization of the South Atlantic snapper grouper fishery is not likely to adversely affect these *Acropora* species. On November 26, 2008, an *Acropora* critical habitat was designated. In a consultation memorandum dated December 2, 2008, NMFS concluded the continued authorization of the snapper grouper fishery is not likely to adversely affect *Acropora* critical habitat. 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 2 previously listed *Acropora* coral species remain protected as threatened. In an "ESA section 7 consultation on the continued authorization of the snapper grouper and dolphin and wahoo fisheries following the listing of new coral species", dated September 11, 2014, NMFS indicated that the previous determination remains valid and the South Atlantic snapper grouper fishery is still not likely to adversely affect *Acropora* corals.

The September 10, 2014, final listing rule provided some new information on the threats

facing *Acropora*; however, none of the information suggested that previous determinations were no longer valid. For this reason, a memo dated September 11, 2014, indicates that previous determination remains valid and the South Atlantic snapper grouper fishery is still not likely to adversely affect *Acropora* corals. For the remaining 5 species of coral (*Mycetophyllia ferox, Dendrogyra cylindrus, Orbicella annularis, O. faveolata, and O. franksi*), the threats to corals from fishing identified in the status review for these species (SSR) include (1) trophic effects, (2) human-induced physical damage, and (3) destructive fishing practices. The September 11, 2014, memo indicates South Atlantic snapper grouper fishery will not cause trophic effects because it does not capture herbivorous fish.

3.2.4.1 ESA-Listed Sea Turtles

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 found 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 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).

Sea turtles are vulnerable to capture by bottom longline and vertical hook-and-line gear. 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 3.2.4.1**).

Table 3.2.4.1. Three-year South Atlantic anticipated takes 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.

The SDDP does not provide data on recreational fishing interactions with ESA-listed sea turtle species. However, anecdotal information indicates that recreational fishermen occasionally take sea turtles with hook-and-line gear. The biological opinion also used the extrapolated data from the SDDP to estimate the magnitude of recreational fishing on sea turtles (**Table 3.2.4.1**).

Regulations implemented through Amendment 15B to the Snapper Grouper FMP (74 FR 31225; June 30, 2009; SAFMC 2008b) required all commercial or charter/headboat vessels with a South Atlantic snapper grouper permit, carrying hook-and-line gear on board, to possess required literature and release gear to aid in the safe release of incidentally caught sea turtles and smalltooth sawfish. Comprehensive Ecosystem-Based Amendment 2 modified these requirements (76 FR 82183; December 30, 2011; SAFMC 2011e) by requiring different gear for vessels with different freeboard heights, mirroring the requirements in the Gulf of Mexico. These regulations are thought to decrease the mortality associated with accidental interactions with sea turtles and smalltooth sawfish.

On July 10, 2014, NMFS published a final rule designating critical habitat for the Northwest Atlantic Ocean (NWA) Loggerhead Sea Turtle DPS 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. A memorandum dated September 16, 2014, evaluated the effects of continued authorization of federal fisheries, including snapper grouper, on the newly-designated critical habitat. The memo concluded that activities associated with the snapper grouper fishery would not adversely affect any of the NWA loggerhead DPS critical habitat units.

3.2.4.2 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).

On September 22, 2011, NMFS and the U.S. Fish and Wildlife Service determined the loggerhead sea turtle population consists of nine distinct population segments (DPSs) (76 FR 58868). Previously, loggerhead sea turtles were listed as threatened species throughout their global range. The snapper grouper fishery interacts with loggerhead sea turtles from what is now considered the Northwest Atlantic (NWA) DPS, which remains listed as threatened. Five DPSs of Atlantic sturgeon were also listed since the completion of the 2006 biological opinion. In a consultation memorandum dated February 15, 2012, NMFS concluded the continued authorization of the South Atlantic snapper grouper fishery is not likely to adversely affect the Atlantic sturgeon. The February 15, 2012, memorandum also stated that because the 2006 biological opinion had evaluated the impacts of the fishery on the loggerhead subpopulations now wholly contained within the NWA DPS, the opinion's conclusion that the fishery is not likely to jeopardize the continued existence of loggerhead sea turtles remains valid.

3.3 Economic Environment

A description of the hogfish stock is provided in **Section 3.2**. Additional details on the South Atlantic Snapper Grouper Fishery can be found in the Comprehensive ACL Amendment for the South Atlantic Region (SAFMC 2011c) and Amendment 24 (SAFMC 2011d) and are incorporated herein by reference.

3.3.1 Commercial Sector

The major sources of data summarized in this description are the NMFS SERO Permits Information Management System (PIMS) and the Federal Logbook System (FLS), supplemented by average prices calculated from the Accumulated Landings System (ALS) and price indices taken from the Bureau of Labor Statistics (BLS). Inflation adjusted revenues and prices are reported in 2014 dollars. Landings are expressed in pounds (lbs) gutted weight (gw) to match the method for collecting ex-vessel price information. The gutted to whole weight (ww) conversion rate is ww = gw x 1.11.

Permits

Any fishing vessel that harvests and sells any of the snapper grouper species from the South Atlantic EEZ must have a valid South Atlantic commercial snapper grouper permit, which is a limited access permit. As of June 30, 2015, there were 557 valid or renewable South Atlantic Snapper Grouper Unlimited Permits and 118 valid or renewable 225-lb Trip-limited Permits. After a permit expires, it can be renewed or transferred up to one year after the date of expiration. The number of valid or renewable snapper grouper permits declined steadily from 2010 through 2014 (**Table 3.3.1.1**).

Table 3.3.1.1. Number of valid or renewable South Atlantic commercial snapper grouper permits (2010 through 2014).

	Unlimited	225-lb Trip-limited
2010	624	139
2011	615	138
2012	604	132
2013	592	129
2014	584	125
Average	604	133

Source: NMFS SERO Permits Dataset, 2015.

Landings, Value, and Effort

Landings of hogfish for each proposed stock area from 2010 through 2014 are presented in **Figure 3.3.1.1**. Landings in Georgia through North Carolina decreased by approximately 50% from 2010 through 2014, whereas landings from the Florida Keys and East Florida increased by approximately 31%.

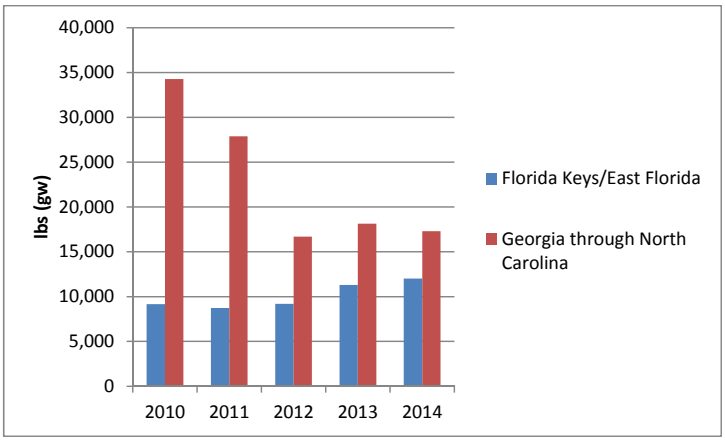


Figure 3.3.1.1. Annual commercial landings of hogfish (lbs gw) by stock area.
Source: NMFS SEFSC Coastal Fisheries Logbook.

On average (2010 through 2014), for the vessels that landed hogfish each year, hogfish accounted for only 1.2% of all species landings and 1.5% of all species revenue (**Table 3.3.1.2** and **Table 3.3.1.3**). Vessels with reported landings of hogfish took almost 5 times as many non-hogfish trips as hogfish trips. The average annual price per pound of hogfish during 2010 through 2014 was $3.64 (2014 dollars) and average prices were mostly stable across years.

Table 3.3.1.2. Number of vessels, number of trips and landings (lbs gw) by year.

Year	Number of vessels that caught hogfish (> 0 lbs gw)	Number of trips that caught hogfish	hogfish landings (lbs gw)	Other species' landings jointly caught with hogfish (lbs gw)	Number of SATL trips that only caught other species	Other species' landings on SATL trips without hogfish (lbs gw)
2010	131	573	43,421	609,628	2,942	2,035,375
2011	147	617	36,619	600,670	3,326	2,450,628
2012	131	607	25,895	497,928	2,901	1,848,574
2013	129	700	29,440	479,596	3,127	2,142,733
2014	136	711	29,317	473,602	3,262	2,081,666
Average	135	642	32,938	532,285	3,112	2,111,795

Source: NMFS SEFSC Coastal Fisheries Logbook.

Table 3.3.1.3. Number of vessels and ex-vessel revenues by year (2014 dollars)*.

	Number of vessels that caught hogfish	Dockside revenue from hogfish	Dockside revenue from 'other species' jointly caught with hogfish	Dockside revenue from 'other species' caught on SATL trips without hogfish	Total dockside revenue	Average total dockside revenue per vessel
2010	131	$146,109	$1,926,324	$5,694,058	$7,766,491	$59,286
2011	147	$131,513	$1,915,203	$6,872,024	$8,918,740	$60,672
2012	131	$92,580	$1,781,292	$5,452,284	$7,326,156	$55,925
2013	129	$108,809	$1,835,368	$6,249,005	$8,193,182	$63,513
2014	136	$116,120	$1,766,921	$5,988,655	$7,871,696	$57,880
Average	135	$119,026	$1,845,022	$6,051,205	$8,015,253	$59,455

Source: NMFS SEFSC Coastal Fisheries Logbook for landings and NMFS Accumulated Landings System for prices.
*Revenues converted to 2014 dollars using the 2014 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS) (http://www.bls.gov/data/).

On average (2010 through 2014), the majority of hogfish trips that occurred in Georgia through North Carolina landed less than 100 lbs gw of hogfish per trip (**Table 3.3.1.4**). Only approximately 19% of vessels that landed hogfish in Georgia through North Carolina from 2010 through 2014 reported landings in excess of 100 lbs gw on a single trip. In the Florida Keys and East Florida, on average (2010 through 2014), the majority of hogfish effort occurred on trips with reported hogfish landings of less than 25 lbs gw per trip (**Table 3.3.1.5**). Approximately half of the vessels that landed hogfish in the Florida Keys and East Florida, however, reported

taking a trip with hogfish landings in excess of 25 lbs gw.

Table 3.3.1.4. Number of trips that landed hogfish in Georgia through North Carolina in excess of each proposed trip limit and number of vessels that took such trips (2010 through 2014 average).

	Trip Limit			
	100	**250**	**500**	**750**
Number of trips with hogfish landings in excess of each trip limit option	47	23	9	5
(percent of all hogfish trips)	(17.1%)	(8.3%)	(3.4%)	(1.9%)
Number of vessels that took a trip with hogfish landings in excess of each trip limit option	12	5	***	***
(percent of all hogfish vessels)	(19.1%)	(8.7%)	***	***

Source: NMFS SEFSC Coastal Fisheries Logbook.
*** 3 or fewer vessels.

Table 3.3.1.5. Number of trips that landed hogfish in the Florida Keys/East Florida in excess of each proposed trip limit and number of vessels that took such trips (2010 through 2014 average).

	Trip Limit (lbs, gw)				
	25	**50**	**100**	**150**	**200**
Number of trips with hogfish landings in excess of each trip limit option	103	50	15	7	4
(percent of all hogfish trips)	(28.1%)	(13.6%)	(4.0%)	(1.8%)	(1.1%)
Number of vessels that took a trip with hogfish landings in excess of each trip limit option	37	23	10	5	4
(percent of all hogfish vessels)	(48.2%)	(29.9%)	(13.0%)	(7.0%)	(4.9%)

Source: NMFS SEFSC Coastal Fisheries Logbook.

Imports

Imports of seafood products compete in the domestic seafood market and have in fact dominated many segments of the seafood market. Imports aid in determining the price for domestic seafood products and tend to set the price in the market segments in which they dominate. Seafood imports have downstream effects on the local fish market. At the harvest level for snapper and grouper species, including hogfish, imports affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production of snappers and groupers, imports tend to cushion the adverse economic effects on

consumers resulting from a reduction in domestic landings. The following describes the imports of fish products which directly compete with domestic harvest of snappers and groupers, including hogfish.

Imports[1] of fresh snapper were 22.8 million lbs product weight (pw) in 2010. They decreased to 21.7 million lbs pw in 2011, then increased steadily to 23.6 million lbs pw in 2014. Total revenue from fresh snapper imports increased from $64.5 million (2014 dollars[2]) in 2010 to a five-year high of $72.1 million in 2014. Imports of fresh snappers primarily originated in Mexico, Central America, or South America, and entered the U.S. through the port of Miami. Imports of fresh snapper were highest on average (2010 through 2014) during the months March through July.

Imports of frozen snapper were substantially less than imports of fresh snapper from 2010 through 2014. The annual value of frozen snapper imports ranged from $20.9 million (2014 dollars) to $30 million during the time period, with a peak in 2012. Imports of frozen snapper primarily originated in South America (especially Brazil), Indonesia, and Mexico. The majority of frozen snapper imports entered the U.S. through the ports of Miami and New York. Imports of frozen snappers tended to be lowest during March through June when fresh snapper imports were the highest.

Imports of fresh grouper ranged from 8.2 million lbs pw to 10 million lbs pw from 2010 through 2014. Total revenue from fresh grouper ranged from $27.6 million (2014 dollars) to $36.8 million during this time period, with a peak in 2013. The bulk of fresh grouper imports originated in Mexico and entered the U.S. through Miami. From 2010 through 2014 fresh grouper imports were lowest on average during the month of March and higher the rest of the year, with a peak in July.

Imports of frozen grouper were minimal and stable from 2010 through 2014, ranging from 1.3 million lbs pw worth $2.5 million (2014 dollars) to 2 million lbs pw worth $3.6 million. Frozen grouper imports generally originated in Mexico and to a lesser extent, Asia and entered the U.S. through Miami and Tampa. There was an inverse relationship in monthly landings between frozen and fresh groupers, with average imports being the highest in March for frozen grouper and lower during other months.

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 hogfish 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

[1] NOAA Fisheries Service purchases fisheries trade data from the Foreign Trade Division of the U.S. Census Bureau. Data are available for download at http://www.st.nmfs.noaa.gov/st1/trade/index.html.
[2] Converted to 2014 dollars using the 2014 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS) (http://www.bls.gov/data/).

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 hogfish, and all species harvested by the vessels that harvested hogfish, were derived using the model developed for and applied in NMFS (2011b) and are provided in **Table 3.3.1.6**. 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. It should be noted that 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 hogfish and a harvester job is "generated" for approximately every $45,000 in ex-vessel revenue. These results contrast with the information provided in **Table 3.3.1.2**, which shows an average of 135 harvesters (vessels) with recorded landings of hogfish from 2010 through 2014.

Table 3.3.1.6. Average annual business activity (2010 through 2014) associated with the commercial harvest of hogfish and the harvest of all species by vessels that landed hogfish. All monetary estimates are in 2014 dollars.

Species	Average Ex-vessel Value ($ thousands)	Total Jobs	Harvester Jobs	Output (Sales) Impacts ($ thousands)	Income Impacts ($ thousands)
Hogfish	$119	20	3	$1,567	$668
All species on all trips made by vessels that landed greater than one pound of hogfish in a year.	$8,015	1,374	179	$105,533	$44,977

Source: Calculated by NMFS SERO using the model developed for NMFS (2011b).

3.3.2 Recreational Sector

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

Landings

The vast majority of estimated recreational landings from 2010 through 2014 occurred in the Florida Keys/East Florida stock area, which includes Monroe County (**Table 3.3.2.1**). Landings fluctuated during this time period in all areas.

Table 3.3.2.1. Recreational landings (lbs gw) of hogfish, by area, 2010-2014.

Year	North Carolina	South Carolina	Georgia / East FL*	East Florida	Monroe County	Total
2010	1,771	1,992	108	54,078	128,002	185,952
2011	461	79	744	48,525	40,797	90,606
2012	4,178	3	178	84,042	281,172	369,573
2013	825	5	255	63,998	92,768	157,852
2014	8	16	368	111,410	154,087	265,889
Average	1,448	419	331	72,411	139,365	213,974

Source: SEFSC Marine Recreational Information Program (MRIP) ACL datasets (July 2015).
*Landings estimates from the Southeast Region Headboat Survey (SRHS) are pooled between Northeast Florida (north of Sebastian, FL) and Georgia.

Permits

For-hire vessels are required to have a for-hire snapper grouper permit to fish for or possess snapper grouper species in the South Atlantic EEZ. As of June 30, 2015, there were 1,381 valid for-hire snapper grouper permits. This sector operates as an open access fishery and not all permitted vessels are necessarily active in the fishery. Some vessel owners may have obtained open access permits as insurance for uncertainties in the fisheries in which they currently operate. The number of for-hire vessel permits issued for the South Atlantic snapper grouper fishery decreased from 1,812 permits in 2010 to a five-year low of 1,727 permits in 2014 (**Table 3.3.2.2**). The majority of snapper grouper for-hire permitted vessels were home-ported in Florida; a relatively high proportion of these permitted vessels were also home-ported in North Carolina and South Carolina. Many vessels with South Atlantic for-hire snapper grouper permits were home-ported in states outside of the SAFMC's area of jurisdiction. On average (2010 through 2014), these vessels accounted for approximately 11% of the total number of for-hire snapper grouper permits issued.

Table 3.3.2.2. Number of South Atlantic for-hire snapper grouper permits, by homeport state, 2010-2014.

Home Port	2010	2011	2012	2013	2014	Average
North Carolina	331	330	312	307	294	315
South Carolina	145	132	138	150	160	145
Georgia	27	26	26	30	34	29
Florida	1,109	1,099	1,122	1,121	1,062	1,103
Gulf (AL-TX)	86	91	93	91	81	88
Others	114	103	106	100	96	104
Total	1,812	1,781	1,797	1,799	1,727	1,783

Source: NMFS SERO Permits Dataset, 2015.

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 operate 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. As of April 24, 2015, 77 South Atlantic headboats were registered in the SRHS (K. Fitzpatrick, NMFS SEFSC, pers. comm.). The majority of these headboats were located in Florida/Georgia (49), followed by North Carolina (18) and South Carolina (10).

There are no specific permitting requirements for recreational anglers to 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 amendment.

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:

- 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 the second primary target for the trip. The species did not have to be caught.
- 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.
- Total recreational trips - The total estimated number of recreational trips in the Gulf, regardless of target intent or catch success.

Other measures of effort are possible, such as directed trips (the number of individual angler trips that either targeted or caught a particular species), among other measures. **Table 3.3.2.3** and **Table 3.3.2.4** present target and catch effort estimates associated with hogfish. Most of the estimated target and catch effort for hogfish occurred in Florida, with the private mode being the most prevalent mode of fishing. Although not shown, on average (2010 through 2014), hogfish target trips, across all modes and states, accounted for approximately 8.9% of all snapper grouper target trips and hogfish catch trips accounted for approximately 1.6% of all snapper grouper catch trips.

Table 3.3.2.3. Hogfish recreational target trips, by mode and state, 2010-2014*.

	Florida	North Carolina**	Total
	Charter Mode		
2010	1,478	0	1,478
2011	262	0	262
2012	0	0	0
2013	152	0	152
2014	207	0	207
Average	420	0	420
	Private/Rental Mode		
2010	24,982	0	24,982
2011	10,445	0	10,445
2012	17,926	734	18,660
2013	23,297	0	23,297
2014	16,361	0	16,361
Average	18,602	147	18,749
	All Modes		
2010	26,460	0	26,460
2011	10,707	0	10,707
2012	17,926	734	18,660
2013	23,449	0	23,449
2014	16,568	0	16,568
Average	19,022	147	19,169

Source: MRIP database, NOAA Fisheries, NMFS, SERO.
*There were no hogfish target trips estimated for Georgia or South Carolina and none for the shore mode.
**2012 estimates were expanded from only three intercepted trips. There were no intercepted hogfish target trips in North Carolina for other years.
Note: Effort estimates have been post-stratified to include Monroe County, FL.

Table 3.3.2.4. Hogfish recreational catch trips, by mode and state, 2010-2014*.

	Florida	North Carolina	South Carolina**	Total
	Shore Mode			
2010	327	263	0	590
2011	0	900	0	900
2012	1,458	0	0	1,458
2013	294	0	0	294
2014	1,329	3,080	0	4,409
Average	682	849	0	1,530
	Charter Mode			
2010	814	35	15	864
2011	1,491	0	0	1,491
2012	1,402	89	0	1,491
2013	2,998	243	0	3,241
2014	4,030	0	0	4,030
Average	2,147	73	3	2,223
	Private/Rental Mode			
2010	16,926	872	758	18,555
2011	13,519	499	0	14,017
2012	27,686	686	0	28,372
2013	28,080	387	0	28,467
2014	28,561	0	0	28,558
Average	22,954	489	152	23,594
	All Modes			
2010	18,067	1,170	773	20,009
2011	15,009	1,398	0	16,408
2012	30,545	775	0	31,321
2013	31,372	630	0	32,002
2014	33,918	3,080	0	36,998
Average	25,782	1,411	155	27,348

Source: MRIP database, NOAA Fisheries, NMFS, SERO.
*There were no hogfish catch trips estimated for Georgia.
**2010 estimates were expanded from only two intercepted trips. There were no intercepted hogfish catch trips in South Carolina for other years.
Note: Effort estimates have been post-stratified to include Monroe County, FL.

Similar analysis of recreational effort is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the total number of standardized full-day angler trips[3]. Headboat effort, in terms of angler days, increased substantially in Florida/Georgia from 2010 through 2014, while effort remained relatively constant in North Carolina and South Carolina (**Table 3.3.2.5**). Headboat effort was the highest, on average, during the summer months of June through August (**Table 3.3.2.6**).

Table 3.3.2.5. Headboat angler days and percent distribution by state (2010 through 2014).

	Angler Days			Percent Distribution		
	Florida/Georgia	North Carolina	South Carolina	Florida/Georgia	North Carolina	South Carolina
2010	123,662	21,071	44,951	65.2%	11.1%	23.7%
2011	124,041	18,457	44,645	66.3%	9.9%	23.9%
2012	139,623	20,766	41,003	69.3%	10.3%	20.4%
2013	165,679	20,547	40,963	72.9%	9.0%	18.0%
2014	195,890	22,691	42,025	75.2%	8.7%	16.1%
Average	149,779	20,706	42,717	70.3%	9.7%	20.0%

Source: NMFS SRHS.

Table 3.3.2.6. Headboat angler days and percent distribution by month (2010 – 2014).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Headboat Angler Days											
2010	5,937	6,437	12,786	18,329	19,898	29,301	31,801	25,123	10,755	13,313	8,458	7,546
2011	8,011	10,688	13,718	17,472	17,786	29,793	33,259	21,634	11,107	8,352	6,491	8,832
2012	9,230	9,663	17,307	19,587	18,232	27,819	35,115	25,052	15,894	8,677	6,564	8,252
2013	10,182	10,892	14,541	16,129	20,969	33,079	39,463	33,830	16,335	14,534	6,698	10,537
2014	8,748	13,512	19,808	22,570	25,764	39,115	44,066	32,886	15,203	15,235	9,088	14,611
Avg	8,422	10,238	15,632	18,817	20,530	31,821	36,741	27,705	13,859	12,022	7,460	9,956
	Percent Distribution											
2010	3.1%	3.4%	6.7%	9.7%	10.5%	15.4%	16.8%	13.2%	5.7%	7.0%	4.5%	4.0%
2011	4.3%	5.7%	7.3%	9.3%	9.5%	15.9%	17.8%	11.6%	5.9%	4.5%	3.5%	4.7%
2012	4.6%	4.8%	8.6%	9.7%	9.1%	13.8%	17.4%	12.4%	7.9%	4.3%	3.3%	4.1%
2013	4.5%	4.8%	6.4%	7.1%	9.2%	14.6%	17.4%	14.9%	7.2%	6.4%	2.9%	4.6%
2014	3.4%	5.2%	7.6%	8.7%	9.9%	15.0%	16.9%	12.6%	5.8%	5.8%	3.5%	5.6%
Avg	4.0%	4.8%	7.3%	8.9%	9.6%	14.9%	17.3%	13.0%	6.5%	5.6%	3.5%	4.6%

Source: NMFS SRHS.

[3] Headboat trip categories include half-, three-quarter-, full-, and 2-day trips. A full-day trip equals one angler day, a half-day trip equals .5 angler days, etc. Angler days are not standardized to an hourly measure of effort and actual trip durations may vary within each category.

Economic Value

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

Direct estimates of the CS for hogfish are not currently available. There are, however, estimates for snapper and grouper species in general. Haab et al. (2012) estimated the CS (willingness to pay (WTP) for one additional fish caught and kept) for snappers and groupers in the Southeastern U.S. using four separate econometric modeling techniques. The finite mixture model, which takes into account variation in the preferences of fishermen, had the best prediction rates of the four models and, as such, was selected for presentation here. The WTP for an additional snapper (excluding red snapper) estimated by this model was $12.37 (2014 dollars)[4]. This value may seem low and may be strongly influenced by the pooling effect inherent to the model in which it was estimated. The WTP for an additional red snapper, in comparison, was estimated to be $140.23 (2014 dollars). The WTP for an additional grouper was estimated to be $134.73 (2014 dollars). Another study estimated the value of the consumer surplus for catching and keeping a second grouper on an angler trip at approximately $103 (2014 dollars) and lower thereafter (approximately $69 for a third grouper, $51 for a fourth grouper, and $40 for a fifth grouper) (Carter and Liese 2012). Additionally, this study estimated the value of harvesting a second red snapper at approximately $81 (2014 dollars) and lower thereafter. No estimates were provided for other snapper species.

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

With regards to for-hire businesses, economic value can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of the PS per for-hire passenger trip are not available. Instead, net operating revenue (NOR), which is the return used to pay all labor wages, returns to capital, and owner profits, is used as a proxy for PS. For the South Atlantic region, estimated NOR values are $163 (2014 dollars) per charter angler trip and $44 per headboat angler trip (C. Liese, NMFS SEFSC, pers. comm.)[5].

[4] Estimates converted to 2014 dollars using the 2014 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS) (http://www.bls.gov/data/).
[5] Estimates were converted to 2014 dollars using the 2014 annual CPI for all US urban consumers provided by the BLS (http://www.bls.gov/data/).

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. It should be clearly noted that, 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 hogfish were derived using average impact coefficients for recreational angling for all species, as derived from an add-on survey to the Marine Recreational Fisheries Statistics Survey (MRFSS) to collect economic expenditure information, as described and utilized in NMFS (2011b). Estimates of the average expenditures by recreational anglers are also provided in NMFS (2011b) 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 target effort (2010-2014) for hogfish and associated business activity (2014 dollars) are provided in **Table 3.3.2.7**. The average impact coefficients, or multipliers, used in the model are invariant to the "type" of effort and can therefore be directly used to measure the impact of other effort measures such as catch trips if desired. To calculate the multipliers from **Table 3.3.2.7**, simply divide the desired impact measure (output impact, value-added impact, or jobs) associated with a given state and mode by the number of target trips for that state and mode. It is noted that multipliers are not provided for combinations of states and modes that had zero estimated hogfish target trips from 2010 through 2014.

The estimates provided in **Table 3.3.2.7** 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 3.3.2.7. Summary of hogfish target trips (2010 through 2014 average) and associated business activity (2014 dollars)*. Output and value added impacts are not additive.

	East Florida	North Carolina
	Private/Rental Mode	
Target Trips	18,602	147
Output Impact	$967,360	$12,392
Value Added Impact	$544,606	$7,025
Jobs	8	0
	Charter Mode	
Target Trips	420	0
Output Impact	$334,777	$0
Value Added Impact	$220,338	$0
Jobs	3	0
	All Modes	
Target Trips	19,022	147
Output Impact	$1,302,136	$12,392
Value Added Impact	$764,944	$7,025
Jobs	11	0

*There were no hogfish target trips estimated for Georgia or South Carolina and none for the shore mode.
Source: effort data from MRIP; economic impact results calculated by NMFS SERO using the model developed for NMFS (2011b).

3.4. Social Environment

Descriptions of the social and cultural environment of snapper grouper fishing communities are contained in Jepson et al. (2005), Amendment 17A (SAFMC 2010a), and the Comprehensive Annual Catch Limit Amendment (SAFMC 2011c).

3.4.1 Commercial Sector

Since 2001, South Atlantic Snapper Grouper Unlimited Permits and Snapper Grouper 225-pound Trip Limit Permits have shown a downward trend (**Figure 3.4.1.1**) as would be expected with a limited entry program in place since 1998 and a "2 for 1" requirement for new permits. That trend will likely continue as long as the criteria are a continued part of management for the snapper grouper commercial fishery. The decline in the number of permits has slowed in recent years as there seems to be a leveling off with the number of unlimited permits in 2013 going from 593 to 584 in 2014 and limited permits dropping from 130 in 2013 to 125 in 2014.

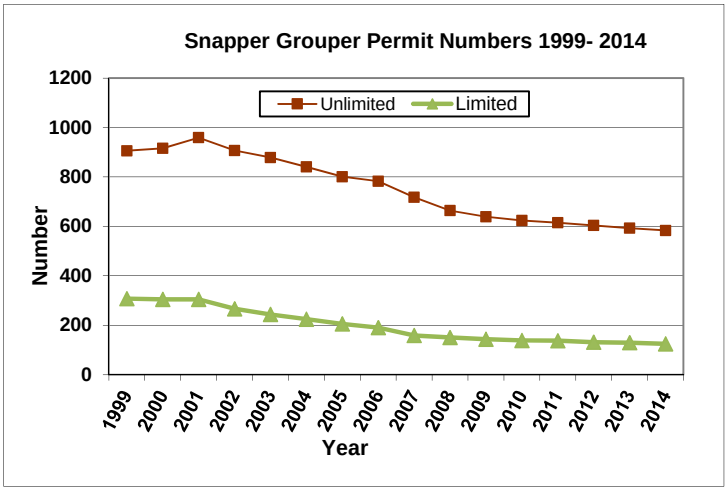


Figure 3.4.1.1. Snapper grouper Unlimited and 225-pound trip limit permits 1999-2014.
Source: NMFS SERO Permits (2015).

In terms of where permit holders are landing hogfish, **Figure 3.4.1.2** provides a ranking of the top fifteen communities in Florida with hogfish landings and their regional quotient (RQ). Regional quotient is the amount of hogfish landed by a community out of all hogfish landed within the South Atlantic region[6]. Most hogfish are landed in Southeast Florida, with Key West, FL dominating other ports, although Mayport, FL is in the top five in terms of RQ. St. Augustine and Jacksonville Beach are other Northeastern Florida communities within the top fifteen.

[6] The values on the y axis are not provided to protect confidentiality.

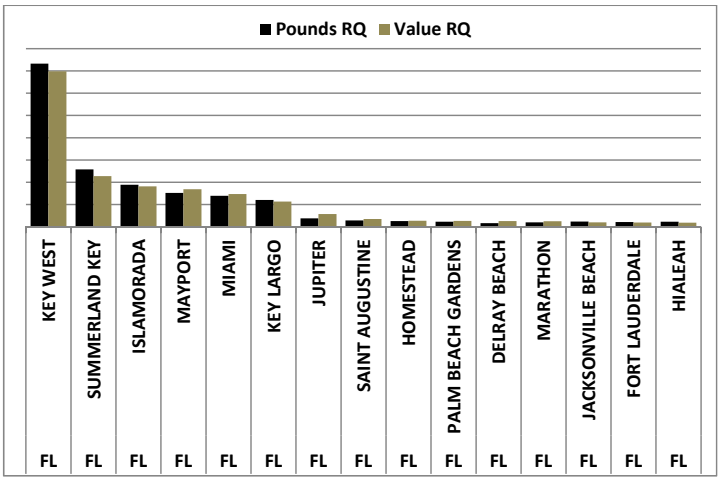


Figure 3.4.1.2. Hogfish Pounds and Value Regional Quotient (RQ) for Top 15 Florida Communities.
Source: NMFS: ALS 2013

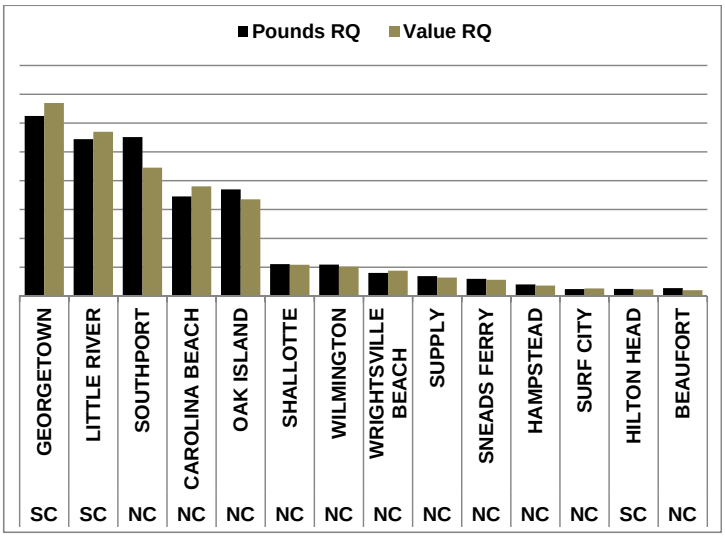


Figure 3.4.1.3. Hogfish Pounds and Value Regional Quotient (RQ) for Top 15 GA-NC Communities.
Source: NMFS: ALS 2013

The areas outside of Florida where hogfish are landed, from Georgia to North Carolina, are dominated by Murrells Inlet, SC with the highest RQ. There are no communities in Georgia within the top 15 communities.

Hogfish are commercially harvested primarily with spear and hook and line. They tend to be an easy target for spear fishermen and are prized for their taste and texture. They are likely bycatch for commercial hook and line fishermen as their numbers are limited they make up a small part of the catch. This is evident in **Table 3.4.1.1** where the average vessel local quotient by community is described. A vessel local quotient is the amount of hogfish harvested by a vessel out of all species harvested within a year and averaged here by community. Although some communities did have a higher average vessel local quotient, they were not included because there were fewer than 3 within a community. The highest average local quotient in **Table 3.4.1.1** was approximately 12 percent of hogfish out of total annual harvest of all species.

Table 3.4.1.1. Average 2012 Vessel Local Quotient by Community

Community	Average Vessel LQ	Number of Vessels
Big Pine Key, FL	0.1196	7
Little Torch Key, FL	0.1031	3
Key West, FL	0.0611	27
Little River, SC	0.0519	9
Conch Key, FL	0.0416	3
Jacksonville, FL	0.0341	7
Murrells Inlet, SC	0.0115	6
Miami, FL	0.0102	7
Southport, NC	0.0049	11
Tavernier, FL	0.0046	5

Commercial Fishing Engagement and Reliance

To better understand how South Atlantic fishing communities are engaged and reliant on fishing overall, several indices composed of existing permit and landings data were created to provide a more empirical measure of fishing dependence (Colburn and Jepson 2013; Jepson and Colburn 2013). Commercial fishing engagement uses the absolute numbers of permits, landings and value, while commercial fishing reliance includes many of the same variables as engagement, but divides by population to give an indication of the per capita impact 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. Factor scores are represented by colored bars and are standardized, therefore the mean is zero. Two thresholds of 1 and ½ standard deviation above the mean are plotted onto the graphs to help determine thresholds for significance. Because the factor scores are standardized, a score above 1 is also above one standard deviation.

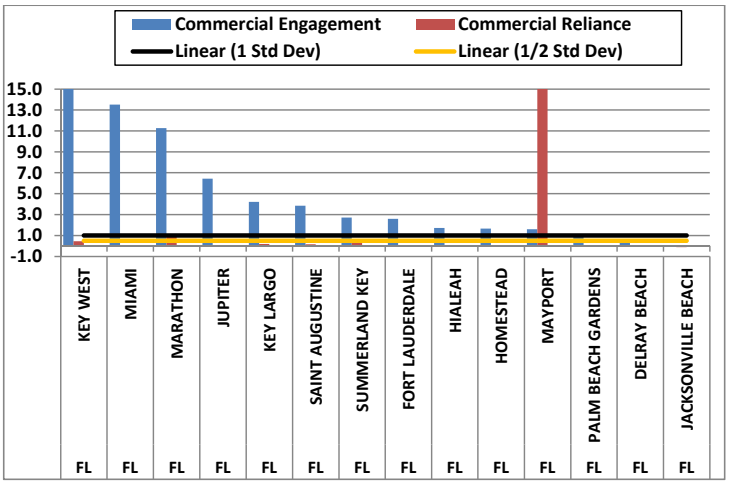


Figure 3.4.1.4. Commercial Fishing Engagement and Reliance for Top 15 Florida Communities. Source: NMFS Social Indicators 2015

Most of the Florida communities that have a high regional quotient for hogfish are also highly engaged in commercial fishing according to **Figure 3.4.1.4**. Key West is one of the highest commercially engaged fishing communities while Delray Beach and Jacksonville Beach are neither highly engaged nor reliant. Mayport has the highest reliance of any Florida community, largely due to its small population. The only other community that exceeds the lowest threshold for reliance is Marathon.

The majority of those communities outside of Florida with high regional quotients for hogfish are also highly engaged in commercial fishing, but few show commercial fishing reliance. In **Figure 3.4.1.5**, Wilmington has the highest engagement while Surf City and Hampstead have little engagement or reliance. Sneads Ferry is both highly engaged and reliant with Beaufort and Southport showing high engagement with some reliance on commercial fishing.

It is expected for those communities that are both highly engaged and reliant on commercial fishing, may experience vulnerabilities from any negative impacts from regulatory change. While their engagement and reliance are not the only factors that should be considered and other vulnerabilities may exist as outlined below in Environmental Justice. While these vulnerabilities may exist, this does not mean that a community will experience negative impacts, only that these factors can contribute to the possibility of negative impacts.

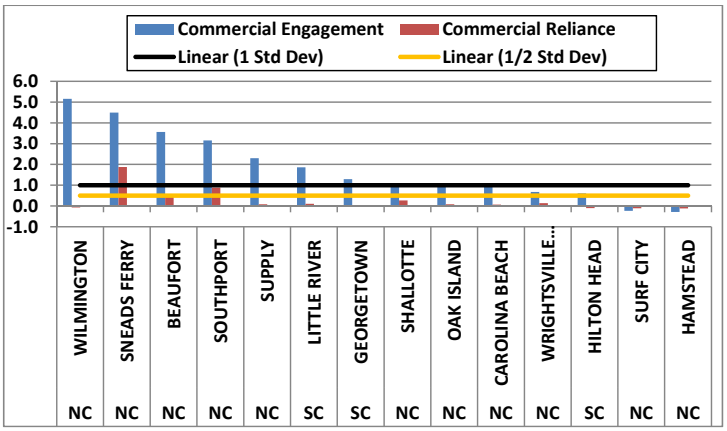


Figure 3.4.1.5. Commercial Fishing Engagement and Reliance for Top 15 Georgia-North Carolina Communities.
Source: NMFS: Social Indicators 2015

3.4.2 Recreational Sector

Hogfish is a popular species for recreational divers and also hook and line fishermen. Because it is difficult to co-locate recreational fishermen and the species for which they fish, **Table 3.4.1.2** identifies those communities in the South Atlantic that have a high number of for-hire vessels and that same number divided by the community's population. Both ranks are averaged to understand the importance of for-hire fishing to that community. Rankings are based upon the vessels description of its primary category of fishing: charter, headboat, or commercial. Florida and North Carolina have the most number of communities by their average rank for charter and headboat designated vessels. Key West, FL ranks first in terms of number of for-hire vessels and Hatteras is ranked first when dividing that number by the community population. These measures are similar to the recreational engagement and reliance measures that are used below to also gauge the importance of recreational fishing to a community.

Table 3.4.1.2. South Atlantic Communities Average Rank by For-hire Permits and For-hire Permits per Population.

State	Community	Number of For-hire Permits	Number of Permits Rank	Permits per Population Rank	Average Rank
NC	Manteo	24	6	2	4
FL	Islamorada	36	3	8	5.5
NC	Hatteras	14	11	1	6
FL	Marathon	44	2	11	6.5
FL	Key West	118	1	16	8.5
NC	Atlantic Beach	13	13	6	9.5
FL	Key Colony Beach	9	16	3	9.5
FL	Ponce Inlet	14	11	17	14
NC	Calabash	9	16	13	14.5
SC	Murrells Inlet	16	9	24	16.5
FL	Duck Key	6	28	5	16.5
NC	Wanchese	8	20	15	17.5
SC	Little River	15	10	27	18.5
NC	Nags Head	8	20	20	20
FL	Cudjoe Key	7	25	18	21.5
FL	Tavernier	7	25	19	22
NC	Morehead City	9	16	31	23.5
FL	Cape Canaveral	9	16	33	24.5
NC	Wrightsville Beach	6	28	22	25
NC	Southport	6	28	25	26.5
NC	Holden Beach	3	41	12	26.5
SC	Hilton Head Island	19	8	46	27
NC	Carolina Beach	7	25	30	27.5
FL	Key Largo	8	20	36	28
NC	Topsail Beach	2	47	9	28

The communities in Florida that are highly engaged in recreational fishing in **Figure 3.4.1.6** are many of the same communities that have important charter fishing activity in **Table 3.4.1.2**. Only five highly engaged communities have high reliance: Islamorada, Key West, Ponce Inlet, Marathon and Big Pine Key. St. Augustine is highly engaged and does show moderate reliance as does Key Largo. Although these communities are highly engaged and reliant on recreational fishing, we do not know to what extent that fishermen fish for hogfish. We can only assume that for many of the Keys communities that there are fishermen who recreationally fish for hogfish and in other Florida communities may also. It may be that for many of those communities where hogfish are landed commercially, there may also be a higher instance of recreational hogfish landings.

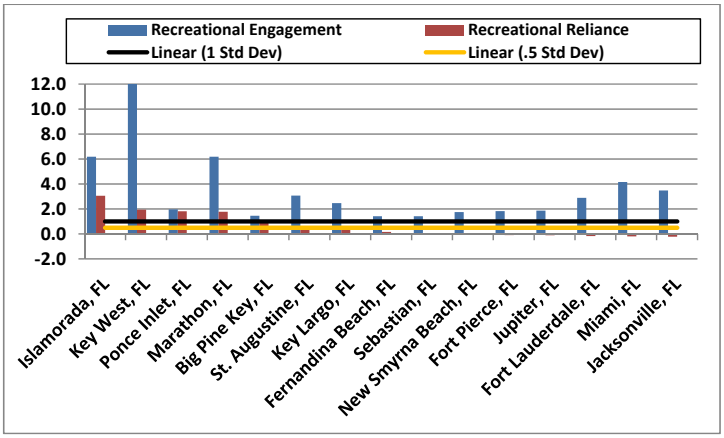


Figure 3.4.1.6. Recreational Fishing Engagement and Reliance for Top 15 Engaged Florida Communities.
Source: NMFS: Social Indicators 2015

Those communities outside of Florida that are highly engaged are shown in **Figure 3.4.1.7**. Several show high reliance on recreational fishing in turn. The communities of Murrells Inlet, SC; Atlantic Beach, Wanchese, Wrightsville Beach, and Nags Head, NC; all have high engagement and reliance on recreational fishing. Several others show high engagement and moderate reliance, including: Morehead City, NC; Little River, SC; and Carolina Beach, NC.

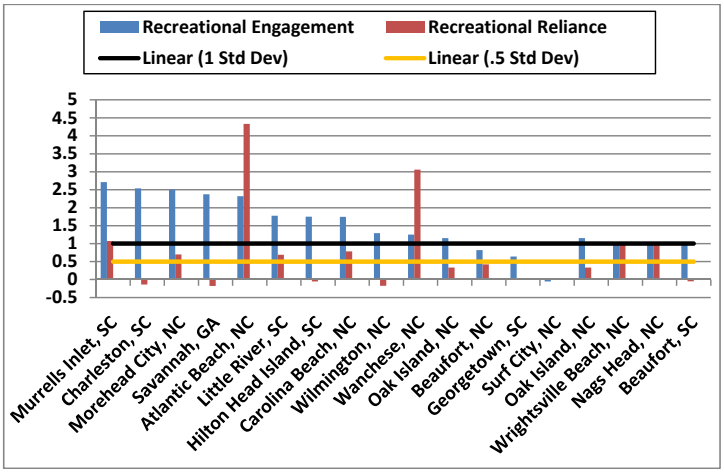


Figure 3.4.1.7. Recreational Fishing Engagement and Reliance for Top 15 Engaged South Carolina and North Carolina Communities.
Source: NMFS: Social Indicators 2015

The above communities, like those in Florida demonstrate that recreational fishing likely plays a prominent role in the local economy. Again, it is not possible to place hogfish fishing activity within a particular community and it is assumed that some fishermen in certain locales do participate in harvesting that species.

For those communities that are both highly engaged and reliant on both commercial and recreational fishing and have high regional quotients, we might expect that that set of communities will be those most likely to exhibit vulnerabilities to negative impacts from alternatives in the document. At this time it is only possible to identify those communities that are highly engaged in fishing activities and have fishermen who may harvest hogfish within that community.

3.4.3 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 and coastal communities in the South Atlantic may experience some impacts by the proposed action depending upon the alternatives selected and whether they have negative or positive social effects. However, information on the race and income status for many of the individuals involved in fishing is not available. To evaluate where EJ concerns might exist, a suite of social vulnerability indices have been developed. The three indices are poverty, population composition and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to a community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and households with children under the age of 5, disruptions such as higher separation rates, higher crime rates and unemployment all are signs of populations experiencing vulnerabilities. These vulnerabilities signify that it may be difficult for someone living in these communities to recover from significant social disruption that might stem from a change in their ability to work or maintain a certain income level.

Because many of the communities included in both the commercial and recreational engagement and reliance figures are the same, a select group most common from each region and sector were included in the following figures. In **Figure 3.4.1.8** there are very few selected communities in Florida that exceed the thresholds for social vulnerability. Fort Pierce and Miami are the only two that demonstrate that substantial social vulnerabilities exist.

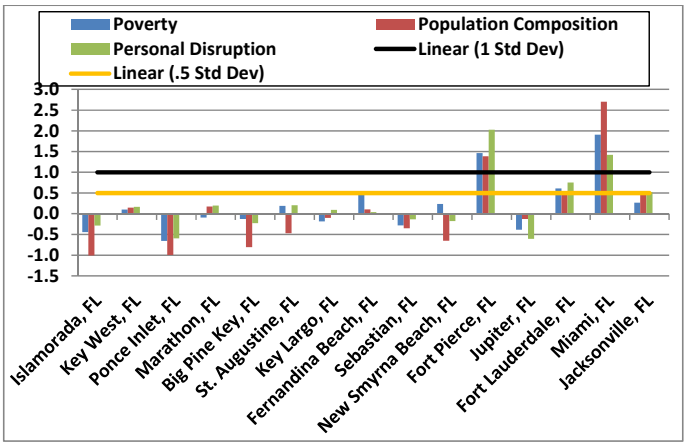


Figure 3.4.1.8. Social Vulnerability Indices for Selected Commercial and Recreationally Fishing Engaged Florida Communities.
Source: NMFS: Social Indicators 2015

The same is true for communities outside of Florida, as only Georgetown, SC and Savannah, GA exhibit substantial social vulnerabilities as they either exceed both thresholds for all three vulnerabilities or have exceeded the lowest threshold for all three. The other communities in the region show some vulnerability but exceed only the lower threshold for one or two vulnerabilities.

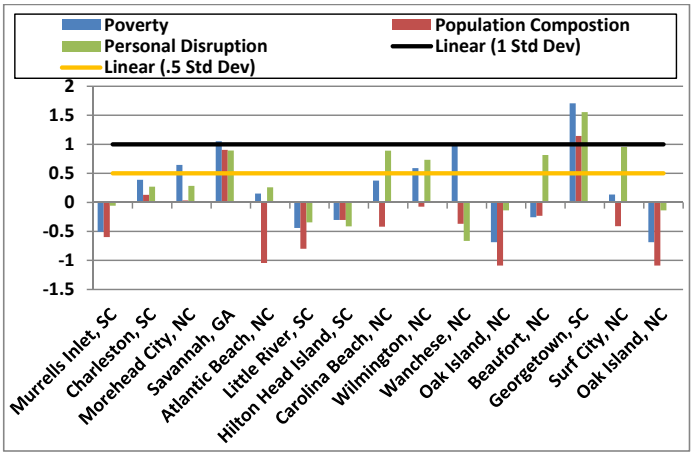


Figure 3.4.1.9. Social Vulnerability Indices for Selected Commercial and Recreationally Fishing Engaged Communities in Georgia, South Carolina and North Carolina.
Source: NMFS: Social Indicators 2015

Those communities that exhibit high social vulnerabilities may experience negative social effects if the alternatives within this amendment have adverse impacts. This is not to say that these communities will be negatively affected, but the indicators suggest that they may experience difficulties. These are the communities that would be most at risk depending upon their fishing engagement and reliance. Overall, because hogfish represent a small portion of many fishing portfolios, the impacts will likely not be community wide, but will more likely affect businesses and households individually. At this time, there are no metrics that allow for the analysis of those types of impacts on individuals or households.

3.5 Administrative Environment

3.5.1 The Fishery Management Process and Applicable Laws

3.5.1.1 Federal Fishery Management

Federal fishery management is conducted under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the EEZ, an area extending 200 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 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 mi 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. The South Atlantic Council also established two voting seats for the Mid-Atlantic Council on the South Atlantic Mackerel Committee. 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.

3.5.1.2 State Fishery Management

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

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

3.5.1.3 Enforcement

Both the NMFS 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 Schedule is available online at http://www.gc.noaa.gov/enforce-office3.html.

Chapter 4. Environmental Consequences

Action 1. Modify the Fishery Management Unit for hogfish

4.1.1 Biological Effects

Hogfish are currently managed as a single stock within the South Atlantic Council's area of jurisdiction. Recently, however, research on the genetic structure of hogfish (Seyoum et al. 2015) indicated that three genetically distinct population segments are present in the Southeastern U.S.: (1) the eastern Gulf of Mexico, (2) the Florida Keys and the southeast coast of Florida, and (3) the Carolinas. Two of the population segments are within the South Atlantic Council's area of jurisdiction. An amendment to the Snapper Grouper Fishery Management Plan (FMP; SAFMC 1983) is therefore needed to delineate the two stocks of hogfish.

Alternatives (preferred alternatives in bold)

1. No Action. Do not establish separate stocks of hogfish in the South Atlantic. There is a Gulf of Mexico stock and South Atlantic stock of hogfish separated at the jurisdictional boundary between the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council.

2. Modify the Snapper Grouper Fishery Management Unit (FMU) to specify two separate stocks of hogfish: (1) a Georgia through North Carolina (GA-NC) stock from the Georgia/Florida state boundary to the North Carolina/Virginia state boundary, and (2) a Florida Keys/East Florida (FLK/EFL) stock from the Florida/Georgia state boundary south to:

2a. The South Atlantic/Gulf of Mexico Council boundary.

2b. The Monroe/Collier County line.

2c. A line just south of Cape Sable running due west.

Under **Alternative 1 (No Action)**, hogfish would continue to be managed as s single stock, thus ignoring the latest scientific evidence. As such, management measures might not be as effective because biological parameters such as growth rates, natural mortality, etc. might not accurately be ascribed to at least some portion of the population. **Preferred Alternative 2** would specify a GA-NC stock of hogfish north of the GA/FL border and a Florida Keys/East Florida stock south of the GA/FL border according to recommendations in Seyoum et al. (2015). Hence, **Preferred Alternative 2** would result in positive biological benefits since management would be based on the latest scientific research and regulations could be better tailored to address specific management issues pertinent to each stock. **Sub-alternatives 2a-2c (Preferred)** specify the dividing line between the Gulf of Mexico stock (under the jurisdiction of the Gulf of Mexico Fishery Management Council) and the Florida Keys/East Florida stock. Seyoum et al. (2015) state that the two stocks split from each other along the "coastal area west of the Florida Everglades". Thus, from a biological standpoint, **Sub-alternatives 2a-2c (Preferred)** would

result in similar biological effects. No changes to how landings are monitored for tracking annual catch limits would result from any of the sub-alternatives considered under this action.

4.1.2 Economic Effects

As described in **Section 4.1.1**, modifying the management unit for hogfish is not expected to alter the current harvest or use of the resource. Therefore, **Alternative 1 (No Action)** and **Preferred Alternative 2** (along with its sub-alternatives) are not expected to have any additional economic effects as modifications to the harvest hogfish may be affected by other actions in this amendment.

4.1.3 Social Effects

Changes to management of hogfish and access to the resource could affect fishermen who target hogfish, and associated communities and fishing businesses. **Section 3.4** provides detailed information about communities that could be affected by management changes and ACLs, particularly for fishermen and communities in the Florida Keys.

Modifying the hogfish Fishery Management Unit would not be expected to result in direct social effects. However, there may be some indirect effects on fishermen and associated communities associated with aligning management with the most recent stock assessment, and also with any associated management changes due to designation of the two hogfish stocks.

Although additional effects would not usually be expected from retaining the current hogfish FMU under **Alternative 1 (No Action)**, this would be inconsistent with the stock assessment. **Preferred Alternative 2** would align hogfish management with updated scientific information. However, if changes in the quota or other management measures restricted access for fishermen harvesting hogfish in specific areas, there may be some negative social effects due to restricted access to the resource.

Any indirect effects from **Sub-alternatives 2a-2c (Preferred)** would be similar for all fishermen targeting hogfish, except for fishermen in the Florida Keys. Under **Sub-alternatives 2a** and **2b**, management of hogfish in the Florida Keys would be split between the Gulf and South Atlantic Councils' jurisdiction. This would pose problems for the Keys fishermen, as some vessels fish in both jurisdictions and may be subject to separate sets of (present and future) fishing regulations. Under **Preferred Sub-alternative 2c**, the Florida Keys would be managed exclusively by the South Atlantic Council. Thus, some additional benefits would be expected from **Preferred Sub-alternative 2c**, compared to **Sub-alternatives 2a** and **2b**.

4.1.4 Administrative Effects

Alternative 2 (Preferred) would split the current stock of hogfish in the South Atlantic into two: to a GA-NC stock and a FLK/EFL stock separated by a line due west from just south of Cape Sable (**Sub-alternative 2c, Preferred**). **Sub-alternative 2c (Preferred)** would have

greater administrative effects compared with **Sub-alternatives 2b** and **2a**, since the South Atlantic/Gulf of Mexico Council boundary and the Monroe/Collier County line are already established boundaries. Under **Sub-alternative 2c (Preferred)**, the Gulf of Mexico Council would need to remove the portion of hogfish in Monroe County, Florida, from the Reef Fish FMU and give management jurisdiction to the South Atlantic Council. Compared to **Alternative 1 (No Action)**, the preferred alternatives would increase the administrative burden for both Councils (South Atlantic and Gulf of Mexico) and for the National Marine Fisheries Service. Administrative impacts resulting from the new regulations would include tracking Annual Catch Limits (ACLs) for two stocks instead of one and educating the public and law enforcement personnel on the new boundaries. However, according to input received from Florida law enforcement personnel, **Sub-alternative 2c (Preferred)** would offer benefits over **Sub-alternatives 2a** and **2b** since the proposed boundary " is far enough north of the Keys and far enough South of Naples and Marco Island so that Monroe is not simply shifting the regulatory problem north to Collier County."

Action 2. Specify Maximum Sustainable Yield (MSY) for the GA-NC and the FLK/EFL stocks of hogfish

4.2.1 Biological Effects

MSY is a reference point used by managers to assess fishery performance over the long term. Defining MSY for each of the stocks of hogfish under **Preferred Alternative 2** would not alter the current harvest or use of the resource. Specification of MSY merely establishes a benchmark for resource evaluation on which additional management actions would be based, if necessary. MSY in **Alternative 1 (No Action)** is defined as the yield produced by F_{MSY} where $F_{30\%SPR}$ is used as a proxy for F_{MSY} and represents the overfishing level defined in Amendment 11 (SAFMC 1998b) for a combined hogfish stock. MSY is not defined for the GA-NC stock or the FLK/EFL stock.

Alternatives (preferred alternatives in bold)

1 (No Action). Do not define MSY for the GA-NC or the FLK/EFL stocks of hogfish. Currently, MSY equals the yield produced by F_{MSY}. $F_{30\%SPR}$ is used as the F_{MSY} proxy for hogfish in the South Atlantic.

2. MSY equals the yield produced by F_{MSY} or the F_{MSY} proxy. MSY and F_{MSY} are recommended by the most recent SEDAR/SSC.

2a. GA-NC stock of hogfish. MSY = $F_{30\%SPR}$.

2b. FLK/EFL stock of hogfish. MSY = 0.138.

In **Alternative 1 (No Action)**, a poundage for MSY is not specified since one was not specified in Amendment 11. **Alternative 2 (Preferred)** would allow for periodic adjustments of F_{MSY} and MSY values based on estimates from new assessments without the need for a plan amendment. Because the SEDAR 37 (2014) stock assessment was not considered applicable to the GA-NC stock of hogfish, **Sub-alternative 2a (Preferred)** would essentially maintain the status quo for that stock. However, it differs from **Alternative 1 (No Action)** in that it would allow future adjustments without the need for a plan amendment if a stock assessment were to produce an estimate of MSY for that stock. **Sub-alternative 2b (Preferred)** would redefine MSY for the Florida Keys/East Florida stock based on the recommendation of SEDAR 37 (2014) and the Council's SSC to equal the value associated with the yield at F_{MSY} (346,095 lbs ww). The specification of a MSY equation would have beneficial effects on the Florida Keys/East Florida stock of hogfish as it provides a reference point to monitor the long-term performance of the stock.

As none of the alternatives considered under this action would have direct effects on resource harvest or use, biological effects would be neutral. However, **Alternative 2 (Preferred)**, which is recommended in the most recent SEDAR and by the SSC, has a better scientific basis and thus provides a more solid ground for management actions that have economic and social implications.

4.2.2 Economic Effects

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

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

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

4.2.3 Social Effects

Social effects of management specifications such as MSY for a stock will be associated with both the biological and economic effects of the MSY value in the rebuilding plan. An MSY level that reflects the best available information (**Preferred Alternative 2**) could result in lower F values in the rebuilding plan, and consequentially lower ACLs, which would likely affect fishermen targeting hogfish. However an informed and relevant MSY (**Preferred Alternative 2**) is expected to contribute to the success of the rebuilding strategy, resulting in greater expected long-term benefits to the commercial fleet and recreational fishermen who target hogfish than under **Alternative 1 (No Action)**.

4.2.4 Administrative Effects

The potential administrative effects of these alternatives differ in terms of the implied restrictions required to constrain the fisheries to the respective benchmarks. Defining a MSY proxy establishes a harvest goal for the fishery, for which management measures will be implemented. Those management measures would directly impact the administrative environment according to the level of conservativeness associated with the chosen MSY and

subsequent restrictions placed on the fishery to constrain harvest levels. For the GA-NC stock of hogfish, **Sub-alternative 2a (Preferred)** differs from **Alternative 1 (No Action)** in that it would allow for periodic adjustments of F_{MSY} and MSY values based on estimates from new assessments without the need for a plan amendment. As such, **Sub-alternative 2a (Preferred)** would reduce the administrative burden from current levels. For the FLK/EFL stock of hogfish, **Sub-alternative 2b (Preferred)** would allow for adoption of the MSY value recommended by the latest stock assessment as well as subsequent adjustments as new assessments or updates are conducted without the need for a plan amendment. Therefore, none of the alternatives considered under this action would result in significant changes in administrative effects compared to **Alternative 1 (No Action).**

Action 3. Specify Minimum Stock Size Threshold (MSST) for the GA-NC and the FLK/EFL stocks of hogfish

Alternatives (preferred alternatives in bold)

1 (No Action). Do not define MSST for the GA-NC and FLK/EFL stocks of hogfish. MSST for hogfish in the South Atlantic is equal to SSB_{MSY} ((1-M) or 0.5, whichever is greater).

2. MSST = SSB_{MSY} ((1-M) or 0.5, whichever is greater).
   - 2a. For the GA-NC stock of hogfish.
   - 2b. For the FLK/EFL stock of hogfish.

3. MSST = 50% of SSB_{MSY}.
   - 3a. For the GA-NC stock of hogfish.
   - 3b. For the FLK/EFL stock of hogfish.

4. MSST = 75% of SSB_{MSY}.
   - **4a. For the GA-NC stock of hogfish.**
   - **4b. For the FLK/EFL stock of hogfish.**

4.3.1 Biological Effects

The Minimum Stock Size Threshold (MSST) corresponds to the level of biomass below which a stock is considered overfished. If it is determined that a stock's biomass is below the MSST, the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires a rebuilding plan, which could result in harvest reductions.

Alternative 1 (No Action) would retain the MSST definition established in Amendment 11 to the Snapper Grouper FMP (SAFMC 1998b) for the entire stock of hogfish in the South Atlantic. **Alternative 2** would impart the same definition of MSST to each of the two stocks of hogfish being defined in this amendment. Hence, in terms of biological effects, **Alternatives 1 (No Action)** and **2** are identical. The current definition of MSST under **Alternatives 1 (No Action)** and **2** requires that MSST be at least one half of SSB_{MSY}, but allows for it to be greater than this value if natural mortality (M) is suitably low. If (1-M) is equal to 0.5, then the value obtained from this alternative would be the same as that obtained from **Alternative 3,** which sets the MSST at 50% of the Spawning Stock Biomass at MSY (SSB_{MSY}). **Preferred Alternative 4** would establish MSST at 75% of SSB_{MSY}.

SEDAR 37 (2014) estimated natural mortality for hogfish at 0.179. However, because the stock assessment was not deemed applicable to the GA-NC stock, this estimate is valid for the Florida Keys/East Florida stock only. For species with such low natural mortality, such as hogfish, the biomass threshold for determining if the stock is overfished (MSST) under the current definition (**Alternatives 1 (No Action)** & **2**) is very close to the biomass level when the stock is not considered overfished (SSB_{MSY}). Since **Alternative 1 (No Action)** nearly eliminates the buffer between MSST and SSB_{MSY} for stocks with low natural mortality rates, a stock would never be permitted to fall below SSB_{MSY} without triggering an "overfished" determination and mandatory development of a rebuilding plan. The most biologically conservative alternatives are

Alternatives 1 (No Action) and **2** because they would ensure that a rebuilding plan is developed for hogfish; however, under these alternatives a rebuilding plan may also be required when it is not biologically necessary. The biological benefits of **Alternative 1 (No Action)** would take the form of increased harvest restrictions that would be implemented with the intent to rebuild the stock according to the current MSST threshold criterion. **Alternative 3** and its sub-alternatives would be the least biologically beneficial since it would allow biomass to decrease by 50% before triggering the rebuilding plan requirement. **Preferred Alternative 4** and its sub-alternatives would still require the development of a rebuilding plan if hogfish was deemed overfished, but would reduce the risk of requiring a rebuilding plan when decreased biomass was due to natural variations in recruitment.

Additionally, if the same management measures are used to rebuild a stock under all the alternatives considered, the stock would be expected to rebuild fastest under **Alternative 1 (No Action)** and **Alternative 2** because the overfished threshold (MSST) would be closest to the rebuilt threshold SSB_{MSY}. Therefore, **Alternative 1 (No Action)** could be considered to have the greatest biological benefit among alternatives considered in this action. The tradeoff associated with the assurance provided by this conservative definition of MSST is that natural variation in recruitment could cause stock biomass to frequently alternate between an overfished and rebuilt condition (biomass at SSB_{MSY}), even if the fishing mortality rate applied to the stock was within the limits specified by the maximum fishing mortality threshold (MFMT). If realized, this situation could result in administrative and socio-economic burdens related to developing and implementing multiple rebuilding plans that may not be biologically necessary. However, simulations on a wide variety of species by Restrepo et al. (1998) indicated that stocks at biomass levels approximating $75\%SSB_{MSY}$ can rebuild to SSB_{MSY} fairly quickly with little constraint on fishing mortality. Therefore, it is not biologically necessary to have extremely small buffers between overfished and rebuilt thresholds.

Preferred Alternative 4, which would set MSST equal to $75\%SSB_{MSY}$, is consistent with how the South Atlantic Council has approached defining MSST for other snapper grouper stocks with low natural mortality estimates. The South Atlantic Council changed the MSST definition to $75\%SSB_{MSY}$ for snowy grouper (SAFMC 2008a), golden tilefish (SAFMC 2008b), red grouper (SAFMC 2011d) and, more recently, several other snapper grouper species (red snapper, blueline tilefish, gag, black grouper, yellowtail snapper, vermilion snapper, red porgy, and greater amberjack) (SAFMC 2014). These species have low estimates of natural mortality, and the overfished threshold from the status quo MSST definition is very close to the biomass threshold when stocks are not considered overfished. The biological benefits of **Preferred Alternative 4**, which would trigger a rebuilding plan when biomass is at 75% of SSB_{MSY}, would be expected to be greater than **Alternative 3**, which would have a lower biomass threshold for an overfished determination ($50\%SSB_{MSY}$) because biomass would not be allowed to decrease as much as it would under **Alternative 3** before triggering implementation of a rebuilding plan. At their October 2013 meeting, the South Atlantic Council's Scientific and Statistical Committee acknowledged that the $75\%SSB_{MSY}$ approach is an acceptable choice for MSST, and they voiced no concern regarding the adoption of this management reference point for South Atlantic Council managed species.

4.3.2 Economic Effects

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

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

Alternatives 2-4 (Preferred) each have sub-alternatives a and b. **Action 3** assumes that **Action 1** will result in the decision to create separate management stocks for the Georgia to North Carolina fish and for the Florida Keys/East Florida. The expected economic effects for the sub-alternatives a and b for each alternative is expected to be similar.

Assuming **Action 1** results in defining two separate hogfish stocks, **Alternative 2** is functionally equivalent to **Alternative 1 (No Action)** except that **Alternative 2** allows MSST to be set to SSB_{MSY} ((1-M) or 0.5, whichever is greater) for each of the stocks separately.

With rebuilding taking place over a number of years, management actions and their economic consequences could change over time depending on a variety of factors, including the status of the stock and fishing conditions. **Alternative 3** would appear to be best from an economics standpoint, because it is unlikely to trigger restrictive rebuilding actions in the short term. One possible downside of this alternative is that once the stock is considered overfished, the required rebuilding actions could be very restrictive and potentially remain for quite some time. **Alternatives 1 (No Action)** and **2** lie on one end of the continuum for potential negative economic effects because they have the highest probability of triggering restrictive rebuilding actions. A possible mitigating factor with **Alternatives 1 (No Action)** and **2** is the possibility that the required management actions would have adverse economic effects which would not last long. But a frequently varying regulatory regime would tend to de-stabilize business planning and fishing decisions which could have potentially worse economic consequences. The economic implications of the **Preferred Alternative 4** may be characterized as falling between **Alternatives 1 (No Action)/2** and **Alternative 3**.

4.3.3 Social Effects

Social effects of revised biological parameters such as MSST for a stock will be associated with both the biological and economic effects of the modified MSST value. The estimated SSB as compared to MSST serves as a proxy for designating a stock as overfished or not. If the proxy

is not accurately representing the stock status, the outcomes of the 'overfished' designation when a stock is not overfished can have negative long- and short-term social effects associated with restricted or no access to the fish. Conversely, if an inaccurate proxy results in a stock designated as not overfished when it *is* overfished, the fishing fleets, associated businesses and communities could be negatively impacted in the long term due to decline in the stock and negative broader biological impacts of overfishing. Lastly, an inaccurate proxy that causes a stock to fluctuate between overfished and not overfished would likely have negative effects on fishermen by requiring changes in regulations on harvest too often. This could negatively affect stability and planning for fishing businesses, in addition to fishing opportunities for recreational anglers, due to inconsistent access to the resource. Although for some fishermen, any access to a stock would be beneficial, the positive effects of consistency in regulations (even if access is restricted) and stability of the fishery would also be expected from a more fixed designation as overfished or not overfished.

Under all alternatives, fishermen could be affected by future restricted access to a specific species due to an overfished designation, which could have negative effects on associated fishing businesses and communities. Although **Preferred Alternative 4** is the more restrictive approach to set the MSST than under **Alternatives 1 (No Action)-3**, it would also be the most likely to trigger a rebuilding plan sooner, which may avoid more severe biological impacts to the stock (as noted in **Section 4.3.1**).

If the FMU were modified in Action 1 to align with the approach used in the stock assessment for the stock boundary, **Alternative 1 (No Action)** would not be consistent with the most recent scientific information as in **Sub-alternatives 2a/b, 3a/b**, and **4a/b (Preferred)**.

4.3.4 Administrative Effects

The MSST is the level of biomass below which a fishery would be considered overfished and is thus tied to implementation of management measures. Those management measures would directly impact the administrative environment according to the level of conservativeness associated with the chosen MSST and subsequent restrictions placed on the fishery to constrain harvest levels. The current MSST definition under **Alternative 1 (No Action)** could cause hogfish to fluctuate between an overfished and rebuilt condition (constantly triggering rebuilding plans). **Alternative 2** is identical to **Alternative 1 (No Action)** but would apply to each individual stock of hogfish. Hence both alternatives would be the most administratively burdensome of the MSST alternatives under consideration. The larger the buffer between MSST and SSB_{MSY}, the lower the probability that hogfish would be considered overfished and require a rebuilding plan. Therefore, **Alternative 3** and its sub-alternatives are the least administratively burdensome of the alternatives considered since under **Alternative 3** hogfish would be least likely to be considered overfished and least likely to require a rebuilding plan. Potential administrative impacts increase as the distance between the MSST value and SSB_{MSY} decreases, therefore, **Alternatives 3** and **4 (Preferred)**, and their sub-alternatives, would result in increasingly greater administrative impacts, respectively. However, **Sub-alternatives 3a** and **4a**

(Preferred), would not result in any changes to the administrative burden relative to **Alternative 1 (No Action)** as the MSST value for the GA-NC stock of hogfish would remain unknown.

Action 4. Establish ACLs for the GA-NC stock of hogfish.

4.4.1 Biological Effects

Genetic evidence (Seyoum et al. 2015) indicates that hogfish within the South Atlantic Council's area of jurisdiction belong to two distinct stocks. The SEDAR 37 (2014) assessment, however, was not deemed applicable to the GA-NC stock due to lack of data hence the status of the GA-NC stock is currently unknown. Based on methodology in *Calculating Acceptable Biological Catch for Stocks That Have Reliable Catch Data Only* (Only Reliable Catch Stocks – ORCS) (Berkson et al. 2011), the South Atlantic Council's SSC recommended an approach to compute the Acceptable Biological Catch (ABC) for unassessed stocks with only reliable catch data. The approach involves selection of a "catch statistic", a scalar to denote the risk of overexploitation for the stock, and a scalar to denote the management risk level. The SSC provides the first two criteria for each stock, and the South Atlantic Council specifies their risk tolerance level for each stock.

Alternatives
(preferred alternatives in bold)

1 (No Action). Do not establish ACLs for the GA-NC stock of hogfish. The current ABC for the entire stock of hogfish is 137,824 lbs ww and ACL = OY = ABC. The commercial ACL = 49,469 lbs ww (36.69%) and the recreational ACL = 85,355 lbs ww (63.31%).

2. Establish an ACL for the GA-NC stock. Specify commercial and recreational ACLs using re-calculated sector allocations based on proposed modifications to the management unit (~~81.91%~~ 69.13% commercial and ~~18.09%~~ 30.87% recreational). The ABC for the GA-NC stock = ~~28,161~~ 35,716 pounds whole weight (lbs ww).

2a. ACL = OY = ABC.
2b. ACL = OY = 95%.
2c. ACL = OY = 90%.

Catch Statistic: The median was considered inadequate to represent the high fluctuation in landings—i.e., to appropriately capture the range of occasional high landings—therefore, the maximum catch over the period 1999-2007 was chosen instead. This time period was chosen to (1) be consistent with the period of landings used in the South Atlantic Council's Comprehensive ACL Amendment (SAFMC 2011c), and (2) to minimize the impact of recent regulations and the economic downturn on the landings time series. For the GA-NC stock of hogfish, 1999 was the year of highest landings over the 1999-2007 time period and was selected as the "catch statistic."

Risk of Overexploitation: Based on SSC consensus and expert judgment each stock was assigned to a final risk of exploitation category based on a suite of attributes used to assess the level of risk. For hogfish, the SSC assigned a risk of overexploitation of 1.25, indicating the species is at moderately high risk of overexploitation.

Risk Tolerance: The next step in the process involves multiplying the "catch statistic x scalar" metric by a range of scalar values that reflects the South Atlantic Council's risk tolerance level.

For instance, the South Atlantic Council may choose to be more risk-averse in computing the ABC for a stock that exhibits a moderately high risk of overexploitation. As such, the South Atlantic Council may use a scalar of 0.50 for such stocks to specify a more conservative ABC. On the other hand, stocks with low risk of overexploitation, and thus able to tolerate a higher level of management risk, may be assigned a less conservative scalar, such as 0.90. For hogfish, the South Atlantic Council selected a risk tolerance scalar of 0.7.

Table 4.4.1.1 below summarizes the ORCS approach to arrive at the ABC for the GA-NC stock of hogfish.

Table 4.4.1.1. The South Atlantic's Scientific and Statistical Committee (SSC) Acceptable Biological Catch (ABC) recommendation for the GA-NC stock of hogfish.

Statistic	Value
Risk of Overexploitation	Moderately High
Associated Scalar	1.25
Range of Years	1999-2007
Year of Max Landings	2006
Catch Statistic	40,818 lbs ww
Council Risk Scalar (Preferred from Am 29)	0.7
Proposed ABC	**35,716 lbs ww**

The allocation formula from the Comprehensive ACL Amendment (SAFMC 2011) was used to specify commercial and recreational allocations for the GA-NC hogfish stock: (0.5 * catch history) + (0.5 * current trend) where catch history = average landings 1986-2008, current trend = average landings 2006-2008. The formula was applied to SEFSC commercial ACL data, accessed in July 2014, and post-stratified SEFSC recreational data accessed in February 2015). Recreational data were post-stratified to include MRIP landings from Monroe County in the FLK/EFL sub-region, consistent with the SEDAR 37 stock assessment. Commercial and recreational landings used to recalculate sector allocations are shown in **Table 4.4.1.2**.

Table 4.4.1.2. Commercial and recreational landings (lbs ww) for the GA-NC stock of hogfish, 1986-2008.

Year	Rec	Comm	Total
1986	20,625	8,040	28,665
1987	8,733	9,295	18,028
1988	942	10,186	11,128
1989	3,193	15,177	18,370
1990	1,848	27,862	29,710
1991	814	23,886	24,700
1992	3,309	32,274	35,583
1993	6,272	31,739	38,011
1994	688	23,063	23,751
1995	83,580	36,903	120,483
1996	262	17,471	17,733
1997	977	25,394	26,371
1998	1,338	21,959	23,297
1999	1,215	29,186	30,401
2000	2,417	24,104	26,521
2001	1,471	14,193	15,664
2002	11,796	20,557	32,353
2003	2,343	9,307	11,650
2004	3,888	19,295	23,183
2005	15,082	19,255	34,337
2006	17,385	23,433	40,818
2007	8,782	20,754	29,536
2008	9,044	30,437	39,481

Source: NMFS SERO

To set the Annual Catch Limit (ACL) and Optimum Yield (OY) for the GA-NC stock of hogfish, the South Atlantic Council may exercise varying degrees of precaution to account for management uncertainty: **Sub-alternative 2a** would set the ACL and OY at the same level as ABC, whereas **Sub-alternatives 2b** and **2c** would each provide a management uncertainty buffer of 5% and 10%, respectively.

Sub-alternatives 2a-2c 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.

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 (**Sub-alternative 2a**) 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 hogfish 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 were 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 Amendment 34 (SAFMC 2015) to enhance the effectiveness of the AMs for hogfish.

Sub-alternatives 2b and **2c** would have a greater positive biological effect than **Sub-alternative 2a** because they would create a buffer between the ACL/OY and ABC, with **Sub-alternative 2c** setting the most conservative ACL at 90% of the ABC (**Table 4.4.1**). 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 SSB_{MSY}. However, the South Atlantic Council's ABC control rule takes into account scientific uncertainty. The Magnuson-Stevens Act national standard 1 guidelines indicate an ACL may typically be set very close to the ABC. 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. An ACT, which is not required, can also be set below the ACL to account for management uncertainty and provide greater assurance overfishing does not occur.

Table 4.4.1. Commercial and recreational ACLs provided by Sub-alternatives 2a-2c. Recreational ACL converted from pounds to numbers using an average weight of 10.60 lbs ww per fish.

Sub-alternative	Total ACL	Rec ACL (lbs)	Rec ACL (numbers)	Comm ACL (lbs)
2a	35,716	11,025	1,040	24,691
2b	33,930	10,474	988	23,456
2c	32,144	9,923	936	22,222

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 in the Southeast Region and the Gulf of Mexico and South Atlantic Councils are developing amendments 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 hogfish. Therefore, there is a low risk of exceeding the commercial and recreational ACLs and **Alternative 2** and its sub-alternatives can be used as part of a successful harvest management system for hogfish with little risk of overfishing.

4.4.2 Economic Effects

Alternative 1 (No Action) is not a viable alternative for this action because establishing an ACL for a stock is a statutory requirement. In general, assuming a sector is able to catch its entire ACL, the higher the ACL, the greater the positive direct economic effects for all sectors, as long as the ACL is not exceeded. Therefore, **Sub-alternative 2a** represents the highest positive direct economic effects, followed by **Sub-alternative 2b** and then **Sub-alternative 2c**.

4.4.3 Social Effects

Compared to other snapper grouper species such as black sea bass, vermilion snapper, and gray triggerfish, hogfish is not as economically and socially important in Georgia, South

Carolina, and North Carolina. However, there are some communities that may have fishermen, fishing businesses, and recreational anglers who would be affected by management changes for the GA-NC stock of hogfish. Commercial landings are relatively highest in the South Carolina communities of Little River and Georgetown, and North Carolina communities around the Cape Fear River including Southport, Carolina Beach, and Oak Island (**Figure 3.4.1.3**). These are also communities that have high levels of engagement and reliance on commercial and recreational fishing (**Figures 3.4.1.5** and **3.4.1.7**).

The ACL for any stock does not directly affect resource users unless the ACL is met or exceeded, in which case AMs that restrict or close harvest could negatively impact the commercial fleet, for-hire fleet, and private anglers. AMs can have significant direct and indirect social effects because, when triggered, can restrict harvest in the current season or subsequent seasons. While the negative effects are usually short-term, they may at times induce other indirect effects through changes in fishing behavior or business operations that could have long-term social effects, such as increased pressure on another species, or fishermen having to stop fishing all together due to regulatory closures. However, restrictions on harvest contribute to sustainable management goals, and are expected to be beneficial to fishermen and communities in the long term.

Under **Alternative 2**, the ACL for the GA-NC would be based on the most recent stock assessment, but could also set ACLs lower than recent recreational and commercial landings (see **Tables 2.4.1.** and **2.4.3**) in the area. This could result in early closures, paybacks, or other management measures. **Sub-alternative 2c** could result in the most restrictive measures, followed by **Sub-alternative 2b** and **Sub-alternative 2a**. **Alternative 1 (No Action)**, although it is not based on the most recent stock assessment, would allow the most access to the hogfish resource because of the larger ACL, and be the most beneficial to commercial and recreational fishermen in Georgia, South Carolina, and North Carolina.

4.4.4 Administrative Effects

Negative administrative impacts of this action are likely to be minimal. **Alternative 1 (No Action)**, and **Alternative 2** (including its sub-alternatives) would not result in significant administrative cost or time burdens other than notifying fishery participants of the change in the sector ACLs and continued monitoring of the sector ACLs. The burden on law enforcement would not change under either alternative since commercial quota closures and bag limits implemented are currently enforced.

Action 5. Establish a rebuilding plan for the FLK/EFL stock of hogfish

4.5.1 Biological Effects

The hogfish population in the South Atlantic had not been assessed until SEDAR 37 (2014). The assessment showed the stock of hogfish off Florida is overfished and undergoing overfishing. Hence the South Atlantic Council is mandated to establish a rebuilding plan for that stock within two years of receiving notification of its status. Action 5 presents options for the rebuilding strategy and schedule that would govern the rebuilding plan for the FLK/EFL stock of hogfish and the resulting Acceptable Biological Catch.

Alternatives
(preferred alternatives in bold)

1 (No Action). Do not establish a rebuilding plan for the FLK/EFL stock of hogfish.

2. Define a rebuilding plan where the rebuilding strategy for the FLK/EFL stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 10 years with a 50% probability of rebuilding success. The Overfishing Limit is the yield at F_{MSY}. The spawning stock biomass at MSY (SSB_{MSY}) is 2,300,391 pounds whole weight (lbs ww). Year 1 = 2017.

3. Define a rebuilding plan where the rebuilding strategy for the FLK/EFL stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 10 years with a 72.5% probability of rebuilding success. The Overfishing Limit is the yield at F_{MSY}. The Spawning Stock Biomass at MSY (SSB_{MSY}) is 2,300,391 pounds whole weight (lbs ww). Year 1 = 2017.

4. Define a rebuilding plan where the rebuilding strategy for the FLK/EFL stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 7 years with a 50% probability of rebuilding success. The Overfishing Limit is the yield at FMSY. The Spawning Stock Biomass at MSY (SSB_{MSY}) is 2,300,391 pounds whole weight (lbs ww). Year 1 = 2017.

5. Define a rebuilding plan where the rebuilding strategy for the FLK/EFL stock of hogfish sets ABC equal to the yield at a constant fishing mortality rate that rebuilds the stock in 7 years with a 72.5% probability of rebuilding success. The Overfishing Limit is the yield at F_{MSY}. The Spawning Stock Biomass at MSY (SSB_{MSY}) is 2,300,391 pounds whole weight (lbs ww). Year 1 = 2017.

Alternatives 2-5 would establish a rebuilding strategy based on the results of the most recent stock assessment (SEDAR 37 2014). The recreational fishery for hogfish was closed in August 2015 due to an increase in landings during Wave 2 of the MRIP survey. As a result, preliminary landings for 2015 were above the landings level assumed in the original set of stock projections from the SEDAR 37 (2014) assessment raising concerns that the projections might no longer represent the Best Scientific Information Available. Hence the Council requested updated projections for the East Florida/Florida Keys Hogfish stock using the most recent landings estimates. The request was for the same suite of scenarios provided in the original projections, modified with the most recent landings estimates and changing year 1 to 2017 to reflect the likely implementation date of the management actions.

The South Atlantic Council's SSC recommended a rebuilding scenario that would set the ABC at the yield under a constant fishing mortality rate that rebuilds the stock in 10 years with a 72.5% probability of rebuilding success. This rebuilding scenario corresponds to **Preferred**

Alternative 3 (see **Table 4.5.1**). Under **Alternatives 2-5** the total ABC would increase over time until the Spawning Stock Biomass (SSB) reaches the level at which the stock is considered to be rebuilt (~ 2.3 million pounds). Under **Preferred Alternative 3**, this level would be reached in 2027.

Table 4.5.1. Acceptable Biological Catch (ABC) under rebuilding plan alternatives 2-5.

Year	Alternative 2 ABC (lbs)	Preferred Alternative 3 ABC (lbs)	Alternative 4 ABC (lbs)	Alternative 5 ABC (lbs)
2017	48,026	38,367	14,352	11,858
2018	61,994	49,449	19,342	15,774
2019	77,363	61,982	25,157	20,469
2020	93,826	75,710	31,751	25,906
2021	111,135	90,469	39,049	32,042
2022	129,008	106,059	46,953	38,810
2023	147,103	122,197	55,333	46,106
2024	165,076	138,566	64,049	53,809
2025	182,603	154,851	--	--
2026	199,389	170,750	--	--
2027	215,211	186,018	--	--

Alternative 2 yields higher ABCs than **Preferred Alternative 3** at a probability of rebuilding of 50%. This level of harvest is higher than that recommended by the South Atlantic Council's Scientific and Statistical Committee. **Alternatives 4** and **5** both result in lower ABCs than those under **Preferred Alternative 3** and rebuild the FLK/EFL stock of hogfish in 7 years instead of 10. In general, lower levels of harvest and less time to rebuild translate into higher biological benefits for the stock, hence the biological benefits of **Alternatives 4** and **5** would be higher than those under **Preferred Alternative 3**. However, the Scientific and Statistic Committee has indicated that harvest levels proposed under **Preferred Alternative 3** are sustainable and would achieve the goal of rebuilding the FLK/EFL stock of hogfish within a reasonable timeframe. Therefore, there is no biological need to constrain harvest below this level. Compared to **Alternative 1 (No Action)**, the biological effects of **Alternatives 2-5** would be beneficial since management would be responding to the best scientific information available and results of the SEDAR 37 (2014) stock assessment have indicated that the FLK/EFL stock of hogfish is overfished and undergoing overfishing.

4.5.2 Economic Effects

Rebuilding plans in general impose negative direct economic effects in the short term in favor of more direct positive economic effects in the long term as the stock recovers. The difficulty is in balancing those long term and short-term economic effects. Being overly restrictive in the short term could rebuild the stock faster, but perhaps at the expense of pushing some fishermen out of the fishery because they are unable to survive financially under the restrictions. Being too lenient in the short term could jeopardize the probability of rebuilding the stock as needed.

Alternative 1 (No Action) is not a viable alternative to consider, as there are statutory requirements to rebuild all fishery stocks that are overfished or undergoing overfishing.

Table 4.5.2 estimates the value of hogfish under Alternatives 2 through 5 based on projected ABC values shown in **Table 4.5.1**. The dockside values shown in **Table 4.5.2** assume that the entire ABC will be caught each year of the rebuilding. Under **Alternatives 4** and **5**, the stock is projected to be rebuilt by 2024.

Table 4.5.2. Expected dockside value (in 2014 $) of hogfish in FLK/EFL under Action 5 alternatives.

Year	Alternative 2 ABC (lbs)	Preferred Alternative 3 ABC (lbs)	Alternative 4 ABC (lbs)	Alternative 5 ABC (lbs)
2017	$196,323	$156,838	$58,669	$48,474
2018	$253,422	$202,140	$79,067	$64,482
2019	$316,248	$253,373	$102,838	$83,674
2020	$383,546	$309,491	$129,793	$105,900
2021	$454,303	$369,823	$159,626	$130,983
2022	$527,365	$433,553	$191,937	$158,649
2023	$601,334	$499,522	$226,193	$188,474
2024	$674,805	$566,436	$261,822	$219,963
2025	$746,453	$633,007	--	--
2026	$815,071	$698,000	--	--
2027	$879,749	$760,413	--	--

In the short term, from most to least direct negative economic effects are **Alternative 5**, **Alternative 4**, **Preferred Alternative 3**, and then **Alternative 2**. In the long term, from most to least direct positive economic effects are **Alternative 2**, **Preferred Alternative 3**, **Alternative 4**, and then **Alternative 5**.

4.5.3 Social Effects

Although establishment of a rebuilding strategy for the FLK/EFL stock of hogfish is primarily an administrative action, the selected level of fishing mortality and associated ABCs determine the level of restrictiveness that the management measures need to be in order to rebuild the resource within the specified timeframe. The level to which access to the resource is limited or non-existent will determine the magnitude of the associated social and economic effects expected to accrue during the recovery period. The rebuilding strategies and associated ABCs in this action are trade-offs of long-term and short-term biological benefits, which are directly tied to long-term and short-term social benefits. A more conservative rebuilding strategy would likely result in short-term negative social impacts such as loss of income and decreased fishing opportunities due to lower target fishing mortality. However, the resulting larger sustainable biomass once the hogfish stock is rebuilt is expected to produce long-term social

benefits, including stable and sustainable livelihoods for commercial fishermen and the for-hire sector; consistent product for fish houses and restaurants; and private recreational fishing opportunities.

Section 3.4 describes Florida communities that could be affected by changes to the FLK/EFL hogfish rebuilding plan, particularly in the Florida Keys. Additionally, hogfish is an important part of the tourism and culinary scene in the Florida Keys, as a signature dish of the area. Changes to access to hogfish could also affect fish houses and restaurants that depend on a steady supply of hogfish.

Because the recent assessment update determined that FLK/EFL hogfish is overfished and experiencing overfishing, **Alternative 1 (No Action)** may provide some short-term benefits by not restricting harvest, but would also be expected to result in negative long-term effects on fishermen associated with negative biological effects on the stock. Overall the most benefits to fishermen and communities would come from a rebuilding strategy that limits harvest and access to the resource for fishermen, but would not cause long-term negative biological effects to the stock that could result in negative effects on fishermen in the future.

The short-term direct effects on fishermen and communities under **Alternatives 2-4** would depend on the level of reduced access to the hogfish resource, and for how long of a period. **Alternative 2** would result in higher ABC levels (and highest possible ACLs) than under **Preferred Alternative 3** under a ten-year plan. **Alternatives 4** and **5** would result in more restrictive ABC levels but within a shorter period of time.

4.5.4 Administrative Effects

In general, the shorter the rebuilding schedule the more restrictive the harvest limitations needed in order to rebuild the stock within the specified timeframe. Greater restrictions can result in increased impacts on the administrative environment due to an increased need to closely track landings; enforce bag, trip, and size limits; or implement in-season and post-season AMs.

Alternative 1 (No Action) would not establish a rebuilding schedule for the FLK/EFL stock of hogfish and would therefore, not comply with Magnuson-Stevens Act requirements for developing rebuilding plans. **Alternative 2** would rebuild the FLK/EFL stock of hogfish in 10 years, but with only a 50% probability of success. **Alternative 3 (Preferred)** would rebuild the FLK/EFL stock of hogfish in 10 years with a 72.5% probability of rebuilding success. **Alternatives 4** and **5** have the shortest rebuilding schedule considered and would require implementation of additional harvest restrictions to meet the goal of rebuilding the stock within 7 years. Therefore, of all the rebuilding schedule alternatives that specify a timeframe, **Alternatives 4** and **5** would be most likely to impact the administrative environment in the form of developing, implementing, and monitoring more restrictive harvest regulations for hogfish. Of all the alternatives considered, **Alternative 3 (Preferred)** would be the most efficient rebuilding strategy and least likely to impact the administrative environment.

Action 6. Establish ACLs for the FLK/EFL stock of hogfish.

4.6.1 Biological Effects

The allocation formula from the Comprehensive ACL Amendment (SAFMC 2011) was used to specify commercial and recreational allocations for the FLK/EFL hogfish stock: (0.5 * catch history) + (0.5 * current trend) where catch history = average landings 1986-2008, current trend = average landings 2006-2008. The formula was applied to SEFSC commercial ACL data, accessed in July 2014, and post-stratified SEFSC recreational data accessed in February 2015). Recreational data were post-stratified to include MRIP landings from Monroe County in the FLK/EFL sub-region, consistent with the SEDAR 37 stock assessment. Commercial and recreational landings data used to re-calculate sector allocations are shown in **Table 2.6.1**.

Alternatives (preferred alternatives in bold)

1 (No Action). Do not establish ACLs for the FLK/EFL hogfish stock. The current ABC for the entire stock of hogfish is 137,824 lbs ww and ACL = OY = ABC. The commercial ACL = 49,469 lbs ww (36.69%) and the recreational ACL = 85,355 lbs ww (63.31%).

2. Establish ACLs for the FLK/EFL stock of hogfish. Specify commercial and recreational ACLs for 2017-2025. ACLs will not increase automatically in a subsequent year if present year projected catch has exceeded the total ACL. Specify commercial and recreational ACLs using re-calculated sector allocations based on proposed modifications to the management unit (~~24.29%~~ 12.48% commercial and ~~75.71%~~ 87.52% recreational).).

2a. ACL = OY = ABC.

2b. ACL = OY = 95%.

2c. ACL = OY = 90%.

Table 2.6.1. Commercial and recreational landings (lbs ww) used to re-calculate hogfish sector allocations for Florida Keys/East Florida hogfish stock, 1986-2008.

Year	Recreational	Commercial	Total
1986	173,489	28,878	202,367
1987	340,881	44,300	385,181
1988	247,203	48,362	295,565
1989	151,578	54,155	205,733
1990	307,831	53,914	361,745
1991	196,098	53,590	249,688
1992	309,536	54,495	364,031
1993	266,249	42,646	308,895
1994	224,732	34,716	259,448
1995	285,983	39,433	325,416
1996	159,365	40,136	199,501
1997	168,822	42,573	211,395
1998	57,160	31,211	88,371

1999	115,575	24,155	139,730
2000	40,295	28,015	68,310
2001	79,266	18,455	97,721
2002	99,499	19,525	119,024
2003	123,767	20,623	144,390
2004	190,292	23,299	213,591
2005	189,126	12,380	201,506
2006	120,381	11,337	131,718
2007	271,031	14,402	285,433
2008	361,301	17,882	379,183

Source: NMFS SERO

To set the Annual Catch Limit (ACL) and Optimum Yield (OY) for the FLK/EFL stock of hogfish, the South Atlantic Council may exercise varying degrees of precaution to account for management uncertainty: **Sub-alternative 2a** would set the ACL and OY at the same level as ABC, whereas **Sub-alternatives 2b** and **2c** would each provide a management uncertainty buffer of 5% and 10%, respectively.

Preferred Sub-alternative 2a, **Sub-alternative 2b**, and **Sub-alternative-2c** 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.

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 (**Preferred Sub-alternative 2a**) 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 hogfish 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 Amendment 34 (SAFMC 2015) to enhance the

effectiveness of the AMs for hogfish.

Sub-alternatives 2b and **2c** would have a greater positive biological effect than **Preferred Sub-alternative 2a** because they would create a buffer between the ACL/OY and ABC, with **Sub-alternative 2c** setting the most conservative ACL at 90% of the ABC (**Table 4.6.1**). 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 SSB_{MSY}. However, the South Atlantic Council's ABC control rule takes into account scientific uncertainty. The Magnuson-Stevens Act national standard 1 guidelines indicate an ACL may typically be set very close to the ABC. 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. An ACT, which is not required, can also be set below the ACL to account for management uncertainty and provide greater assurance overfishing does not occur.

Table 4.6.1. Sector ACLs in pounds and numbers (recreational) for **Sub-alternatives 2a (Preferred)-2c** in **Action 6** and based on ABC projections from **Preferred Alternative 3** in **Action 5** where ABC equal to the yield at a constant fishing mortality rate and rebuilds the stock in 10 years with a 72.5% probability of rebuilding success. Recreational ACL in numbers of fish is based on average weight of 1.76 lbs ww.

Preferred Sub-alternative 2a: ACL=OY=ABC				
Year	**Total ACL (lbs)**	**Rec ACL (lbs)**	**Rec ACL (numbers)**	**Commercial ACL (lbs)**
2017	38,367	34,670	19,699	3,697
2018	49,449	44,685	25,389	4,764
2019	61,982	56,010	31,824	5,972
2020	75,710	68,415	38,872	7,295
2021	90,469	81,752	46,450	8,717
2022	106,059	95,840	54,455	10,219
2023	122,197	110,423	62,741	11,774
2024	138,566	125,215	71,145	13,351
2025	154,851	139,931	79,506	14,920
2026	170,750	154,298	87,669	16,452
2027	186,018	168,095	95,509	17,923
Sub-alternative 2b: ACL=OY= 95%ABC				
2017	36,449	32,937	18,714	3,512
2018	46,977	42,450	24,120	4,526
2019	58,883	53,210	30,233	5,673
2020	71,925	64,995	36,929	6,930
2021	85,946	77,665	44,128	8,281
2022	100,756	91,048	51,732	9,708
2023	116,087	104,902	59,604	11,185
2024	131,638	118,954	67,588	12,683
2025	147,108	132,935	75,531	14,174
2026	162,213	146,583	83,286	15,629
2027	176,717	159,690	90,733	17,027

Sub-alternative 2c: ACL=OY=90%ABC				
2017	34,530	31,203	17,729	3,327
2018	44,504	40,216	22,850	4,288
2019	55,784	50,409	28,642	5,375
2020	68,139	61,574	34,985	6,565
2021	81,422	73,577	41,805	7,845
2022	95,453	86,256	49,009	9,197
2023	109,977	99,381	56,466	10,596
2024	124,709	112,694	64,031	12,016
2025	139,366	125,938	71,556	13,428
2026	153,675	138,868	78,903	14,807
2027	167,416	151,286	85,958	16,130

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 and

the Gulf of Mexico and South Atlantic Councils are developing 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 hogfish. Therefore, there is a low risk of exceeding the commercial and recreational ACLs and **Preferred Alternative 2** and its sub-alternatives can be used as part of a successful harvest management system for hogfish with little risk of overfishing.

4.6.2 Economic Effects

Alternative 1 (No Action) is not a viable alternative for this action because establishing an ACL for a stock is a statutory requirement. In general, assuming a sector is able to catch its entire ACL, the higher the ACL, the greater the positive direct economic effects for all sectors, as long as the ACL is not exceeded. Therefore, **Preferred Sub-alternative 2a** represents the highest positive direct economic effects, followed by **Sub-alternative 2b** and then **Sub-alternative 2c**.

4.6.3 Social Effects

As noted in **Section 4.4.3**, social effects of ACLs are associated with changes to access through associated AMs triggered by reaching the ACL. In general, the higher the ACL, the greater the short-term social and economic benefits that would be expected to accrue, assuming long-term recovery and rebuilding goals are met. Adhering to stock recovery and rebuilding goals is assumed to result in net long-term positive social and economic benefits. 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 coastal communities because ACLs would be based on the current conditions, even if the updated information indicates that a lower ACL is appropriate to sustain the stock.

Assuming **Preferred Alternative 3** under **Action 5**, the ACLs under **Preferred Alternative 2** will all have negative effects by restricting access for the commercial and recreational sectors. **Sub-alternative 2c** would be the most restrictive, followed by **Sub-alternative 2b**, and then **Preferred Sub-alternative 2a**. However, the differences in expected social effects between **Sub-alternatives 2a (Preferred)-2c** will likely not matter, because there is such a large difference from the proposed ACLs under **Preferred Alternative 2** and the current conditions of the fishery (**Tables 2.6.1.** and **2.6.2**). However, the restrictions that would result under **Preferred Alternative 2** are expected to result in more long-term benefits than under **Alternative 1 (No Action)** by rebuilding the FLK/EFL hogfish stock.

4.6.4 Administrative Effects

Negative administrative impacts of this action are likely to be minimal. **Alternative 1 (No Action),** and **Alternative 2 (Preferred)**, (including its sub-alternatives) would not result in significant administrative cost or time burdens other than notifying fishery participants of the

change in the sector ACLs and continued monitoring of the sector ACLs. The burden on law enforcement would not change under either alternative since commercial quota closures and bag limits implemented are currently enforced.

Action 7. Establish a recreational Annual Catch Target (ACT) for the GA-NC and the FLK/EFL stocks of hogfish

Alternatives (preferred alternatives in bold)

1 (No Action). Do not modify recreational ACTs for hogfish for the GA-NC and FLK/EFL stocks of recreational sector hogfish. The current ACT is 59,390 lbs ww and applies to hogfish throughout the South Atlantic Council's jurisdiction. The ACT = recreational ACL*(1-PSE) or ACL*0.5, whichever is greater, and where Percent Standard Error (PSE) = average PSE 2005-2009.

2. Establish an ACT for the GA-NC stock of hogfish for the recreational sector.

2a. ACT = recreational ACL*(1-PSE) or ACL*0.5, whichever is greater.

2b. ACT =85% recreational ACL.

2c. ACT = 75% recreational ACL.

3. Establish an ACT for the FLK/EFL stock of hogfish for the recreational sector.

3a. ACT = recreational ACL*(1-PSE) or ACL*0.5, whichever is greater.

3b. ACT =85% recreational ACL.

3c. ACT = 75% recreational ACL.

4.7.1 Biological Effects

As explained in **Section 2.7.1**, Annual Catch Targets (ACTs) can be used to prevent ACLs from being exceeded. For species without in-season management control to prevent the ACL from being exceeded, managers may utilize ACTs that are set below ACLs so that catches do not exceed the ACLs. In managing the snapper grouper fishery; however, the South Atlantic Council has chosen not to use ACTs to trigger AMs because it is anticipated that improvements in reporting will significantly reduce management uncertainty.

Since the ACT is typically set lower and would be reached sooner than the ACL, using an ACT rather than the ACL as a trigger for AMs in the recreational sector may prevent an ACL overage. This more conservative approach, would likely help to ensure that recreational data uncertainties do not cause or contribute to excessive ACL overages for vulnerable species. Using recreational ACTs rather than the ACLs to trigger recreational AMs may not eliminate ACL overages completely; however, using such a strategy for the recreational sector may reduce the need to compensate for very large overages. Because the South Atlantic Council has not employed ACTs in its management strategy for the snapper grouper fishery, the biological effects of **Preferred Alternatives 2** and **3** (and their respective sub-alternatives) would be neutral. Compared to **Alternative 1 (No Action)**, **Preferred Alternatives 2** and **3** (and their respective sub-alternatives) would be biologically beneficial in that management would be adjusted to apply to two separate stocks of hogfish and, therefore, be responding to the best scientific information available about the target species.

The Percent Standard Error (PSE) for the GA-NC stock of hogfish is above 50%. The South Atlantic Council has consistently chosen to specify recreational ACTs using a formula that incorporates the PSE in order to account for uncertainty in recreational landings estimates. However, recreational landings estimates for the GA-NC stock of hogfish are imprecise (and therefore have high PSEs) due to low MRIP intercepts that may result from low intercept rates of

recreational divers. Hogfish are primarily harvested with spearfishing gear. Using the South Atlantic Council's existing ACT formula (Rec ACT = rec ACL*(1-PSE) or 0.5, whichever is greater), would have resulted in setting the recreational ACT at 50% of the recreational ACL. Given that the proposed recreational ACLs for the GA-NC stock of hogfish are low compared to status quo, the South Atlantic Council chose instead to establish the recreational ACT at 85% of the recreational ACL (**Preferred Sub-alternative 2b**). For the FLK/EFL stock of hogfish, the South Atlantic Council selected **Preferred Sub-alternative 3b** to maintain consistency.

Table 4.7.1 shows recreational Annual Catch Targets (ACTs) for the GA-NC stock of hogfish based on the proposed recreational ACL alternatives in **Action 4**.

Table 4.7.1. Recreational Annual Catch Targets (in pounds and numbers) for the GA-NC stock of hogfish for each of the Recreational ACL sub-alternatives in Action 4.

	ACL=ABC		ACL=95%ABC		ACL=90%ABC	
	lbs	num	lbs	num	lbs	num
ACT=rec ACL (1-PSE) or rec ACL*0.5, whichever is greater	5,513	520	5,237	494	4,961	468
ACT=85%rec ACL (Preferred)	**9,371**	**884**	**8,903**	**840**	**8,434**	**796**
ACT=75%recACT	8,269	780	7,855	741	7,442	702

Table 4.7.2 shows recreational Annual Catch Targets (ACTs) for the Florida Keys/ East Florida (FLK/EFK) stock for the **Alternative 3** sub-alternatives, including **Preferred Sub-alternative 3b**. Recreational ACTs are specified in numbers of fish based on **Preferred Sub-alternative 2a** under **Action 6**.

Table 2.7.2. Recreational Annual Catch Targets (ACTs; numbers of fish) under consideration for the Florida Keys/East Florida (FLK/EFL) stock of hogfish based on **Preferred Sub-alternative 2a** under **Action 6**.

			ACT=rec ACL (1-PSE)		ACT=85%recACL (Preferred)		ACT=75%recACL	
Year	**Rec ACL (numbers)**	**Rec ACL (lbs)**	**numbers**	**pounds**	**numbers**	**pounds**	**numbers**	**pounds**
2017	19,699	34,670	15,661	27,563	16,744	29,470	14,774	26,003
2018	25,389	44,685	20,184	35,524	21,581	37,982	19,042	33,513
2019	31,824	56,010	25,300	44,528	27,050	47,609	23,868	42,008
2020	38,872	68,415	30,904	54,390	33,042	58,153	29,154	51,312
2021	46,450	81,752	36,928	64,993	39,483	69,489	34,838	61,314
2022	54,455	95,840	43,291	76,193	46,286	81,464	40,841	71,880
2023	62,741	110,423	49,879	87,787	53,329	93,860	47,055	82,818
2024	71,145	125,215	56,560	99,546	60,473	106,433	53,359	93,911
2025	79,506	139,931	63,208	111,245	67,580	118,941	59,630	104,948
2026	87,669	154,298	69,697	122,667	74,519	131,154	65,752	115,724
2027	95,509	168,095	75,929	133,636	81,182	142,881	71,631	126,071

4.7.2 Economic Effects

The purpose of establishing ACTs is to help prevent a sector from exceeding its ACLs due to management uncertainty. Exceeding an ACL would have direct negative economic effects on a all sectors potentially due to a reduced stock size and to a sector that would have its future ACL reduced by the size of the overage. Without being able to predict exactly how much precaution is needed in setting the ACL, it is difficult to compare alternatives. However, if a fishery is closed too early for a sector based on the ACT, there would be direct negative economic effects as well because the sector was prohibited from harvesting fish.

Alternative 1 (No Action) is not a viable alternative for management as the previous single stock of hogfish has been separated into two separate stocks and the current ACT set for the recreational sector is no longer valid. **Preferred Alternative 2, Preferred Sub-alternative 2b** and **Preferred Alternative 3, Preferred Sub-alternative 3b** would allow for this highest catches (and highest positive direct economic effects) before the ACT could be used to trigger a closure for the recreational sector. **Preferred Alternative 2, Sub-alternative 2a** and **Preferred Alternative 3, Sub-alternative 3a** which results in the second highest ACL would be expected to result in the next highest amount of positive direct economic effects, followed lastly by **Preferred Alternative 2, Sub-alternative 2c** and **Preferred Alternative 3, Sub-alternative 3c**.

4.7.3 Social Effects

Establishment of a recreational ACT for each stock of hogfish would likely have little effects on recreational fishermen targeting hogfish, unless the Council decides to set the ACT as a trigger for AMs at a later time. A higher ACT could be more beneficial for fishermen, depending on the levels specified in **Preferred Alternative 2** and **Preferred Alternative 3**. Because the ACT is used for monitoring only, it is expected that the social effects of **Alternative 1 (No Action)**, **Preferred Alternative 2**, and **Preferred Alternative 3** would be the similar.

4.7.4 Administrative Effects

Under this action, it is important to note that recreational data collection can be more administratively burdensome due to time delays and lengthy reviews. Specifying an ACT alone would not increase the administrative burden over the status quo, other than adding an additional layer of precautionary monitoring to the system of AMs. In-season monitoring needed for tracking how much of the ACT has been harvested throughout a particular fishing season can potentially result in a need for additional cost and personnel resources if a monitoring mechanism is not already in place. However, because the ACT alternatives as they are presented here, do not trigger any corrective or preventative action, no additional in-season monitoring is required regardless of where the ACT level is set. Therefore, there is no difference in the potential administrative impacts associated with **Preferred Alternatives 2** and **3** (including their sub-alternatives) when compared with **Alternative 1 (No Action)**.

Action 8. Increase the commercial and recreational minimum size limit for hogfish for the GA-NC and the FLK/EFL stocks of hogfish

Alternatives
(preferred alternatives in bold)

1 (No Action). Do not increase the commercial and recreational minimum size limit for hogfish. The current minimum size limit for hogfish is 12 inches fork length (FL) for both the commercial and recreational sectors in federal waters of the South Atlantic Region, and state waters of South Carolina, North Carolina, and Florida. There is no minimum size limit for hogfish in state waters of Georgia.

2. Increase the commercial and recreational minimum size limit for the GA-NC stock of hogfish in the South Atlantic Region.

2a. 16 inches FL
2b. 17 inches FL
2c. 18 inches FL
2d. 19 inches FL
2e. 20 inches FL
2f. Increase the minimum size limit from 12" to 15" in year 1, to 18" in year 2, and to 20" in year 3.

3. Increase the commercial and recreational minimum size limit for the FLK/EFL stock of hogfish in the South Atlantic Region.

3a. 14 inches FL
3b. 15 inches FL
3c. 16 inches FL
3d. 17 inches FL
3e. Increase the minimum size limit from 12" to 14" in year 1 and to 16" in year 3.

4.8.1 Biological Effects

Commercial and recreational hogfish size limit analysis assumed a 10% release mortality rate based on estimates for hook-and-line releases SEDAR 37 (2014). Spearfishing release mortality is estimated to be 100%, but for the purposes of the recreational size limit analysis for hogfish, all landings were treated as hook-and-line. Spearfishing gear is not used on headboats. Although the majority of MRIP landings are likely from spearfishing gear, it is unlikely that all fishermen would spear undersized fish when the size limit is increased. Further, it is unlikely that fishermen who use spearfishing gear would discard many fish. Hence, the assumption of 10% release mortality for size limit analyses is more realistic. A similar rationale was applied to the size limit analysis for the commercial sector; the assignment of a 10% release mortality rate to spearfishing records of fish that would be undersized if the size limit were increased accounts for some level of estimation error by spearfishermen but avoids the unrealistic assumption that 100% of undersized fish between the current and increased size limit would be killed. Projected reductions in recreational hogfish harvest under different minimum size limits for the recreational and commercial sectors are shown in **Tables 4.8.1** and **4.8.2**, respectively.

Hogfish are monandric, protogynous hermaphrodites. Fish mature as females first, and are expected to eventually become male if they live long enough. Research conducted on hogfish that would belong to the Florida Keys/East Florida stock, indicate that a single male maintains harems of 5 to 15 females (Colin 1982, Munoz et al. 2010) during extended spawning seasons

that last for months. Hogfish are pair spawners (Davis 1976, Colin 1982), and spawning occurs daily during spawning season (McBride and Johnson 2007, Collins and McBride 2008, Munoz et al. 2010). The size (7.8-28.6 inches FL) and age (1-11 years) range at which sexual transition occurs indicates that transition is socially mediated (Collins and McBride 2011).

Life history studies on hogfish that would belong to the Florida Keys/East Florida stock have estimated female size and age at 50% maturity to occur between 6.0 and 7.6 inches fork length (FL) and 0.9 to 1.6 years (McBride et al. 2008, Collins and McBride 2011). Males may occur as small as 7.8 inches FL, but size at 50% male maturity has been estimated as 16.4 inches FL and 7 years in the Florida Keys (McBride et al. 2008; **Figure 4.8.1**). Sex change in hogfish can take several months (McBride and Johnson 2007), so removal of the dominant male has the potential to significantly affect harem stability and decrease reproductive potential (Munoz et al. 2010). Size limits above 16 inches FL (**Sub-alternatives 3c, 3d** and **3e**) may provide hogfish the opportunity to form harems and transition to males. McBride et al. (2008) state: "…the size of 50% male maturation, approximately 415 to 425 mm (16.3-16.7 inches) FL, is well above the current minimum size limit. Evidently, to reduce disruption to spawning harems and avoid recruitment overfishing, the minimum size limit should be increased."

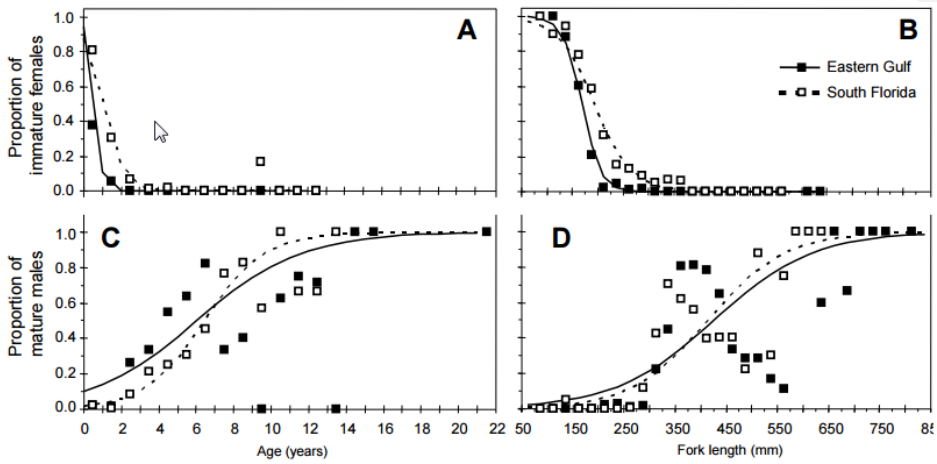


Figure 4.8.1. Maturation of hogfish (*Lachnolaimus maximus*) from the eastern Gulf of Mexico and south Florida for (A) females by age, (B) females by size, (C) males by age, and (D) males by size (Fig. 4 in McBride et al. 2008).

For hogfish in the GA-NC stock, the size at transition was calculated based on macroscopic investigation of gonad samples collected in 2013 through 2015 from vessels fishing off North Carolina (Scott Van Sant, SEFSC, unpublished data). The size at which 50% of females transition to males was estimated to be 24 inches fork length (**Figure 4.8.2**) using binary logistic regression implemented in SAS 9.1. The smallest male observed was 15 inches fork length. No female hogfish were observed greater than 30 inches fork length. These data are preliminary and

will likely change when a complete historical analysis is completed; however, they provide a general estimate of the transition size for hogfish off North Carolina that can be considered in the management of the GA-NC stock.

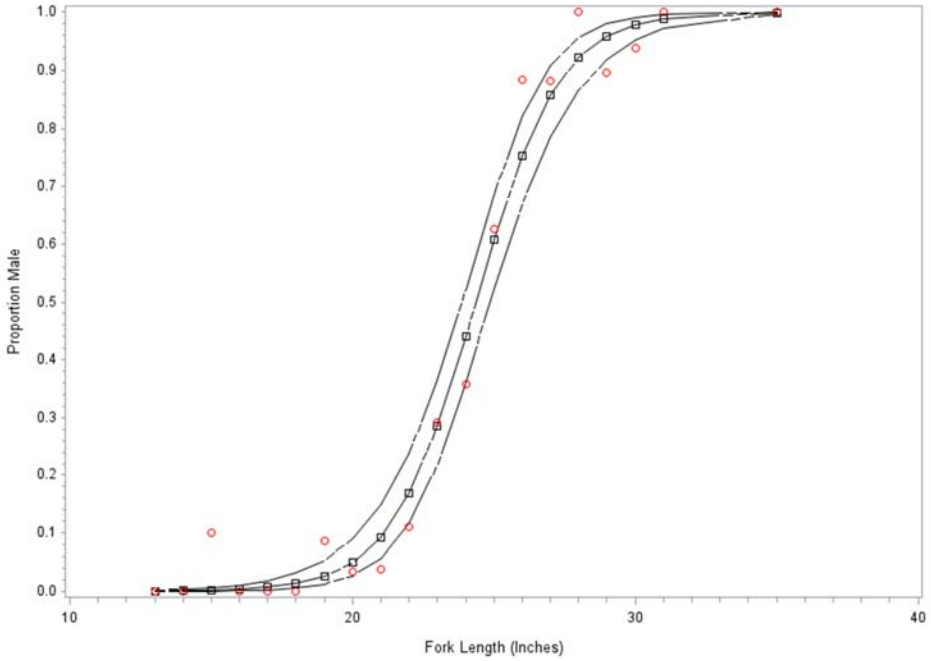


Figure 4.8.2. Size at transition (female to male) for hogfish in North Carolina (preliminary data). Source: Scott Van Sant, SEFSC.

Table 4.8.1. Percent reductions in FLE/FL-Keys recreational landings (in numbers), by mode and wave, at different proposed minimum size limits.

	Mode of Fishing												
	Headboat	Charter						Private					
Size Limit	Annual	1	2	3	4	5	6	1	2	3	4	5	6
12 (status quo)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	43%	18%	18%	18%	18%	18%	9%	34%	38%	14%	30%	24%	33%
14	59%	39%	39%	39%	39%	39%	33%	56%	54%	23%	53%	52%	63%
15	72%	79%	79%	79%	79%	79%	70%	63%	63%	66%	53%	52%	68%
16	80%	84%	84%	84%	84%	84%	76%	76%	75%	68%	59%	58%	77%
17	86%	90%	90%	90%	90%	90%	90%	82%	77%	82%	69%	70%	84%
18	86%	90%	90%	90%	90%	90%	90%	87%	80%	90%	87%	87%	90%
19	86%	90%	90%	90%	90%	90%	90%	89%	82%	90%	90%	90%	90%
20	86%	90%	90%	90%	90%	90%	90%	90%	86%	90%	90%	90%	90%

Sources: Headboat CRNF file (mean 2011-2013), MRIP Catch-Effort Files (mean 2012-2014).
Note: There were insufficient samples to model monthly impacts of proposed size limits for headboat; headboat catch effort file for 2014 not available.

Table 4.8.2. Percent reductions in GA-NC recreational landings (in numbers), by mode and wave, at different proposed minimum size limits.

	Mode of Fishing												
	Headboat	Charter						Private					
Size Limit	Annual	1	2	3	4	5	6	1	2	3	4	5	6
12 (status quo)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	0%	0%	0%	0%	0%	0%	0%	27%	27%	24%	14%	27%	27%
14	0%	30%	30%	30%	30%	30%	30%	52%	52%	49%	47%	52%	52%
15	0%	30%	30%	30%	30%	30%	30%	66%	66%	62%	66%	66%	66%
16	45%	30%	30%	30%	30%	30%	30%	72%	72%	76%	82%	72%	72%
17	45%	39%	39%	39%	39%	39%	39%	79%	79%	80%	86%	79%	79%
18	45%	39%	39%	39%	39%	39%	39%	81%	81%	82%	86%	81%	81%
19	45%	39%	39%	39%	39%	39%	39%	82%	82%	82%	86%	82%	82%
20	45%	39%	39%	39%	39%	39%	39%	85%	85%	85%	89%	85%	85%

Sources: Headboat CRNF file (mean 2011-2013), MRIP Catch-Effort Files (mean 2012-2014).
Note: There were insufficient samples to model monthly impacts of proposed size limits for headboat; headboat catch effort file for 2014 not available.

Table 4.8.3. Percent reductions in FLE/FL-Keys recreational landings (in pounds whole weight), by mode and wave, at different proposed minimum size limits.

	Mode of Fishing												
	Headboat	Charter						Private					
Size Limit	Annual	1	2	3	4	5	6	1	2	3	4	5	6
12 (status quo)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	28%	13%	13%	13%	13%	13%	6%	29%	33%	10%	26%	18%	26%
14	42%	32%	32%	32%	32%	32%	28%	46%	45%	18%	45%	40%	54%
15	55%	75%	75%	75%	75%	75%	64%	54%	51%	60%	45%	40%	59%
16	65%	81%	81%	81%	81%	81%	71%	69%	64%	62%	53%	48%	70%
17	73%	90%	90%	90%	90%	90%	90%	77%	68%	78%	65%	64%	79%
18	73%	90%	90%	90%	90%	90%	90%	85%	72%	90%	87%	87%	89%
19	73%	90%	90%	90%	90%	90%	90%	89%	76%	90%	90%	90%	90%
20	73%	90%	90%	90%	90%	90%	90%	89%	82%	90%	90%	90%	90%

Sources: Headboat CRNF file (mean 2011-2013), MRIP Catch-Effort Files (mean 2012-2014).
Note: There were insufficient samples to model monthly impacts of proposed size limits for headboat; headboat catch effort file for 2014 not available.

Table 4.8.4. Percent reductions in GA-NC recreational landings (in pounds whole weight), by mode and wave, at different proposed minimum size limits.

	Mode of Fishing												
	Headboat	Charter						Private					
Size Limit	Annual	1	2	3	4	5	6	1	2	3	4	5	6
12 (status quo)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
13	0%	0%	0%	0%	0%	0%	0%	17%	17%	14%	11%	17%	17%
14	0%	30%	30%	30%	30%	30%	30%	37%	37%	35%	36%	37%	37%
15	0%	30%	30%	30%	30%	30%	30%	50%	50%	45%	53%	50%	50%
16	45%	30%	30%	30%	30%	30%	30%	55%	55%	61%	71%	55%	55%
17	45%	34%	34%	34%	34%	34%	34%	65%	65%	65%	78%	65%	65%
18	45%	34%	34%	34%	34%	34%	34%	67%	67%	67%	78%	67%	67%
19	45%	34%	34%	34%	34%	34%	34%	69%	69%	67%	78%	69%	69%
20	45%	34%	34%	34%	34%	34%	34%	75%	75%	72%	85%	75%	75%

Sources: Headboat CRNF file (mean 2011-2013), MRIP Catch-Effort Files (mean 2012-2014).
Note: There were insufficient samples to model monthly impacts of proposed size limits for headboat; headboat catch effort file for 2014 not available.

Figure 4.8.3 shows the length composition of recreationally caught hogfish from 1995 to 2012. The solid black line represents the 12-inch (fork length) minimum size limit. The average length in the time series was 14.07 inches.

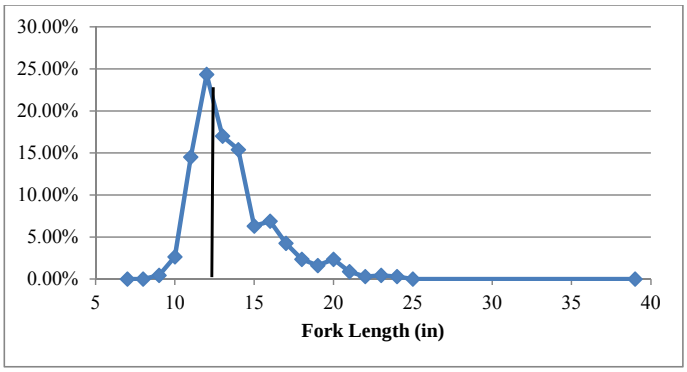
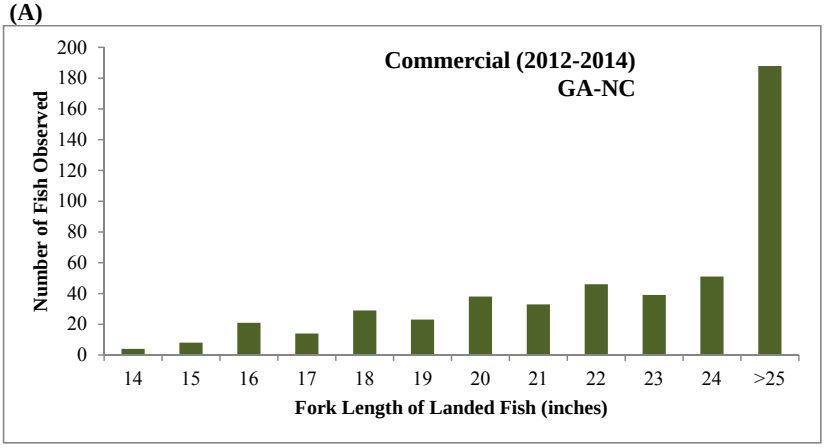


Figure 4.8.3. Length composition (inches fork length) of recreationally caught hogfish, 1995-2012. N=682.
Source: SEDAR 37 (2014).

Figure 4.8.4 shows the size distribution (inches fork length) of commercially harvested hogfish in the South Atlantic. The majority of hogfish in the GA-NC portion of the stock are harvested at 25 inches and greater. In Florida, the majority of commercially harvested hogfish are at the 12-inch minimum size limit.

(A)



(B)

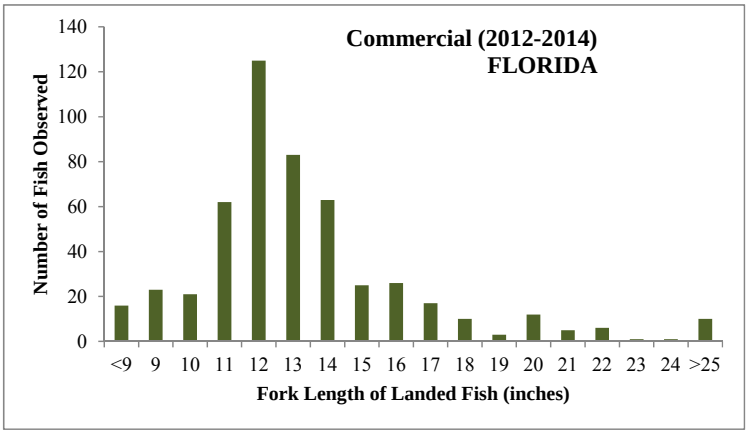
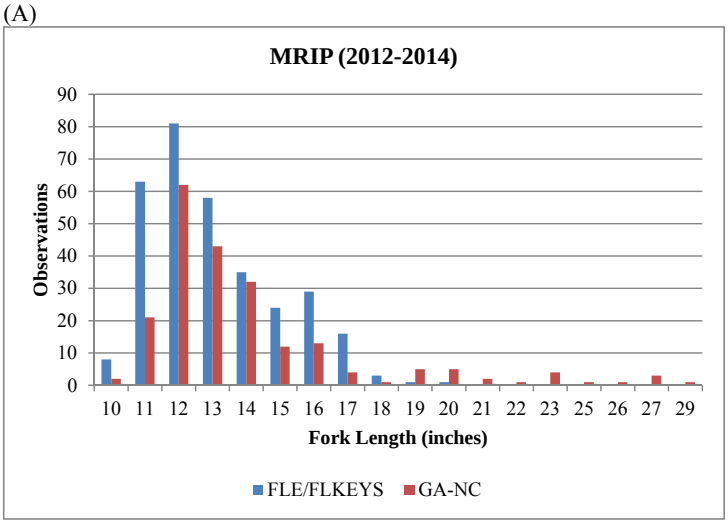


Figure 4.8.4. Size distribution in inches fork length (FL) of hogfish landed commercially in two areas: (A) GA-NC and (B) Florida Keys/East Florida, 2012-2014.
Source: NMFS SERO. Commercial TIP data (L. Beerkircher, SEFSC, pers. comm.)

Figure 4.8.5 shows the size distribution (inches fork length) of hogfish harvested recreationally in the South Atlantic. For the GA-NC stock, the size distribution of recreationally caught hogfish (based on MRIP) in 2012-2014 shows shows a peak at 12 inches, the current minimum size limit. Similarly, headboat landings (for South Atlantic hogfish overall), also show a peak at 12 inches.

(A)



(B)

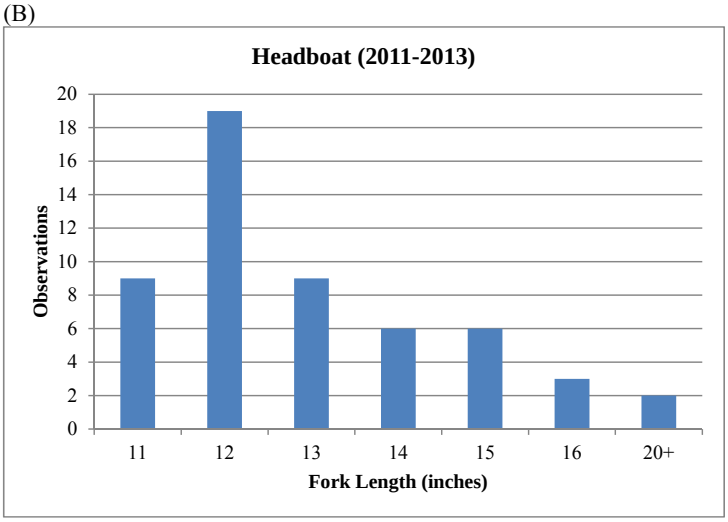


Figure 4.8.5. Size distribution in inches fork length (FL) of hogfish landed recreationally in 2011-2014: (A) GA-NC and FLK/EFL based on Marine Recreational Information Program (MRIP) estimates; and (B) entire South Atlantic based on Southeast Headboat Survey.
Sources: NMFS SERO. MRIP (NMFS OST, accessed May 2015) and Southeast Headboat Survey (HBS bp72_13 file).

Preferred Sub-alternative 2e would increase the minimum size limit for the GA-NC stock (both sectors) to 20 inches fork length (FL). Off North Carolina, 50% of hogfish transition to males at 24.5 inches FL (**Figure 4.8.2**) and the majority of commercial harvested hogfish are 25 inches or larger (**Figure 4.8.4, A**). Hence the proposed minimum size limit would continue to allow removal of the most reproductively successful individuals with potentially negative biological effects on the population. On average, **Preferred Sub-alternative 2e** would result in a 45% reduction in harvest from mean landings from 2012 through 2014 for the headboat sector and 39% and 86% for the charter and private sectors, respectively (**Table 4.8.2**). **Sub-alternatives 2a-2d** would also result in reductions in harvest but not to the same level as **Preferred Sub-alternative 2e**. Hence the latter would be the most biologically conservative of the alternatives considered and, presumably result in the greatest biological benefit. However, ACLs and AMs are in place to constrain harvest. Compared to **Alternative 1 (No Action)** all of the sub-alternatives under **Alternative 2** would be expected to benefit the GA-NC stock of hogfish, although all of them would continue to allow the most fecund individuals to be removed from the population. Need to add discussion for Sub-alt 2f

As mentioned previously, studies on reproductive biology of hogfish in Florida suggest that minimum size limits above 16 inches would allow more females to transition to males thus promoting spawning harems and benefiting the hogfish population. Hence, **Sub-alternatives 3c**, **3d** and **3e** would increase the minimum size limit for the FLK/EFL stock of hogfish to a level that would impart the most biological benefits to the stock. Of these, **Sub-alternative 3d** would be the most biologically beneficial, followed by **Sub-alternative 3c** and **3e**. **Preferred Sub-alternative 3b**, however, would not be expected to impart biological benefits to the FLK/EFL hogfish stock because it would continue to allow removal of the most reproductively productive individuals and possibly disrupt formation of harems since individuals would be harvested before transition from female to male could take place. Similarly, **Sub-alternative 3a** would result in negative biological effects compared to the other alternatives considered. Compared to **Alternative 1 (No Action)**, **Sub-alternatives 3a-3e** would be expected to benefit the FLK/EFL stock of hogfish to varying degrees. On average, **Preferred Sub-alternative 3b** would reduce harvest from mean 2012-2014 landings by 72% for the headboat sector, and by 78% and 61% for the charter and private sectors, respectively (**Table 4.8.1**). **Sub-alternatives 3c-3e** would result in greater potential reductions in harvest and presumably be more biologically beneficial. However, ACLs and AMs are in place to constrain harvest.

4.8.2 Economic Effects

In general, increasing the size limit for a species has little long-term economic effect unless the larger size limit results in greater numbers of fish reaching spawning size and/or fish have higher fecundity prior to being harvested. Size limits that result in more spawning and/or higher fecundity would result on more direct, long-term, positive economic effects presumably through the availability of increased numbers of fish in the future. However, there could be some direct, short-term, negative economic effects as fewer fish would be available to harvest until the current population grows into the new minimum size and/or the biomass of harvestable fish increases. The greater the increase in size limit from **Alternative 1 (No Action)**, the higher the

probability for longer short-term negative economic effects. However, this could also eventually result in greater long-term positive economic effects from a larger spawning biomass.

Preferred Sub-alternative 2e affords the highest probability of long-term positive economic effects, as well as the highest probability of greater short-term direct negative economic effects. In terms of least to most long-term, direct, positive economic effects, the sub-alternatives for **Preferred Alternative 2** would be **2a**, **2b**, **2c**, **2d**, and **Preferred Sub-alternative 2e**. Until further biological effects are provided, it is not clear where **Sub-alternative 2f** fits into the ranking. Nonetheless, **Sub-alternative 2f** would provide fewer long-term, direct, positive economic effects than **Preferred Sub-alternative 2e**.

Preferred Sub-alternative 3d affords the highest probability of long-term positive economic effects, as well as the highest probability of greater short-term direct negative economic effects. In terms of least to most long-term, direct, positive economic effects, the sub-alternatives for **Preferred Alternative 3** would be **3a**, **Preferred 3b**, **3c**, and **3d**. Until further biological effects are provided, it is not clear where **Sub-alternative 3e** fits into the ranking. Nonetheless, **Sub-alternative 3e** would provide greater long-term, direct, positive economic effects than **Preferred Sub-alternative 3b**.

4.8.3 Social Effects

As discussed in **Section 4.5.3**, hogfish is an important commercial and recreational species in the Florida Keys. Additionally, as discussed in **Section 4.4.3**, there are communities in South Carolina and North Carolina that may be affected by management changes for GA-NC hogfish.

Some social effects of minimum size limits would be associated with the positive and negative biological effects of minimum size limits on the hogfish stocks (**Section 4.8.1**). Positive effects of allowing only fish of a certain size that are caught in the South Atlantic EEZ to be landed could help maintain sustainability of harvest and the health of each hogfish stock, which would be beneficial to recreational and commercial fishermen in the long term. Negative effects of potential increase in discard mortality due to higher minimum size limit could affect the stock and in turn, commercial and recreational fishing opportunities.

Because recreational harvest would be reduced as the minimum size limit increases (see **Table 4.8.2**), there would be expected negative short-term effects on recreational fishermen targeting hogfish in North Carolina, South Carolina, and Georgia under an increased minimum size limit for the GA-NC stock (**Preferred Alternative 2**). However, there would be more expected negative effects on private recreational anglers than on recreational fishermen on for-hire vessels. Recreational fishing opportunities would likely be the most affected by the largest minimum size limit under **Preferred Sub-alternative 2e**, but there would be minimal or no expected effects on the commercial sector by any minimum size limit in **Sub-alternatives 2a-2f** (**Figure 4.8.4**). Short-term effects on recreational fishermen and associated businesses and communities would be the least under **Alternative 1 (No Action)**. However, it should be noted that there may be long-term benefits of reducing the rate of harvest to extend the fishing season

and to contribute to rebuilding the stock when the minimum size limit is increased (**Preferred Alternative 2**).

Under **Preferred Alternative 3**, an increase in the minimum size limit for FLK/EFL hogfish would be expected to result in a higher level of harvest reduction for the recreational sector (**Table 4.8.1**), particularly under the highest proposed minimum size limit (**Sub-alternative 3d**). **Preferred Sub-alternative 3b** would have less negative effects on recreational harvest and on commercial harvest, but even a small reduction in the minimum size limit will likely have negative effects on commercial and recreational fishing opportunities.

4.8.4 Administrative Effects

Beneficial administrative effects would be expected from **Preferred Alternatives 2** and **3**, including their sub-alternatives compared to **Alternative 1 (No Action)** which would continue to have a minimum size limit for three out of the four states in the South Atlantic Region. Alternatives that specify a consistent minimum size limit throughout the South Atlantic Council's jurisdiction would help the public avoid confusion with regulations and aid law enforcement. Administrative impacts on the agency associated with the action alternatives would be incurred by rulemaking, outreach, education and enforcement.

Action 9. Establish a commercial trip limit for the GA-NC and the FLK/EFL stocks of hogfish

4.9.1 Biological Effects

Alternative 1 (No Action) would not establish a commercial trip limit for the GA-NC and FLK/EFL stocks of hogfish. **Alternatives 2** and **3** (including their respective sub-alternatives) would establish a commercial trip limit for the GA-NC and FLK/EFL stocks of hogfish, respectively.

Alternatives (preferred alternatives in bold)

1 (No Action). Do not establish a commercial trip limit for the GA-NC and FLK/EFL stocks of hogfish in the South Atlantic Region. Currently there is no commercial trip limit for hogfish in the South Atlantic Region.

2. Establish a commercial trip limit for the GA-NC stock of hogfish in the South Atlantic Region.

- 2a. 100 lbs per trip.
- 2b. 250 lbs per trip.
- 2c. 500 lbs per trip.
- 2d. 750 lbs per trip.

3. Establish a commercial trip limit for the FLK/EFL stock of hogfish in the South Atlantic Region.

- 3a. 25 lbs per trip.
- 3b. 50 lbs per trip.
- 3c. 100 lbs per trip.
- 3d. 150 lbs per trip
- 3e. 200 lbs per trip

Commercial logbook data were explored to determine harvest of hogfish per trip and to analyze trip limit options. During 2012-2014 (the most recent years of complete data), 2,008 commercial trips landed hogfish in the South Atlantic (**Figure 4.9.1**). During 2012-2014, 64% of the commercial trips landed 25 lbs ww or less, 14% landed 50 lbs ww, 9% landed 75 lbs ww, 5% landed 200 lbs ww, 2% landed 300 lbs ww, 1% landed 400 lbs ww, and <1% landed 500 lbs ww or more (**Figure 4.9.1**).

Hogfish are commercially harvested primarily by spear and hook-and-line gear. **Figure 4.9.2** shows the distribution of hogfish landings per trip by gear type. The majority of the trips that landed hogfish during 2012-2014 used spear (47%, 950 trips) and hook and line gear (42%, 842 trips). **Figure 4.9.3** shows hogfish harvested commercially per trip (lbs ww) in two areas of the South Atlantic, GA-NC and FLK/EFL, during 2012-2014.

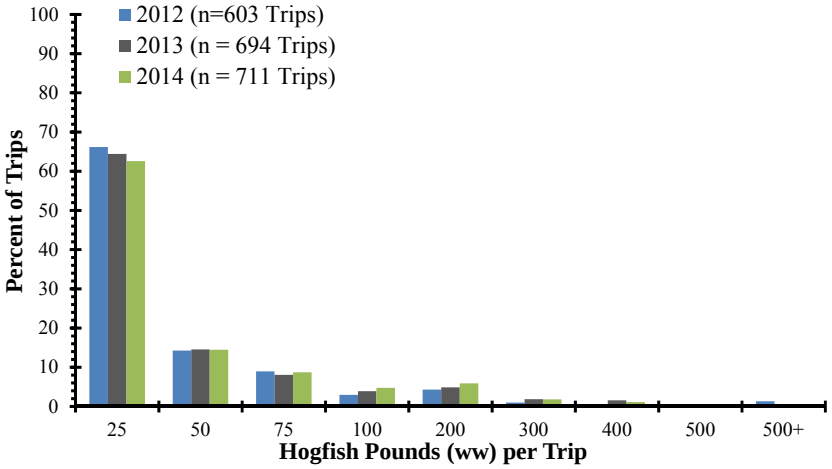


Figure 4.9.1. Distribution of commercially harvested hogfish per trip (lbs ww) by year, from 2012 through 2014, in the South Atlantic. Source: Commercial logbook dataset accessed April 2, 2015.

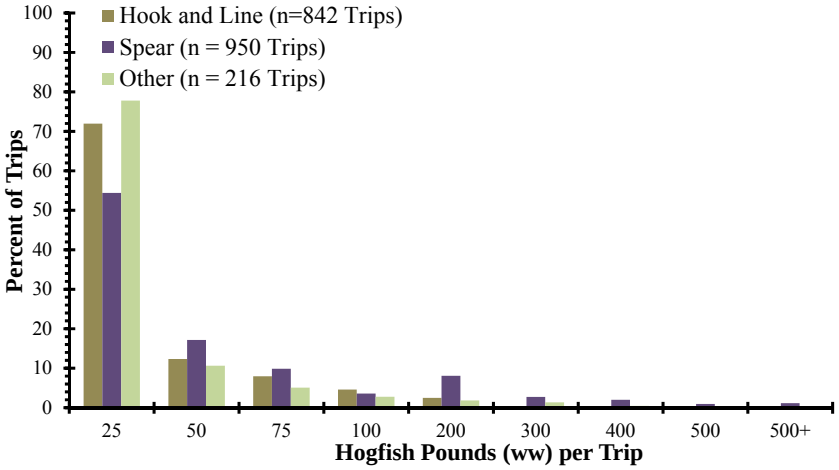


Figure 4.9.2. Distribution of commercially harvested hogfish per trip (lbs ww) by gear, from 2012 through 2014, in the South Atlantic. Note: The "Other" gear type consists of hogfish landings from gill nets, traps, and if the gear type was not provided in the commercial logbook dataset.
Source: Commercial logbook dataset accessed April 2, 2015.

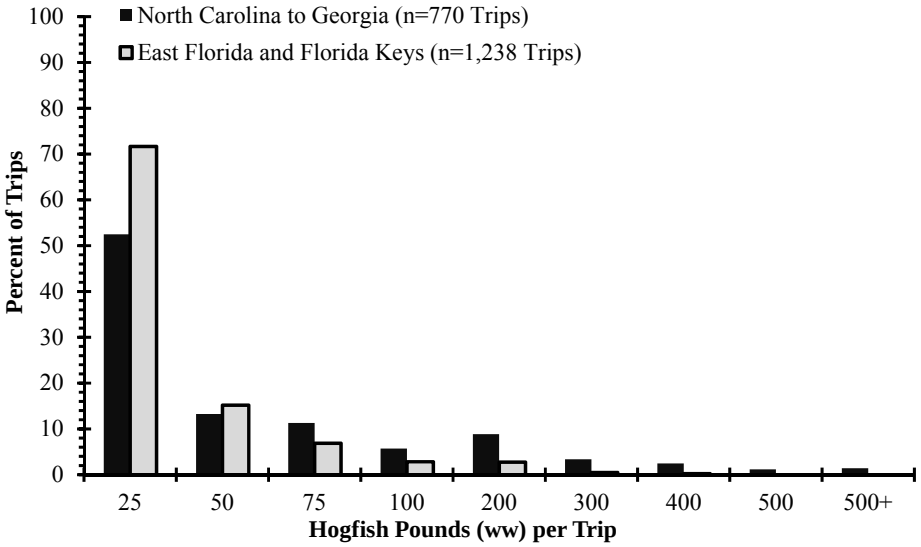


Figure 4.9.3. Distribution of commercially harvested hogfish per trip (lbs ww) by area, from 2012 through 2014, in the the South Atlantic. The areas were defined as GA-NC and FLK/EFL.
Source: Commercial logbook dataset accessed April 2, 2015.

More commercial trips (1,238) were observed for the Florida Keys/east Florida stock than in GA-NC (770) during 2012-2014, but GA-NC had higher pounds per trip (**Figure 4.9.3**). In the FLK/EFL area, 72% of the commercial trips landed 25 lbs ww or less per trip, 15% landed 50 lbs ww, 7% landed 75 lbs ww, 3% (each) landed 100 and 200 lbs ww, <1% landed 300 lbs ww or more (Figure 4.9.3). For GA-NC, 53% of the commercial trips landed 25 lbs ww or less per trip, 13% landed 50 lbs ww, 11% landed 75 lbs ww, 6% landed 100 lbs ww, 9% landed 200 lbs ww, 3% each landed 300 and 400 lbs ww, and 1% landed 500 lbs ww or more (**Figure 4.9.3**).

Percent decrease in landings by gear and for all gears were calculated for the different trip limits considered by the sub-alternatives under **Alternatives 2** and **3**. The results for GA-NC are shown in **Table 4.9.1** and the results for FLK/EFL are shown in **Table 4.9.2**.

Table 4.9.1. Percent decrease in landings by gear and for all gears, for various commercial hogfish trip limits for GA-NC.

Alternative 2; Trip Limit (lbs ww)	Hook and Line	Spear	All Gears (incl. hook-and-line, spear, gill nets, traps, etc.)
Sub-alternative 2a - 100	1.7%	38.5%	40.8%
Sub-alternative 2b - 250	0.1%	17.0%	17.4%
Sub-alternative 2c - 500	0.0%	5.0%	5.0%
Sub-alternative 2d - 750	0.0%	2.3%	2.3%

Source: South Atlantic commercial logbook data, 2012-2014.

Table 4.9.2. Percent decrease in landings by gear and for all gears, for various commercial hogfish trip limits for FLK/EFL.

Alternative 3; Trip Limit (lbs ww)	Hook-and-Line	Spear	All Gears (incl. hook-and-line, spear, gill nets, traps, etc.)
Sub-alternative 3a - 25	7.7%	27.1%	42.1%
Sub-alternative 3b - 50	4.3%	13.1%	21.9%
Sub-alternative 3c - 100	2.0%	3.8%	8.1%
Sub-alternative 3d - 150	1.4%	1.6%	4.3%
Sub-alternative 3e - 200	0.8%	1.1%	2.6%

Source: South Atlantic commercial logbook data, 2012-2014.

Alternative 2, **Sub-alternative 2a** (100 lbs ww trip limit) would have the largest percent decrease in commercial landings for GA-NC stock of hogfish, followed by **Sub-alternatives 2b** (250 lbs ww trip limit), and **2c** (500 lbs ww trip limit) (**Table 4.9.1**). This is logical, given that only 6% of the commercial trips during 2012-2014 landed 100 lbs ww, 9% landed 200 lbs ww, and only 1% landed 500 lbs ww or more (**Figure 4.9.3**).

Alternative 3, **Sub-alternative 3a** (25 lbs ww trip limit) would have the largest percent decrease in commercial landings for the FLK-EFL stock of hogfish, followed by **Sub-alternatives 3b** (50 lbs ww trip limit), **3c** (100 lbs ww trip limit), **3d** (150 lbs ww trip limit) and **3e** (200 lbs ww trip limit) (**Table 4.9.2**). This reflects the data shown in **Figure 4.9.3**, which shows that most (72%) of the commercial trips landed 25 lbs ww or less per trip, 15% landed 50 lbs ww, and 3% (each) landed 100 and 200 lbs ww.

None of the alternatives under consideration for this action are expected to adversely impact species or critical habitat listed under the Endangered Species Act (ESA). Establishing commercial trip limits for hogfish as addressed in this action would not alter the way in which the snapper grouper fishery is prosecuted in terms of gear types used or areas fished; nor would

any of the alternatives substantially increase or decrease fishing effort. Therefore, no impacts on ESA-listed species or designated critical habitat thereof are anticipated as a result of this action (see **Section 3.2.4** for a detailed description of ESA-listed species and critical habitat in the action area).

The proposed alternatives under this action would not alter the way the commercial portion of the snapper grouper fishery for hogfish is prosecuted. Furthermore, the gears predominantly used by hogfish commercial fishermen (spear and hook-and-line gear) are known to have minimal to no bycatch issues, and do little damage to physical or biogenic habitats (Blue Ocean 2010; Seafood Watch 2010). Therefore, no adverse effects on EFH, EFH-HAPCs, or Coral HAPCs are anticipated (see **Section 3.1** and **Appendix H** for a detailed description of EFH in the South Atlantic Region).

4.9.2 Economic Effects

Generally, trip limits are not considered to be economically efficient because they require an increase in trips and associated trip costs to land the same amount of fish. The fewer the number of trips that have to stop targeting hogfish because the trip limit has been reached would result in the least amount of direct negative economic effect. **Alternative 2** applies to the GA-NC stock, while **Alternative 3** applies to the FLK/EFL stock. **Alternatives 2** and **3** each have different trip limits. There are no specific trip costs available for average trip costs associated with either stock, therefore specific values associated with trip costs cannot be estimated.

Table 4.9.1 shows the percent of trips that would be expected to be affected by the sub-alternatives of **Alternative 2** (GA-NC stock). The ranking of sub-alternatives from least direct negative economic effect to the greatest is **Alternative 1 (No Action)**, **Sub-alternative 2d**, **Sub-alternative 2c**, **Sub-alternative 2b**, and **Sub-alternative 2a**.

Likewise, **Table 4.9.2** shows the percent of trips that would be expected to be affected by the sub-alternatives of **Alternative 3** (FLK/EFL stock). The ranking of sub-alternatives from least direct negative economic effect to the greatest is **Alternative 1 (No Action)**, **Sub-alternative 3e**, **Sub-alternative 3d**, **Sub-alternative 3c**, **Sub-alternative 3b**, and **Sub-alternative 3a**.

4.9.3 Social Effects

Commercial fishermen in the communities identified in **Section 4.3** would likely be those affected by a change in the hogfish commercial trip limit. However, it is likely that fishermen who have targeted hogfish in recent years also target other species, and will be able to adjust their businesses to adapt to regulatory changes. In general, a commercial trip limit may help slow the rate of harvest, lengthen a season, and prevent the ACL from being exceeded, but trip limits that are too low may make fishing trips inefficient and too costly if fishing grounds are too far away. Additionally, if the trip limit is too low, the commercial ACL may not be met.

However, in general hogfish are not harvested commercially at high levels in the South Atlantic (**Figure 4.9.3**), with most trips landing 25 lbs or less. While a trip limit may help to slow the rate of harvest by restricting landings for larger vessels, it is likely that establishing a trip limit under **Alternative 2** and **3** would have minimal effects on commercial fishermen and associated communities. The social benefits of extending the fishing season by slowing the rate of harvest would be most likely under the lower trip limits (**Sub-alternatives 2a** and **3a**).

4.9.4 Administrative Effects

Currently, there is no trip limit for the hogfish commercial sector (**Alternative 1, No Action**). **Alternatives 2** and **3** (including their sub-alternatives) could add to the administrative burden in the form of cost, time, or law enforcement efforts because two new commercial trip limits would need to be monitored and enforced. However, even if the commercial ACLs are met under each of the proposed commercial trip limits under **Alternatives 2** and **3** (including their sub-alternatives), the administrative resources required to implement in-season closures would not be much different from what is currently in place under **Alternative 1 (No Action)**. Higher trip limits could have slightly greater administrative effects because they increase the likelihood that the commercial ACL or quota would be met and a commercial closure would occur. **Alternatives 2** and **3** (including their respective sub-alternatives) would require notifying the commercial snapper grouper fishery and law enforcement personnel of an impending trip limit change for hogfish. Therefore, **Alternative 1 (No Action)** would be the least burdensome alternative compared to **Alternatives 2** and **3** (including their respective sub-alternatives).

Action 10. Modify and or establish recreational bag limits for the GA-NC and the FLK/EFL stocks of hogfish

Alternatives
(preferred alternatives in bold)

1 (No Action). Do not modify and/or establish recreational bag limits for the GA-NC and FLK/EFL stocks of hogfish in the South Atlantic Region. Currently the recreational bag limit is 5 fish per person per day off Florida and there is no recreational bag limit off Georgia, South Carolina, and North Carolina.

2. Modify the recreational bag limit for the GA-NC stock of hogfish in the South Atlantic Region.

2a. 2 fish per person per day.
2b. 1 fish per person per day.
2c. 1 fish per vessel per day.

3. Modify the recreational bag limit for the Florida Keys/East Florida FLK/EFL stock of hogfish in the South Atlantic Region.

3a. 3 fish per person per day.
3b. 2 fish per person per day.
3c. 1 fish per person per day.
3d. 1 fish per vessel per day.

4.10.1 Biological Effects

During 2012-2014, recreational landings (lbs ww) of hogfish were predominantly from Monroe County, Florida and East Florida, followed by North Carolina, Georgia/East Florida, and South Carolina (**Table 4.10.1**).

Alternative 1 (No Action) would maintain the 5 fish per person per day recreational bag limit for hogfish off Florida, with no recreational bag limit off Georgia, South Carolina, and North Carolina. Under **Alternative 2**, for the GA-NC stock of hogfish, **Sub-alternatives 2a** and **2b** would consider a 2 fish per person per day and 1 fish per person per day recreational bag limit, respectively. **Sub-alternative 2c** would consider a 1 fish per vessel per day recreational bag limit. Under **Alternative 3**, for the FLK/EFL stock of hogfish, **Sub-alternatives 3a**, **3b**, and **3c** would consider 3, 2, and 1 fish per person per day recreational bag limits, respectively. **Sub-alternative 3d** would consider a 1 fish per vessel per day recreational bag limit.

Table 4.10.1. Recreational landings (lbs ww) of hogfish by state in the South Atlantic during 2012-2014.

Year	North Carolina	South Carolina	Georgia/East FL	East Florida	Monroe County	Total
2012	4,178	3	178	84,042	281,172	369,573
2013	825	5	255	63,998	92,768	157,852
2014	8	16	368	111,410	154,087	265,889
Average 2012-2014	**1,670**	**8**	**267**	**86,483**	**176,009**	**264,438**

Source: MRIP ACL dataset generated from the SEFSC on July 20, 2015.

Marine Recreational Information Program (MRIP) catch and effort files from 2012 to 2014 were explored to determine recreational trips that harvested hogfish in the South Atlantic. Five hundred fifty-five recreational trips (194 MRIP and 361 Headboat trips) from North Carolina through Monroe County, Florida harvested hogfish. None of the headboat trips harvested more than 1 hogfish per person. The MRIP private and charter trips had 78% of the trips harvest 2 hogfish per person or less, 14% of the trips harvested 3-4 hogfish per person, and 8% of the trips harvested 5 hogfish or more per person (**Figure 4.10.1**).

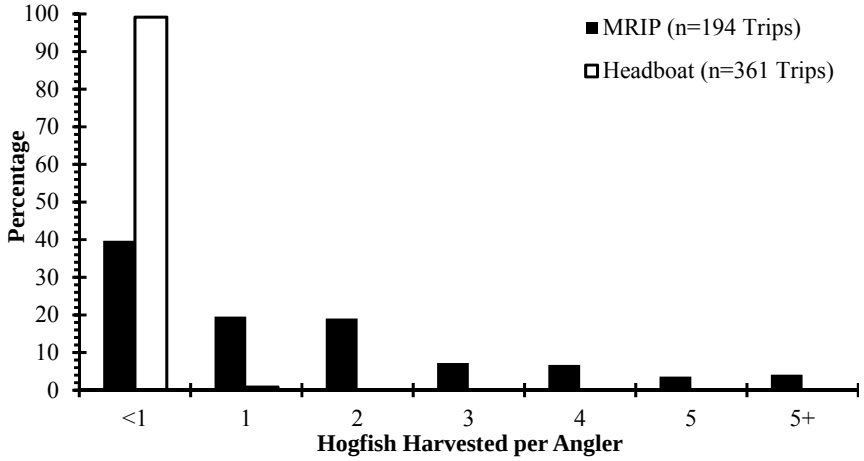


Figure 4.10.1. Distribution of hogfish harvested per person from two recreational datasets (MRIP and Headboat) during 2012-2014, in the South Atlantic.

Figure 4.10.2 shows the distribution of hogfish harvested per vessel during 2012-2014. Among headboats trips, 87% harvested 1 hogfish per vessel, 10% harvested 2 hogfish, 1% harvested 3 hogfish, and 2% harvested more than 5 hogfish per vessel. For the MRIP private and charter recreational trips, 19% harvested 1 hogfish per vessel, 34% harvested 2 hogfish per vessel, 19% harvested 4 hogfish per vessel, and 28% harvested more than 5 hogfish per vessel (**Figure 4.10.2**).

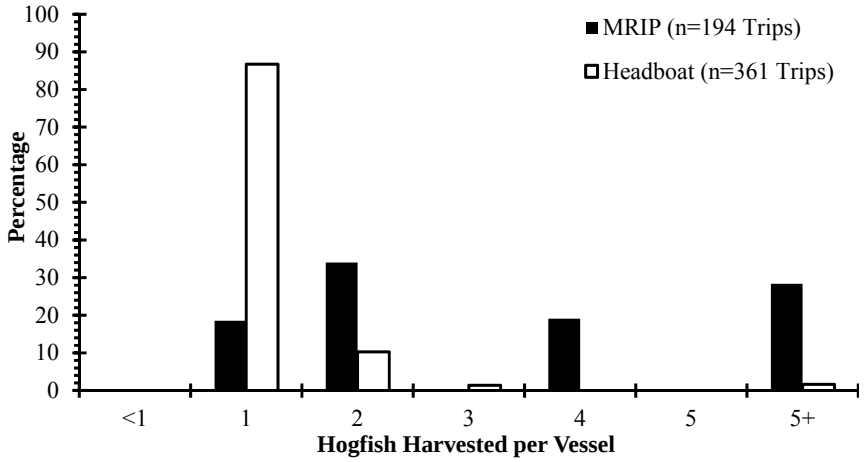


Figure 4.10.2. Distribution of hogfish harvested per vessel from two recreational datasets (MRIP and Headboat) during 2012-2014, in the South Atlantic.

Reductions in landings from the proposed bag limits in **Alternatives 2** and **3** (and their sub-alternatives) were calculated. A discard mortality of 10% (SEDAR 37 2014) was applied to the bag limit analysis. The majority of the MRIP trips from 2012-2014 harvested hogfish were with spearfishing gear (56%, n=109 trips). Discard mortality for spearfishing trips was assumed to be zero because spearfishing is very selective and any reduction in bag limit will result in the spearing of fewer fish. For example, if the bag limit is reduced from five to three fish then spear fishermen would focus their efforts to only spear three fish, and it's assumed the spear fishermen would not spear five fish and then release two in the water.

The calculated percent decrease in landings for the bag limits under consideration are shown by mode in **Table 4.10.2**. There were no calculated reductions in landings for headboat bag limits per person because there were no trips in 2012 to 2014 that harvested more than one hogfish per person. The percent decrease in landings from the bag limits per person from North Carolina to Georgia was very small, because only 5% (n=9 trips) of the MRIP trips occurred from North Carolina to Georgia from 2012 to 2014. In both regions the bag limits per vessel had higher reductions because this would restrict the catch to only one hogfish per trip for the entire vessel.

Table 4.10.2. Percent decrease in recreational landings from decreasing the bag limit in the South Atlantic. Percent decrease in landings were calculated by mode, and applied the bag limit reduction to 3 areas: 1) All of South Atlantic region; 2) Only North Carolina to Georgia; and 3) only east Florida and the Florida Keys. Data used for this analysis were from 2012 through 2014.

Bag Limit	MRIP		Headboat
	Charter	Private	
All of South Atlantic Region			
3 per Person	3.1	12.9	0.0
2 per Person	7.8	25.4	0.0
1 per Person	20.3	49.3	0.0
1 per Vessel	93.3	99.1	39.5
Only North Carolina to Georgia Alternative 2			
2 per Person (Sub-alternative 2a)	0.0	0.0	0.0
1 per Person (Sub-alternative 2b)	0.0	0.4	0.0
1 per Vessel (Sub-alternative 2c)	33.3	75.0	41.1
Only east Florida and Florida Keys Alternative 3			
3 per Person (Sub-alternative 3a)	3.1	12.9	0.0
2 per Person (Sub-alternative 3b)	7.8	25.4	0.0
1 per Person (Sub-alternative 3c)	20.3	48.9	0.0
1 per Vessel (Sub-alternative 3d)	92.4	99.7	25.0

Source: NMFS SERO

For GA-NC, there would be smaller percent decrease in recreational landings under **Alternative 2** and its sub-alternatives for private, charterboat, and headboat (**Table 4.10.2**), because most of the hogfish are harvested in FLK/EFL (**Table 4.10.1**). For FLK/EFL, there would be no percent decrease for headboats under **Alternative 3** bag limits per person but a 25% decrease in landings for a 1 hogfish per vessel limit (**Table 4.10.2**). For charter and private modes, **Sub-alternative 3d** would have the largest percent decrease, followed by **Sub-alternative 3c**, **3b**, and **3a** (**Table 4.10.2**). The percent reductions in landings are higher for the private mode then the charter mode calculations. This is an expected outcome because private recreational anglers harvest more hogfish per vessel compared to headboats (**Figure 4.10.2**).

Alternatives 4 and **5** (including their sub-alternatives) consider two-month fishing seasons for GA-NC and FLK/EFL, respectively. **Sub-alternative 4a** would allow recreational harvest of hogfish during May-June, **Sub-alternative 4b** during July-August, and **Sub-alternative 4c**

during August-September. **Sub-alternative 5a** would allow recreational harvest of hogfish during May-June, and **Sub-alternative 5b** would allow recreational harvest during July-August.

Recreational landings are reported in two-month waves, with wave 1 covering January/February and wave 6 covering November/December. Average recreational landings during 2012-2014 show steady landings from January to April, a drop during May and June, a substantial increase in July and August and a drop off from September through December (**Figure 4.10.3**).

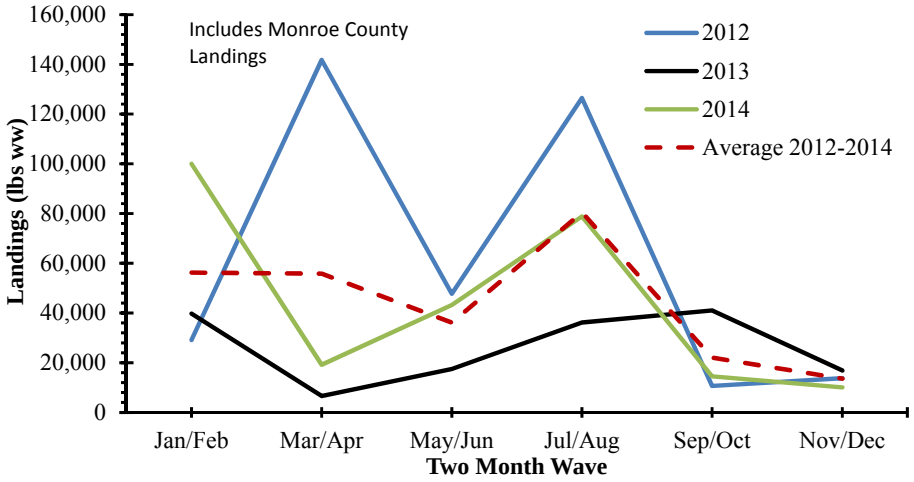


Figure 4.10.3. Recreational landings (lbs ww) by two month waves during 2012-2014 for the South Atlantic Region, including Monroe County, Florida.

4.10.2 Economic Effects

There are no reliable consumer surplus or net operating revenue estimates available that specifically address the value of recreationally caught hogfish (see **Section 3.3.2**). Therefore, the analysis for this action is qualitative. The more restrictive the sub-alternative, the increased probability that there will be increased direct negative economic effects to recreational fishers and businesses such as the for-hire industry. All the sub-alternatives of **Alternative 2** and **Alternative 3** are more restrictive than **Alternative 1 (No Action)**.

The sub-alternatives of **Alternative 2** (GA-NC stock) would establish a recreational trip limit where there had not been one in the past. Sub-Alternatives 2a and 2b are expected to have little to no economic effect on the fishery as very few anglers as shown in **Table 4.10.2** have landed more than 1 fish as reported in MRIP landings. However, the MRIP estimates were based on very few trips having been sampled and may not capture recreational spearfishing landings. In

terms of least to greatest negative direct economic effects would be **Alternative 1 (No Action)**, **Alternative 2a** (2 fish per person/day), **Alternative 2b** (1 fish per person/day), and lastly **Alternative 2c** (1 fish per vessel/day).

The sub-alternatives of **Alternative 3** (FLK/EFL stock) would establish a recreational trip limit that would be more restrictive than the current five fish per person limit (**Alternative 1 – No Action**). Historically, most recreational hogfish trips in FLK/EFL stock would be affected by the sub-alternatives of **Alternative 3** as shown in **Table 4.10.2**. In terms of least to greatest negative direct economic effects would be **Alternative 1 (No Action)**, **Sub-alternative 3a** (3 fish per person/day), **Sub-alternative 3b** (2 fish per person/day), **Alternative 3c** (1 fish per person/day), and lastly **Sub-alternative 3d** (1 fish per vessel/day).

4.10.3 Social Effects

In general, the social effects of modifying the recreational bag or vessel limit would be associated with the biological costs of each alternative (see **Section 4.10.1**), as well as the effects on current recreational fishing opportunities. While **Alternatives 2** and **3** would limit recreational fishing opportunities for hogfish, **Alternative 3** would also be expected to contribute to successful rebuilding of the FLK/EFL.

Different levels of recreational fishing opportunities under each alternative could affect recreational anglers and for-hire businesses targeting hogfish. The social effects of bag limits can be associated with how many and at what times of year the recreational catch may be retained. Additionally, any long-term negative biological effects on the stock due to recreational landings from higher bag limits, or dead discards due to lower bag limits, would also likely result in negative effects of recreational fishing opportunities in future years.

In general, social benefits from improved recreational fishing opportunities will result from a bag limit that has the largest portion of the year open to recreational harvest, with the highest number of fish per person, as long as the recreational ACL is not exceeded and there is no in-season closure or post-season payback. **Alternative 1 (No Action)** would be the most beneficial to recreational fishermen in the short-term but could detract from measures to rebuild the FLK/EFL stock and sustain the GA-NC stock. For the GA-NC stock, **Sub-alternative 2c** would be the most restrictive by designating a vessel limit of one fish, and would in particular be expected to negatively affect private recreational anglers (**Table 4.10.2**). **Sub-alternatives 2a** and **2b** would be expected to have little or no effects on recreational fishing opportunities, similar to **Alternative 1 (No Action)**.

For the FLK/EFL stock, the most restrictive recreational limit (**Sub-alternative 3d**) may eliminate recreational fishing opportunities for charter and private recreational anglers (T**able 4.10.2**). Less restrictive recreational limits in **Sub-alternatives 3a-3c** and **Alternative 1 (No Action**) would improve benefits to the recreational sector and associated businesses, but may also shorten the fishing season under the recreational ACL specified in **Action 6**.

4.10.4 Administrative Effects

Under **Alternative 1 (No Action)**, there would be no recreational bag limit in three out of four states in the South Atlantic Region for hogfish. **Alternatives 2** through **5** (including their sub-alternatives) would add to the administrative burden in the form of cost, time, law enforcement efforts, and informing the public. However, consistent regulations help avoid confusion with the public and aid law enforcement, which reduces the administrative burden in the long term.

Action 11. Establish a recreational season for the GA-NC and Florida Keys/East Florida (FLK/EFL) stocks of hogfish

4.11.1 Biological Effects

Alternatives
(preferred alternatives in bold)

1 (No Action). There is no recreational season for hogfish in the South Atlantic.

2. Establish a season for the GA-NC stock of hogfish in the South Atlantic region.
- 2a. May-August
- 2b. July-August
- 2c. May-June

3. Establish a season for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic region.
- 3a. May-June
- 3b. July-August

4.11.2 Economic Effects

The economic effects of establishing a set recreational season for hogfish would depend on several factors. The factors would include whether or not the season was restrictive enough to keep the recreational ACL from being exceeded or if the season was too restrictive and unnecessarily restricting access to the resource.

In each case, the sub-alternatives of **Alternatives 2** and **3** are more restrictive than **Alternative 1 (No Action)**. However, depending on how quickly the recreational sector ACL is expected to be caught, it is impossible to know whether setting an exact season is more beneficial to the recreational sector because of the delay related to processing MRIP landings estimates. Too long of a delay in closing the recreational sector could result in very large overages and shortened future seasons. Until there is analysis of the sub-alternatives of **Alternatives 2** and **3**, it will not be known whether setting a fixed season, or which fixed season is most appropriate for either the GA-NC or FLK/EFL hogfish stocks.

4.11.3 Social Effects

Hogfish is an important recreational species in some areas of the South Atlantic, particularly in South Florida and the Florida Keys (see **Section 3.4**). Changes to the fishing year for each stock could change the level of access to hogfish during periods when hogfish are available and when participation in the fishery is highest. However, long-term biological benefits of maintaining a healthy stock would contribute to future fishing opportunities for both the commercial and recreational sectors.

The social effects of **Alternatives 2** and **3** compared to **Alternative 1 (No Action)** will depend on when recreational effort is the highest, and how the proposed recreational limits in **Action 10** will work under the proposed ACLs in **Actions 4** and **6**.

4.11.4 Administrative Effects

Action 12. Establish commercial and recreational accountability measures (AMs) for the GA-NC and the FLK/EFL stocks of hogfish

Alternatives (preferred alternatives in bold)

1 (No Action). Do not establish AMs for the GA-NC and FLK/EFL stocks of hogfish. Current commercial and recreational AMs apply to hogfish throughout the South Atlantic Fishery Management Council's area of jurisdiction.

2. If commercial landings reach or are projected to reach the commercial ACL, NMFS would close the commercial sector for the remainder of the fishing year. On and after the effective date of such a notification, all sale or purchase is prohibited and harvest or possession of hogfish in or from the EEZ would be limited to the recreational bag and possession limit. Additionally, if the commercial ACL is exceeded, NMFS would reduce the commercial ACL in the following fishing year by the amount of the commercial overage, only if hogfish is overfished and the total ACL (commercial ACL and recreational ACL) is exceeded.
Sub-alternative 2a: For the GA-NC stock of hogfish.
Sub-alternative 2b: For the FLK/EFL stock of hogfish.

3. If recreational landings reach or are projected to reach the recreational ACL, NMFS would close the recreational sector for the remainder of the fishing year, unless, using the best scientific information available, NMFS determines that a closure is unnecessary.
Sub-alternative 3a: For the GA-NC stock of hogfish if the stock is overfished.
Sub-alternative 3b: For the GA-NC stock of hogfish regardless of stock status.
Sub-alternative 3c: For the FLK/EFL stock of hogfish if the stock is overfished.
Sub-alternative 3d: For the FLK/EFL stock of hogfish regardless of stock status.

4. If recreational landings exceed the recreational ACL, then during the following fishing year, recreational landings will be monitored for a persistence in increased landings. If necessary, NMFS would reduce the length of fishing season and the recreational ACL in the following fishing year by the amount of the recreational overage, only if the species is overfished and the total ACL (commercial ACL and recreational ACL) is exceeded. The length of the recreational season and recreational ACL will not be reduced if NMFS determines, using the best scientific information available, that a reduction is unnecessary.
Sub-alternative 4a. For the GA-NC stock of hogfish.
Sub-alternative 4b. For the FLK/EFL stock of hogfish.

4.12.1 Biological Effects

Accountability Measures (AMs) for hogfish are being revised through Amendment 34 to the Snapper Grouper Fishery Management Plan (FMP; under review). A revision to the AMs for hogfish and many other snapper grouper species was necessary to create a consistent regulatory environment while preventing unnecessary negative socio-economic impacts, and prevent overfishing. Subsequent to the reauthorization of the Magnuson-Stevens Act in 2007, the South Atlantic Council established AMs for managed species over the next several years through various amendments to the Snapper Grouper FMP. Consequently, inconsistencies in the regulatory language arose creating some confusion. Through implementation of Amendment 34 (under review), however, the South Atlantic Council has brought consistency in the management response to meeting or exceeding established Annual Catch Limits (ACLs) for snapper grouper species.

As Amendment 34 was being developed, however, work was underway to determine the stock structure of hogfish (Seyoum et al. 2015). Since a splitting of the hogfish stock within the South Atlantic Council's area of jurisdiction is being proposed in this amendment (Action 1), action must be also taken to specify AMs for each of the two hogfish stocks.

For the commercial sector, the payback provision under **Preferred Alternative 2** would be triggered infrequently, because the payback would only be required if two criteria are met: (1) hogfish is overfished *and* the total ACL has been exceeded. At this time, the likelihood of both of these scenarios taking place at the same time for the GA-NC stock of hogfish is zero, since the status of the stock is unknown. As such, **Preferred Sub-alternative 2a** is the least biologically advantageous alternative for the GA-NC stock of hogfish because a commercial payback would never be triggered, even when it was biologically needed. For the FLK/EFL stock of hogfish, while the likelihood of both of these scenarios taking place at the same time is small, one of the two criteria to trigger a commercial payback has already been met as the stock is overfished. Hence, **Preferred Sub-alternative 2b** may impart biological benefits to the FLK/EFL stock. However, since **Preferred Alternative 2** would prohibit harvest in-season if the commercial ACLs for the respective hogfish stock was met or was projected to be met, overages of the total ACL (commercial and recreational combined) would be unlikely.

Preferred Alternatives 3 and **4** would apply to the recreational sector. **Preferred Sub-alternatives 3b** and **3d** would trigger an in-season closure for the GA-NC stock and the FLK/EFL stock, respectively, regardless of stock status. These sub-alternatives have the potential to impart biological benefits to both stocks compared to **Sub-alternatives 3a** and **3c** since an overfished determination would not be needed to trigger a closure and thus ACL overages would be avoided. Under **Preferred Alternative 4**, if the recreational ACL is exceeded, recreational landings during the following year would be monitored for persistence in increased landings. If necessary, the recreational season *and* the recreational ACL would be reduced the following fishing year but only if the respective hogfish stock is overfished and the total ACL (commercial + recreational) is exceeded. In this respect, **Preferred Alternative 4** is almost identical to **Preferred Alternative 2** for the commercial sector; however, the Regional Administrator would determine, based upon the best scientific information available, whether a payback is actually needed. The Regional Administrator may determine that a payback is not needed in a case where the combined total ACL has been met and the species is overfished, but an ongoing stock assessment indicates the species, or a species in a species group, is no longer overfished; or if ACL overages are shown to be caused by increased rates of harvest due to increasing stock abundance rather than increased fishing effort. Thus, **Preferred Alternative 4** would maintain the ability of the Regional Administrator to interpret landings data to determine whether a payback is needed. However, these sub-alternatives would all allow the payback to take the form of a recreational ACL reduction *and* a season length reduction, compared to **Alternative 1 (No Action)**, which only allows for a season length reduction as a form of payback. However, **Preferred Alternative 3** would allow the Regional Administrator to close the recreational sector when the recreational ACL for the respective hogfish stock is met or projected to be met. Therefore, if in-season closures are implemented when needed to prevent recreational ACLs from being exceeded, the need to initiate an ACL payback the following year would be greatly reduced.

Since **Preferred Alternatives 2** and **3** would prohibit commercial and recreational harvest in-season if the sector ACLs were met or were projected to be met and since overages of the total

ACL (commercial and recreational combined) would be unlikely to occur, significant biological impacts, beneficial or adverse, on the GA-NC and FLK/EFL stocks of hogfish are not expected.

None of the alternatives considered under this action would significantly alter the way in which the hogfish portion of the snapper grouper fishery is prosecuted in the South Atlantic EEZ. No adverse impacts on endangered or threatened species are anticipated because of this action; nor are any adverse impacts on essential fish habitats or habitat areas of particular concern including corals, sea grasses, or other habitat types expected because of this action.

4.12.2 Economic Effects

In general, AMs help ensure that ACLs are not exceeded, particularly on a consistent basis. Exceeding an ACL on a consistent basis presents a high likelihood of overfishing which could possibly derail a rebuilding strategy adopted for an overfished stock or even drive an otherwise healthy stock to being overfished. Once overfishing occurs, or a stock become overfished, and more restrictive regulations are adopted, affected fishers could redirect their effort to other species that could also experience overfishing or be overfished over time. This could eventually trigger untoward repercussions on the ecological environment for a stock and other associated species. Incorporating paybacks in AMs may not eliminate the occurrence of overages but it does decrease the likelihood that overages (and overfishing) would occur over time.

Action 12 considers alternatives that would modify AMs for hogfish which had recently been modified in Snapper Grouper Amendment 34 (2015). Under **Alternative 1 (No Action)**, the current AMs in place for these species would not be modified. **Preferred Alternative 2** specifies the same conditions that would require paybacks of overages in the commercial sector, which are the same as **Alternative 1 (No Action)**. **Preferred Sub-alternatives 2a** and **2b** specify that the commercial AMs for both the GA-NC and Florida Keys/East Florida Sectors. **Preferred Alternative 4** considers an in-season closure for the recreational sector.

Preferred Alternative 3 specifies the same conditions that would require closure of the recreational sector. **Sub-alternatives 3a** and **3c** would close the recreational sector for the rest of the fishing year only if the GA-NC or FLK/EFL stocks are overfished. **Preferred Sub-alternatives 3b** and **3d** would close the recreational sector for the rest of the fishing year regardless of the stock status.

Preferred Alternative 4 and **Preferred Sub-alternatives 4a** and **4b** are analogous to **Alternative 1 (No Action)**, but for the recreational sector. **Preferred Sub-alternatives 4a** and **4b** would require NMFS to monitor the recreational sector for a persistence in increased landings and if necessary reduce the recreational ACL the following fishing year for the amount of the recreational overage.

The selection of any of the sub-alternatives of **Preferred Alternative 2** through **Preferred Alternative 4** does not change the basic premise of **Alternative 1 (No Action)** that commercial fishing would be stopped when the commercial ACL has been met or projected to be met or the

following recreational fishing season shortened when recreational ACL is exceeded. Thus, only when overages occur would the various alternatives have possibly differing economic effects. The relative magnitude of short-term economic effects of the various alternatives would depend on the likelihood of triggering AMs, particularly those that have a payback proviso. The alternatives' long-term economic effects would depend on their effects on the sustainability of the stock to support continued fishing opportunities for the commercial and recreational fishing participants, overall the potential economic impacts of **Preferred Alternatives 2** through **Preferred Alternative 4** are not expected to be significant.

There is no expected difference in economic effects among **Alternative 1 (No Action)**, **Preferred Alternative 2 (Preferred Sub-Alternatives 2a** and **2b)** and **Preferred Alternative 4 (Preferred Sub-Alternatives 4a** and **4b)**.

Preferred Alternative 3 is designed to help prevent recreational fishing for hogfish from continuing when it is known through MRIP landings that the recreational ACL has been or will soon be exceeded. Allowing fishing to continue under these conditions would only exacerbate the magnitude of ACL paybacks, shorten future seasons even more, or depending on the size of the overage, eliminate a recreational fishing season altogether for one or more years. While it is not possible to determine the specific economic effects without knowing the potential extent of the impact of the hogfish AM, minimizing recreational overages would reduce the longer term direct negative economic impacts. **Sub-alternatives 3a** and **3c** would allow the Regional Administrator to close a recreational sector during a season only if the stock is overfished. **Preferred Sub-alternatives 3b** and **3c** would give the Regional Administrator more flexibility to close a recreational sector during a season regardless of the status of the stock. **Sub-alternatives 3a** and **3c** would be less likely to cause short-term direct economic effects compared to **Preferred Sub-alternatives 3b** and **3d** because fewer species potentially would be affected. However, **Preferred Sub- alternatives 3b** and **3d** would be more likely to prevent long term, direct economic effects compared to **Sub- alternatives 3a** and **3c.** In summary, regardless of which alternatives are chosen under **Action 12**, none of the potential direct or indirect economic effects are expected to be significant when compared to the status quo.

4.12.3 Social Effects

Accountability measures can have significant direct and indirect social effects because, when triggered, can restrict harvest in the current season or subsequent seasons. However, AMs are critical in keeping landings from exceeding the recommended catch levels, which is crucial under a rebuilding plan.

Alternative 1 (No Action) would maintain the current AMs, which would provide some protection to keep the ACLs from being exceeded and negative effects on the rebuilding plan. **Preferred Alternative 2** and **Preferred Sub-alternatives 2a** and **2b** would have similar effects on commercial fishermen and businesses as Alternative 1 (No Action), except that there may be more flexibility in the payback provision because the total ACL must be exceeded and the stock

be overfished. Additionally, **Preferred Alternative 2** will make the commercial AMs for the hogfish stocks consistent with AMs for several other snapper grouper species.

Because there is no in-season closure for the recreational sector in place (**Alternative 1 (No Action)**), there is no additional means to reduce the risk of an overage, particularly for the FLK/EFL stock. **Preferred Alternative 3/ Preferred Sub-alternatives 3b** and **3d** would require an in-season closure regardless of stock status, which would be expected to be more beneficial than **Sub-alternatives 3a** and **3c** for fishermen by contributing to success in the rebuilding plan for the FLK/EFL stock, and sustaining harvest for the GA-NC stock.

Similar to **Alternative 1 (No Action)**, **Preferred Alternative 4/ Preferred Sub-alternatives 4a** and **4b** would maintain the same post-season recreational AM but make the AMs consistent with other snapper grouper species.

4.12.4 Administrative Effects

Under **Alternative 1 (No Action)**, AMs would not be separate for the GA-NC and FLK/EFL stocks. Therefore, any increase or decrease in administrative burden associated with **Alternatives 2-4** would be caused by more or less frequently implemented AMs. **Alternative 2** and its sub-alternatives would continue the in-season commercial sector closure AM with slight changes to the administrative environment based on the frequency with which each of the AM options would be triggered. **Sub-alternative 2b** is likely to be triggered the most often; and therefore, would be associated with the highest level of administrative impacts in the form of document preparation and notifications sent to the commercial sector participants informing them that the ACL the following year would be reduced. **Sub-alternative 2a** is likely to follow **Sub-alternative 2b** in frequency of implementation. However, if AMs are not implemented when they are biologically necessary, the risk of overfishing increases and the administrative burden associated with having to curtail overfishing are much greater than those associated with implementing an effective AM. **Alternative 3** and its sub-alternatives would consider an in-season recreational sector closure AM with slight changes to the administrative environment based on the frequency with which each of the AM options would be triggered. **Sub-alternatives 3b** and **3d** are likely to be triggered more often than **Sub-alternatives 3a** and **3c**; and therefore, would be associated with a higher level of administrative impacts in the form of document preparation and notifications sent to the recreational sector participants informing them of the closure of the recreational sector for the remainder of the year. The administrative impacts associated with **Alternative 4** and its associated sub-alternatives are largely the same as those under **Alternative 3** for the recreational sector, with the addition of continued monitoring for persistence of increased landings when the recreational ACL has been exceeded. Because landings are already closely monitored and recreational AMs are in place, the addition of the payback provision of the recreational AM would not constitute an additional administrative burden. Payback provisions for the recreational sector under **Alternative 4** and its sub-alternatives are the least likely to have administrative burdens compared with **Alternatives 2** and **3**, because two conditions would have to be met, the species would have to be overfished *and* the total ACL (for both the commercial and recreational sectors) would have to be met.

Chapter 5. Council's Choice for the Preferred Alternatives

5.1

5.1.1 Snapper Grouper Advisory Panel (AP) Comments and Recommendations

5.1.3 Law Enforcement Advisory Panel Comments and Recommendations

5.1.4 Scientific and Statistical Committee Comments and Recommendations

5.1.5 Public Comments and Recommendations

5.1.6 South Atlantic Council Choice for Preferred Alternative

5.2

5.2.1 Snapper Grouper AP Comments and Recommendations

5.2.2 Law Enforcement AP Comments and Recommendations

5.2.3 Scientific and Statistical Committee Comments and Recommendations

5.2.4 Public Comments and Recommendations

5.2.5 South Atlantic Council Choice for Preferred Alternative

Chapter 6. Cumulative Effects

(UPDATE)

6.1 Affected Area

The immediate impact area would be the federal 200-mile limit of the Atlantic off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West, which is also the South Atlantic Fishery Management Council's (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. The ranges of affected species are described in **Section 3.2**. The most measurable effects would be limited to the area off southern Florida within South Atlantic region. For this action, the cumulative effects analysis (CEA) includes an analysis of data dating back to 2004 and through what is expected to take place approximately before or within 2015-2017.

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

Past Actions

The reader is referred to **Appendix C** for a list of all past regulatory activity for species in the Snapper Grouper FMP. No relevant non-FMP related actions have occurred within the analysis CEA time frame outlined above.

Present Actions

Currently, there are several actions under development affecting the snapper grouper fishery. Amendment 29 to the Snapper Grouper FMP would update the South Atlantic Council's acceptable biological catch (ABC) control rule to incorporate methodology for determining the ABC of "Only Reliable Catch Species"; (2) adjust ABCs for the affected unassessed species; (3) specify ACLs for 3 species grouper and 4 species based on the updated ABCs; and (4) establish management measures for gray triggerfish in federal waters of the South Atlantic region.

Regulatory Amendment 14 to the Snapper Grouper FMP, which became effective on December 8, 2014, modified the (1) commercial and recreational fishing years for greater amberjack; (2) recreational fishing year for black sea bass; (3) recreational accountability measure (AM) for black sea bass; (4) commercial fishing year for black sea bass; (5) commercial fishing seasons for vermilion snapper; (6) trip limit for gag; and (7) recreational AM for vermilion snapper.

The Generic Dealer Reporting Amendment, which became effective on August 7, 2014, established one dealer permit for the Gulf of Mexico and South Atlantic Regions and increased the reporting frequency requirements for species managed by the Gulf of Mexico and South

Atlantic Councils. This amendment is expected to improve fisheries data collection through more timely and accurate dealer reporting and streamlines the dealer permit system.

Reasonably Foreseeable Future Actions

Regulatory Amendment 20 to the Snapper Grouper FMP would update the sector annual catch limits (ACLs) for snowy grouper based on the outcome of a recent stock assessment.

Regulatory Amendment 22 to the Snapper Grouper FMP would update ACLs for gag and wreckfish based on a recent stock assessment.

The Generic AM and Dolphin Allocation Amendment would modify AMs for snapper-grouper species and golden crab to make them more consistent with AMs already implemented for other species and other fishery management plans (FMP). In the same amendment, South Atlantic Council is also considering alternatives to modify existing commercial and recreational sector allocations for dolphin.

Amendment 36 to the Snapper Grouper FMP would establish new special management zones to protect spawning areas for speckled hind and warsaw grouper.

The Comprehensive Ecosystem-Based Amendment 3 contains an action to improve bycatch reporting for the snapper grouper fishery.

A Joint Commercial Logbook Reporting Amendment would require electronic reporting of logbook information by federally-permitted vessels.

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

Expected Impacts from Past, Present, and Future Actions

The above listed past, present and future actions are expected to result in cumulative impacts on the human environment. The Comprehensive ACL Amendment (SAFMC 2011c) removed 13 snapper grouper species from the Snapper Grouper FMP. Amendment 35 would remove four more species, bringing the total removed over the past four years to 17. Removal of species from a FMP also removes them from essential fish habitat (EFH) consultation consideration. Reducing the number of federally managed species utilizing a habitat type (or parcel) identified and described as EFH may reduce the strength of the EFH consultation for that EFH. Therefore, the action to remove four snapper grouper species from the Snapper Grouper FMP combined with the previous action to remove 13 snapper grouper species from the Snapper Grouper FMP

may result in an adverse cumulative impacts on EFH. However, as noted above, it is not possible to quantify the direct impact of **Preferred Alternatives 2-5** on future EFH consultations. If black snapper, dog snapper, mahogany snapper, and schoolmaster were removed from the Snapper Grouper FMP, there would still be 50 non-ecosystem component snapper grouper species left in the Snapper Grouper FMP. Those species and their designated EFH may continue to be used in the EFH consultation process. Therefore, the impacts of the action in Amendment 35 to remove four species from the Snapper Grouper FMP, in combination with the intended effects of the other action in this amendment to clarify the regulations for golden tilefish, and other actions affecting the resource and human environment, are not expected to result in significant adverse biological, social, or economic impacts.

The action to modify regulations governing the use of golden tilefish longline endorsements is also not expected to result in significant effects on the human environment when combined with past, present, and future actions discussed previously. Clarifying golden tilefish longline endorsement regulations would remove the potential for fishery participants to harvest golden tilefish under the longline quota and the hook-and-line quota within the same fishing year, consistent with the South Atlantic Council's intent when the longline endorsement was created. Anecdotal information indicates few fishery participants have engaged in activities that allowed them to fish under both quotas; however, clarifying the regulations would prevent future fishing under both quotas within the same fishing year. The action is largely administrative with some minor non-significant socioeconomic impacts that are not likely to result in significant cumulative impacts when combined with past, present, and future actions.

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 (November 2, 2014). 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 migration, range, larval and juvenile survival, prey availability, and susceptibility to predators.

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. Other potential impacts of climate change to the southeast include increases in hurricanes, decreases in salinity, altered circulation patterns, and sea level rise. 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 contribute to climate change through the increase of carbon emissions associated with fishing activities.

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 of Mexico. 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. 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 at this time. Direct and indirect impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators in the South Atlantic have not been significant and are not likely to be significant in the future.

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

The proposed management actions are summarized in **Section 2** of this document. Detailed discussions of the magnitude and significance of the impacts of the preferred alternatives on the human environment appear in **Section 4** of this document. None of the impacts of the actions in this amendment, in combination with past, present, and future actions have been determined to be significant. Although several other management actions, in addition to this amendment, are expected to affect snapper grouper including golden tilefish, black snapper, dog snapper, mahogany snapper, and schoolmaster; the additive effects, beneficial and adverse, 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 Exclusive Economic Zone (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. Additionally, the proposed action is not likely to change the way in which the snapper grouper, dolphin and wahoo, or golden crab fisheries are prosecuted; therefore, the actions are not expected to result in adverse impacts on health or human safety beyond the status quo.

6.5 Monitoring and Mitigation

The effects of the proposed action are, and will continue to be, monitored through collection of landings data by the Florida Fish and Wildlife Conservation Commission for black snapper, dog snapper, mahogany snapper, and schoolmaster. The National Marine Fisheries Service will continue to monitor and collect information on golden tilefish for 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 indigenous species in the Atlantic, and the activities/regulations being altered do not introduce non-indigenous species, and are not reasonably expected to facilitate the spread of such species through depressing the populations of native species. Additionally, this amendment 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.

Chapter 7. List of Interdisciplinary Plan Team (IPT) Members

Name	Agency/Division	Title
Myra Brouwer	SAFMC	Interdisciplinary plan team (IPT) Lead/Fishery Biologist
Nikhil Mehta	SERO/SF	IPT Lead/Fishery Biologist
Rick DeVictor	SERO/SF	IPT Co-lead/Fishery Biologist
Jennifer Lee	SERO/PR	Fishery Biologist
Brian Cheuvront	SAFMC	Economist
Mike Errigo	SAFMC	Data analyst
Chip Collier	SAFMC	Biologist
Kate Siegfried	SEFSC	Research Fish Biologist
David Dale/Pace Wilber	SERO/HC	EFH Specialist
Adam Bailey	SERO	Technical Writer and Editor
Nick Farmer	SERO	Biologist
Mike Larkin	SERO	Biologist
David Records	SERO/SF	Economist
Mike Jepson	SERO/SF	Social Scientist
Heather Blough	NMFS/SER	Regional NEPA Coordinator
Monica Smit-Brunello	NOAA GC	General Counsel
Larry Perruso	SEFSC	Economist
Jack McGovern	SERO/SF	Fishery Scientist
Kari McLauchlin	SAFMC	Social Scientist
Gregg Waugh	SAFMC	Deputy Director

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

Chapter 8. Agencies and Persons Consulted

Responsible Agency

South Atlantic
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
Charleston, South Carolina 29405
(843) 571-4366 (TEL)
Toll Free: 866-SAFMC-10
(843) 769-4520 (FAX)
safmc@safmc.net

NMFS, Southeast Region
263 13th Avenue South
St. Petersburg, Florida 33701
(727) 824-5301 (TEL)
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Environmental Assessment:

List of Agencies, Organizations, and Persons Consulted

SAFMC Law Enforcement Advisory Panel
SAFMC Snapper Grouper Advisory Panel
SAFMC Scientific and Statistical Committee
North Carolina Coastal Zone Management Program
South Carolina Coastal Zone Management Program
Georgia Coastal Zone Management Program
Florida Coastal Zone Management Program
Florida Fish and Wildlife Conservation Commission
Georgia Department of Natural Resources
South Carolina Department of Natural Resources
North Carolina Division of Marine Fisheries
North Carolina Sea Grant
South Carolina Sea Grant
Georgia Sea Grant
Florida Sea Grant
Atlantic States Marine Fisheries Commission
Gulf and South Atlantic Fisheries Development Foundation
Gulf of Mexico Fishery Management Council
National Marine Fisheries Service
- Washington Office
- Office of Ecology and Conservation
- Southeast Regional Office
- Southeast Fisheries Science Center

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Appendix A. Considered But Rejected Alternatives

Action 5. Establish a rebuilding plan for the Florida Keys/East Florida (FLK/EFL) stock of hogfish

Alternative 2. Define a rebuilding plan where the rebuilding strategy for the Florida Keys/East Florida (FLK/EFL) stock of hogfish sets ABC equal to the yield at 75% F_{MSY} and rebuilds the stock in 11 years. The Overfishing Limit (OFL) is the yield at F_{MSY}. The Spawning Stock Biomass (SSB_{MSY})is 2,300,391 lbs ww. Year 1 = 2016.

Year	F	ABC (lbs ww)	ABC (numbers)	OFL* (lbs ww)	OFL* (numbers)	Spawning Stock Biomass (lbs ww)
2016	0.104	95,380	39,710	127,490	53,140	806,960
2017	0.104	113,180	45,900	146,850	59,930	965,140
2018	0.104	131,870	51,660	166,560	66,060	1,133,820
2019	0.104	150,840	57,520	185,930	72,140	1,306,580
2020	0.104	169,700	63,430	204,610	78,130	1,479,650
2021	0.104	188,110	69,190	222,310	83,830	1,649,810
2022	0.104	205,760	74,660	238,830	89,130	1,813,950
2023	0.104	222,410	79,750	253,990	93,950	1,969,510
2024	0.104	237,870	84,430	267,700	98,280	2,114,570
2025	0.104	252,030	88,670	279,930	102,120	2,247,960
2026	0.104	264,800	92,470	290,720	105,500	**2,368,780**

Source: Table 4, Appendix A (*) OFL values from Table 5, Appendix A.

Note: While the probably of rebuilding for this projection was not provided in the analysis, it is probably very close to 50% since the estimated Spawning Stock Biomass is very close to SSB_{MSY}. However, the probability of rebuilding would be lower over a 10-year timeframe.

Discussion: Alternative 2 would rebuild the stock in 10 years, but would do so with less than 50% probability of rebuilding success….

Action 8. Increase the commercial and recreational minimum size limit for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 2. Increase the commercial and recreational minimum size limit for the GA-NC stock of hogfish in the South Atlantic Region.

Sub-alternative 2a. 13 inches FL

Sub-alternative 2b. 14 inches FL

Sub-alternative 2c. 15 inches FL

Discussion:

Alternative 3. Increase the commercial and recreational minimum size limit for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic Region.

Sub-alternative 3a. 13 inches FL
Sub-alternative 3f. 18 inches FL
Sub-alternative 3g. 19 inches FL
Sub-alternative 3h. 20 inches FL

Discussion:

Action 9. Establish a commercial trip limit for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 2. Establish a commercial trip limit for the GA-NC stock of hogfish in the South Atlantic Region.

Sub-alternative 2d. 1,000 lbs per trip.

Discussion:

Action 10. Modify and/or establish recreational bag limits for the GA-NC and the Florida Keys/East Florida (FLK/EFL) stocks of hogfish

Alternative 2. Establish a recreational bag limit for the GA-NC stock of hogfish in the South Atlantic Region.

Sub-alternative 2a. 5 fish per person per day.
Sub-alternative 2b. 4 fish per person per day.
Sub-alternative 2c. 3 fish per person per day.

Discussion:

Alternative 3. Modify the recreational bag limit for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic Region.

Sub-alternative 3a. 5 fish per person per day.
Sub-alternative 3b. 4 fish per person per day.

Discussion:

Appendix B. Glossary

Allowable Biological Catch (ABC): Maximum amount of fish stock than can be harvested without adversely affecting recruitment of other components of the stock. The ABC level is typically higher than the total allowable catch, leaving a buffer between the two.

ALS: Accumulative Landings System. NMFS database which contains commercial landings reported by dealers.

Biomass: Amount or mass of some organism, such as fish.

B_{MSY}: Biomass of population achieved in long-term by fishing at F_{MSY}.

Bycatch: Fish harvested in a fishery, but not sold or kept for personal use. Bycatch includes economic discards and regulatory discards, but not fish released alive under a recreational catch and release fishery management program.

Caribbean Fishery Management Council (CFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The CFMC develops fishery management plans for fisheries off the coast of the U.S. Virgin Islands and the Commonwealth of Puerto Rico.

Catch Per Unit Effort (CPUE): The amount of fish captured with an amount of effort. CPUE can be expressed as weight of fish captured per fishing trip, per hour spent at sea, or through other standardized measures.

Charter Boat: A fishing boat available for hire by recreational anglers, normally by a group of anglers for a short time period.

Cohort: Fish born in a given year. (See year class.)

Control Date: Date established for defining the pool of potential participants in a given management program. Control dates can establish a range of years during which a potential participant must have been active in a fishery to qualify for a quota share.

Constant Catch Rebuilding Strategy: A rebuilding strategy where the allowable biological catch of an overfished species is held constant until stock biomass reaches B_{MSY} at the end of the rebuilding period.

Constant F Rebuilding Strategy: A rebuilding strategy where the fishing mortality of an overfished species is held constant until stock biomass reached BMSY at the end of the rebuilding period.

Directed Fishery: Fishing directed at a certain species or species group.

Discards: Fish captured, but released at sea.

Discard Mortality Rate: The % of total fish discarded that do not survive being captured and released at sea.

Derby: Fishery in which the TAC is fixed and participants in the fishery do not have individual quotas. The fishery is closed once the TAC is reached, and participants attempt to maximize their harvests as quickly as possible. Derby fisheries can result in capital stuffing and a race for fish.

Effort: The amount of time and fishing power (i.e., gear size, boat size, horsepower) used to harvest fish.

Exclusive Economic Zone (EEZ): Zone extending from the shoreline out to 200 nautical miles in which the country owning the shoreline has the exclusive right to conduct certain activities such as fishing. In the United States, the EEZ is split into state waters (typically from the shoreline out to 3 nautical miles) and federal waters (typically from 3 to 200 nautical miles).

Exploitation Rate: Amount of fish harvested from a stock relative to the size of the stock, often expressed as a percentage.

F: Fishing mortality.

Fecundity: A measurement of the egg-producing ability of fish at certain sizes and ages.

Fishery Dependent Data: Fishery data collected and reported by fishermen and dealers.

Fishery Independent Data: Fishery data collected and reported by scientists who catch the fish themselves.

Fishery Management Plan: Management plan for fisheries operating in the federal produced by regional fishery management councils and submitted to the Secretary of Commerce for approval.

Fishing Effort: Usually refers to the amount of fishing. May refer to the number of fishing vessels, amount of fishing gear (nets, traps, hooks), or total amount of time vessels and gear are actively engaged in fishing.

Fishing Mortality: A measurement of the rate at which fish are removed from a population by fishing. Fishing mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

Fishing Power: Measure of the relative ability of a fishing vessel, its gear, and its crew to catch fishes, in reference to some standard vessel, given both vessels are under identical conditions.

$F_{30\%SPR}$: Fishing mortality that will produce a static SPR = 30%.

$F_{45\%SPR}$: Fishing mortality that will produce a static SPR = 45%.

F_{OY}: Fishing mortality that will produce OY under equilibrium conditions and a corresponding biomass of B_{OY}. Usually expressed as the yield at 85% of F_{MSY}, yield at 75% of F_{MSY}, or yield at 65% of F_{MSY}.

F_{MSY}: Fishing mortality that if applied constantly, would achieve MSY under equilibrium conditions and a corresponding biomass of B_{MSY}.

Fork Length (FL): The length of a fish as measured from the tip of its snout to the fork in its tail.

Framework: An established procedure within a fishery management plan that has been approved and implemented by NMFS, which allows specific management measures to be modified via regulatory amendment.

Gear restrictions: Limits placed on the type, amount, number, or techniques allowed for a given type of fishing gear.

Growth Overfishing: When fishing pressure on small fish prevents the fishery from producing the maximum poundage. Condition in which the total weight of the harvest from a fishery is improved when fishing effort is reduced, due to an increase in the average weight of fishes.

Gulf of Mexico Fishery Management Council (GFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The GFMC develops fishery management plans for fisheries off the coast of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida.

Head Boat: A fishing boat that charges individual fees per recreational angler onboard.

Highgrading: Form of selective sorting of fishes in which higher value, more marketable fishes are retained, and less marketable fishes, which could legally be retained are discarded.

Individual Fishing Quota (IFQ): Fishery management tool that allocates a certain portion of the TAC to individual vessels, fishermen, or other eligible recipients.

Longline: Fishing method using a horizontal mainline to which weights and baited hooks are attached at regular intervals. Gear is either fished on the bottom or in the water column.

Magnuson-Stevens Fishery Conservation and Management Act: Federal legislation responsible for establishing the fishery management councils and the mandatory and discretionary guidelines for federal fishery management plans.

Marine Recreational Fisheries Statistics Survey (MRFSS): Survey operated by NMFS in cooperation with states that collects marine recreational data.

Maximum Fishing Mortality Threshold (MFMT): The rate of fishing mortality above which a stock's capacity to produce MSY would be jeopardized.

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

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

Modified F Rebuilding Strategy: A rebuilding strategy where fishing mortality is changed as stock biomass increases during the rebuilding period.

Multispecies fishery: Fishery in which more than one species is caught at the same time and location with a particular gear type.

National Marine Fisheries Service (NMFS): Federal agency within NOAA responsible for overseeing fisheries science and regulation.

National Oceanic and Atmospheric Administration: Agency within the Department of Commerce responsible for ocean and coastal management.

Natural Mortality (M): A measurement of the rate at which fish are removed from a population by natural causes. Natural mortality can be reported as either annual or instantaneous. Annual mortality is the percentage of fish dying in one year. Instantaneous is that percentage of fish dying at any one time.

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

Overfished: A stock or stock complex is considered overfished when stock biomass falls below the minimum stock size threshold (MSST) (e.g., current biomass < MSST = overfished).

Overfishing: Overfishing occurs when a stock or stock complex is subjected to a rate of fishing mortality that exceeds the maximum fishing mortality threshold (e.g., current fishing mortality rate > MFMT = overfishing).

Quota: % or annual amount of fish that can be harvested.

Recruitment (R): Number or percentage of fish that survives from hatching to a specific size or age.

Recruitment Overfishing: The rate of fishing above which the recruitment to the exploitable stock becomes significantly reduced. This is characterized by a greatly reduced spawning stock, a decreasing proportion of older fish in the catch, and generally very low recruitment year after year.

Scientific and Statistical Committee (SSC): Fishery management advisory body composed of federal, state, and academic scientists, which provides scientific advice to a fishery management council.

Selectivity: The ability of a type of gear to catch a certain size or species of fish.

South Atlantic Fisheries Management Council (SAFMC): One of eight regional councils mandated in the Magnuson-Stevens Fishery Conservation and Management Act to develop management plans for fisheries in federal waters. The SAFMC develops fishery management plans for fisheries off North Carolina, South Carolina, Georgia, and the east coast of Florida.

Spawning Potential Ratio (Transitional SPR): Formerly used in overfished definition. The number of eggs that could be produced by an average recruit in a fished stock divided by the number of eggs that could be produced by an average recruit in an unfished stock. SPR can also be expressed as the spawning stock biomass per recruit (SSBR) of a fished stock divided by the SSBR of the stock before it was fished.

% Spawning Per Recruit (Static SPR): Formerly used in overfishing determination. The maximum spawning per recruit produced in a fished stock divided by the maximum spawning per recruit, which occurs under the conditions of no fishing. Commonly abbreviated as %SPR.

Spawning Stock Biomass (SSB): The total weight of those fish in a stock which are old enough to spawn.

Spawning Stock Biomass Per Recruit (SSBR): The spawning stock biomass divided by the number of recruits to the stock or how much spawning biomass an average recruit would be expected to produce.

Total Allowable Catch (TAC): The total amount of fish to be taken annually from a stock or stock complex. This may be a portion of the Allowable Biological Catch (ABC) that takes into consideration factors such as bycatch.

Total Length (TL): The length of a fish as measured from the tip of the snout to the tip of the tail.

Appendix C. History of Management

Table B-1. Snapper Grouper History of Management

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
FMP (1983)	08/31/83	PR: 48 FR 26843 FR: 48 FR 39463	-12" total length (TL) limit – red snapper, yellowtail snapper, red grouper, Nassau grouper; -8" limit – black sea bass; -4" trawl mesh size; -Gear limitations – poisons, explosives, fish traps, trawls; -Designated modified habitats or artificial reefs as Special Management Zones (SMZs).
Regulatory Amendment #1 (1987)	03/27/87	PR: 51 FR 43937 FR: 52 FR 9864	-Prohibited fishing in SMZs except with hand-held hook-and-line and spearfishing gear; -Prohibited harvest of goliath grouper in SMZs.
Amendment #1 (1988)	01/12/89	PR: 53 FR 42985 FR: 54 FR 1720	-Prohibited trawl gear to harvest fish south of Cape Hatteras, NC and north of Cape Canaveral, FL; -Directed fishery defined as vessel with trawl gear and ≥200 lb s-g on board; -Established rebuttable assumption that vessel with s-g on board had harvested such fish in the exclusive economic zone (EEZ).
Regulatory Amendment #2 (1988)	03/30/89	PR: 53 FR 32412 FR: 54 FR 8342	-Established 2 artificial reefs off Ft. Pierce, FL as SMZs.
Emergency Rule	8/3/90	55 FR 32257	-Added wreckfish to the fishery management unit (FMU); -Fishing year beginning 4/16/90; -Commercial quota of 2 million pounds; -Commercial trip limit of 10,000 pounds per trip.
Fishery Closure Notice	8/8/90	55 FR 32635	- Fishery closed because the commercial quota of 2 million pounds was reached.
Notice of	09/24/90	55 FR 39039	-Anyone entering federal wreckfish fishery in

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Control Date			the EEZ off S. Atlantic states after 09/24/90 was not assured of future access if limited entry program developed.
Amendment #2 (1990)	10/30/90	PR: 55 FR 31406 FR: 55 FR 46213	-Prohibited harvest/possession of goliath grouper in or from the EEZ; -Defined overfishing for goliath grouper and other species.
Emergency Rule Extension	11/1/90	55 FR 40181	-Extended the measures implemented via emergency rule on 8/3/90.
Regulatory Amendment #3 (1989)	11/02/90	PR: 55 FR 28066 FR: 55 FR 40394	-Established artificial reef at Key Biscayne, FL as SMZ; -Fish trapping, bottom longlining, spear fishing, and harvesting of Goliath grouper prohibited in SMZ.
Amendment #3 (1990)	01/31/91	PR: 55 FR 39023 FR: 56 FR 2443	-Added wreckfish to the FMU; -Defined optimum yield and overfishing; -Required permit to fish for, land or sell wreckfish; -Required catch and effort reports from selected, permitted vessel; -Established control date of 03/28/90; -Established a fishing year for wreckfish starting April 16; -Established a process to set annual quota, with initial quota of 2 million pounds; provisions for closure; -Established 10,000 pound trip limit; -Established a spawning season closure for wreckfish from January 15 to April 15; -Provided for annual adjustments of wreckfish management measures.
Notice of Control Date	07/30/91	56 FR 36052	-Anyone entering federal snapper grouper fishery (other than for wreckfish) in the EEZ off S. Atlantic states after 07/30/91 was not assured of future access if limited entry program developed.
Amendment #4 (1991)	01/01/92	PR: 56 FR 29922 FR: 56 FR 56016	-Prohibited gear: fish traps except black sea bass traps north of Cape Canaveral, FL; entanglement nets; longline gear inside 50 fathoms; bottom longlines to harvest wreckfish; powerheads and bangsticks in

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			designated SMZs off S. Carolina. -Defined overfishing/overfished and established rebuilding timeframe: red snapper and groupers ≤ 15 years (year 1 = 1991); other snappers, greater amberjack, black sea bass, red porgy ≤ 10 years (year 1 = 1991); -Required permits (commercial & for-hire) and specified data collection regulations; -Established an assessment group and annual adjustment procedure (framework); -Permit, gear, and vessel id requirements specified for black sea bass traps; -No retention of snapper grouper spp. caught in other fisheries with gear prohibited in snapper grouper fishery if captured snapper grouper had no bag limit or harvest was prohibited. If had a bag limit, could retain only the bag limit; -8" TL limit – lane snapper; -10" TL limit – vermilion snapper (recreational only); -12" TL limit – red porgy, vermilion snapper (commercial only), gray, yellowtail, mutton, schoolmaster, queen, blackfin, cubera, dog, mahogany, and silk snappers; -20" TL limit – red snapper, gag, and red, black, scamp, yellowfin, and yellowmouth groupers; -28" fork length (FL) limit – greater amberjack (recreational only); -36" FL or 28" core length – greater amberjack (commercial only); -Bag limits – 10 vermilion snapper, 3 greater amberjack -Aggregate snapper bag limit – 10/person/day, excluding vermilion snapper and allowing no more than 2 red snappers; -Aggregate grouper bag limit – 5/person/day, excluding Nassau and goliath grouper, for which no retention (recreational & commercial) is allowed; -Spawning season closure – commercial

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			harvest greater amberjack > 3 fish bag prohibited in April south of Cape Canaveral, FL; -Spawning season closure – commercial harvest mutton snapper >snapper aggregate prohibited during May and June; -Charter/headboats and excursion boat possession limits extended.
Amendment #5 (1992)	04/06/92	PR: 56 FR 57302 FR: 57 FR 7886	For wreckfish: -Established limited entry system with individual transferable quotas (ITQs); -Required dealer to have permit; -Rescinded 10,000 lb. trip limit; -Required off-loading between 8 am and 5 pm; -Reduced occasions when 24-hour advance notice of offloading required for off-loading; -Established procedure for initial distribution of percentage shares of total allowable catch (TAC).
Emergency Rule	8/31/92	57 FR 39365	For Black Sea Bass (bsb): -Modified definition of bsb pot; -Allowed multi-gear trips for bsb; -Allowed retention of incidentally-caught fish on bsb trips.
Emergency Rule Extension	11/30/92	57 FR 56522	For Black Sea Bass: -Modified definition of bsb pot; -Allowed multi-gear trips for bsb; -Allowed retention of incidentally-caught fish on bsb trips.
Regulatory Amendment #4 (1992)	07/06/93	FR: 58 FR 36155	-For Black Sea Bass: -Modified definition of bsb pot; -Allowed multi-gear trips for bsb; -Allowed retention of incidentally-caught fish on bsb trips.
Regulatory Amendment #5 (1992)	07/31/93	PR: 58 FR 13732 FR: 58 FR 35895	-Established 8 SMZs off South Carolina, where only hand-held, hook-and-line gear and spearfishing (excluding powerheads) was allowed.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #6 (1993)	07/27/94	PR: 59 FR 9721 FR: 59 FR 27242	-Set up separate commercial TAC levels for golden tilefish and snowy grouper; -Established commercial trip limits for snowy grouper, golden tilefish, speckled hind, and warsaw grouper; -Included golden tilefish in grouper recreational aggregate bag limits; -Prohibited sale of warsaw grouper and speckled hind; -100% logbook coverage upon renewal of permit; -Creation of the *Oculina* Experimental Closed Area; -Data collection needs specified for evaluation of possible future individual fishing quota system.
Amendment #7 (1994)	01/23/95	PR: 59 FR 47833 FR: 59 FR 66270	-12" FL – hogfish; -16" TL – mutton snapper; -Required dealer, charter and headboat federal permits; -Allowed sale under specified conditions; -Specified allowable gear and made allowance for experimental gear; -Allowed multi-gear trips in NC; -Added localized overfishing to list of problems and objectives; -Adjusted bag limit and crew specs. for charter and head boats; -Modified management unit for scup to apply south of Cape Hatteras, NC; -Modified framework procedure.
Regulatory Amendment #6 (1994b)	05/22/95	PR: 60 FR 8620 FR: 60 FR 19683	-Established actions which applied only to EEZ off Atlantic coast of FL: Bag limits – 5 hogfish/person/day (recreational only), 2 cubera snapper/person/day > 30" TL; 12" TL – gray triggerfish.
Notice of Control Date	04/23/97	62 FR 22995	-Anyone entering federal black sea bass pot fishery off South Atlantic states after 04/23/97 was not assured of future access if limited entry program developed.
Interim Rule Request	1/16/98		-The South Atlantic Fishery Management Council (Council) requested all Amendment 9

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
			measures except black sea bass pot construction changes be implemented as an interim request under the Magnuson-Stevens Act.
Action Suspended	5/14/98		-NMFS informed the Council that action on the interim rule request was suspended.
Emergency Rule Request	9/24/98		-Council requested Amendment 9 be implemented via emergency rule.
Amendment #8 (1997)	12/14/98	PR: 63 FR 1813 FR: 63 FR 38298	-Established program to limit initial eligibility for snapper grouper fishery: -Must have demonstrated landings of any species in the snapper grouper FMU in 1993, 1994, 1995 or 1996; and have held valid snapper grouper permit between 02/11/96 and 02/11/97; -Granted transferable permit with unlimited landings if vessel landed ≥ 1,000 pounds (lb) of snapper grouper species in any of the years; -Granted non-transferable permit with 225 lb trip limit to all other vessels; -Modified problems, objectives, optimum yield (OY), and overfishing definitions; -Expanded the Council's habitat responsibility; -Allowed retention of snapper grouper species in excess of bag limit on permitted vessel with a single bait net or cast nets on board; -Allowed permitted vessels to possess filleted fish harvested in the Bahamas under certain conditions.
Request not Implemented	1/22/99		-NMFS informed the Council that the final rule for Amendment 9 would be effective 2/24/99; therefore they did not implement the emergency rule.
Regulatory Amendment #7 (1998a)	01/29/99	PR: 63 FR 43656 FR: 63 FR 71793	-Established 10 SMZs at artificial reefs off South Carolina.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #9 (1998)	2/24/99	PR: 63 FR 63276 FR: 64 FR 3624	-Red porgy: 14" TL (recreational and commercial); 5 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, in March and April; -Black sea bass: 10" TL (recreational and commercial); 20 fish rec. bag limit; required escape vents and escape panels with degradable fasteners in bsb pots; -Greater amberjack: 1 fish rec. bag limit; no harvest or possession > bag limit, and no purchase or sale, during April; quota = 1,169,931 lb; began fishing year May 1; prohibited coring; -Specified size limits for several snapper grouper species (indicated in parentheses in inches TL): including yellowtail snapper (12), mutton snapper (16), red snapper (20); red grouper, yellowfin grouper, yellowmouth grouper, and scamp (20) ; -Vermilion snapper: 11" TL (recreational), 12" TL commercial; -Gag: 24" TL (recreational); no commercial harvest or possession > bag limit, and no purchase or sale, during March and April; -Black grouper: 24" TL (recreational and commercial); no harvest or possession > bag limit, and no purchase or sale, during March and April; -Gag and Black grouper: within 5 fish aggregate grouper bag limit, no more than 2 fish may be gag or black grouper (individually or in combination); -All snapper grouper without a bag limit: aggregate recreational bag limit 20 fish/person/day, excluding tomtate and blue runner; -Vessels with longline gear aboard may only possess snowy, warsaw, yellowedge, and misty grouper, and golden, blueline and sand tilefish.
Emergency Action	9/3/99	64 FR 48326	-Reopened the Amendment 8 permit application process.
Emergency	09/08/99		-Prohibited harvest or possession of red porgy.

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Interim Rule	expired 08/28/00	64 FR 48324 and 65 FR 10040	

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #11 Comprehensive Sustainable Fisheries Act Amendment (1998)	12/02/99	PR: 64 FR 27952 FR: 64 FR 59126	-Maximum sustainable yield (MSY) proxy: goliath and Nassau grouper = 40% static spawning potential ratio (SPR); all other species = 30% static SPR; -OY: hermaphroditic groupers = 45% static SPR; goliath and Nassau grouper = 50% static SPR; all other species = 40% static SPR -Overfished/overfishing evaluations: BSB: overfished (minimum stock size threshold (MSST)=3.72 mp, 1995 biomass=1.33 mp); undergoing overfishing (maximum fishing mortality threshold (MFMT)=0.72, F1991-1995=0.95) Vermilion snapper: overfished (static SPR = 21-27%) Red porgy: overfished (static SPR = 14-19%). Red snapper: overfished (static SPR = 24-32%) Gag: overfished (static SPR = 27%) Scamp: no longer overfished (static SPR = 35%) Speckled hind: overfished (static SPR = 8-13%) Warsaw grouper: overfished (static SPR = 6-14%) Snowy grouper: overfished (static SPR = 5-15%) White grunt: no longer overfished (static SPR = 29-39%) Golden tilefish: overfished (couldn't estimate static SPR) Nassau grouper: overfished (couldn't estimate static SPR) Goliath grouper: overfished (couldn't estimate static SPR) -overfishing level: goliath and Nassau grouper = F>F40% static SPR; all other species: = F>F30% static SPR Approved definitions for overfished and overfishing. MSST = [(1-M) or 0.5 whichever is greater]*B_{MSY}. MFMT = F_{MSY}.
South Atlantic Snapper Grouper AMENDMENT 37			

Document	All Actions Effective By:	Proposed Rule Final Rule	Major Actions. Note that not all details are provided here. Please refer to Proposed and Final Rules for all impacts of listed documents.
Amendment #10 Comprehensive Essential Fish Habitat Amendment (1998)	07/14/00	PR: 64 FR 37082 and 64 FR 59152 FR: 65 FR 37292	-Identified essential fish habitat (EFH) and established habitat areas of particular concern (HAPC) for species in the snapper grouper FMU.
Amendment #12 (2000)	09/22/00	PR: 65 FR 35877 FR: 65 FR 51248	For Red porgy: -MSY=4.38 mp; OY=45% static SPR; MFMT=0.43; MSST=7.34 mp; rebuilding timeframe=18 years (1999=year 1); -no sale of red porgy during Jan-April; -1 fish bag limit; -50 lb. bycatch commercial trip limit May-December; -Modified management options and list of possible framework actions.
Amendment #9 (1998) resubmitted	10/13/00	PR: 63 FR 63276 FR: 65 FR 55203	-Commercial trip limit for greater amberjack.
Regulatory Amendment #8 (2000)	11/15/00	PR: 65 FR 41041 FR: 65 FR 61114	-Established 12 SMZs at artificial reefs off Georgia; revised boundaries of 7 existing SMZs off Georgia to meet CG permit specs; restricted fishing in new and revised SMZs.
Amendment #13A (2003)	04/26/04	PR: 68 FR 66069 FR: 69 FR 15731	-Extended for an indefinite period the regulation prohibiting fishing for and possessing snapper grouper species within the *Oculina* Experimental Closed Area.
Notice of Control Date	10/14/05	70 FR 60058	-Considered management measures to further limit participation or effort in the commercial fishery for snapper grouper species (excluding wreckfish).
Amendment #13C (2006)	10/23/06	PR: 71 FR 28841 FR: 71 FR 55096	-End overfishing of snowy grouper, vermilion snapper, black sea bass, and golden tilefish. Increase allowable catch of red porgy. Year 1 = 2006;

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			1. Snowy Grouper Commercial: -Quota = 151,000 lb gutted weight (gw) in year 1, 118,000 lb gw in year 2, and 84,000 lb gw in year 3 onwards. -Trip limit = 275 lb gw in year 1, 175 lb gw in year 2, and 100 lb gw in year 3 onwards; Recreational: -Limit possession to one snowy grouper in 5 grouper per person/day aggregate bag limit; 2. Golden Tilefish Commercial: Quota of 295,000 lb gw, 4,000 lb gw trip limit until 75% of the quota is taken when the trip limit is reduced to 300 lb gw. Do not adjust the trip limit downwards unless 75% is captured on or before September 1; Recreational: Limited possession to 1 golden tilefish in 5 grouper per person/day aggregate bag limit; 3. Vermilion Snapper Commercial: Quota of 1,100,000 lb gw; Recreational: 12" TL size limit. 4. Black Sea Bass Commercial: Quota of 477,000 lb gw in year 1, 423,000 lb gw in year 2, and 309,000 lb gw in year 3 onwards; -Required use of at least 2" mesh for the entire back panel of black sea bass pots effective 6 months after publication of the final rule; -Required black sea bass pots be removed from the water when the quota is met; -Changed fishing year from calendar year to June 1 – May 31; Recreational: Recreational allocation of 633,000 lb gw in year 1, 560,000 lb gw in year 2, and 409,000 lb gw in year 3 onwards. Increase minimum size limit from 10" to 11" in year 1 and to 12" in year 2; -Reduced recreational bag limit from 20 to 15 per person per day;

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			-Changed fishing year from the calendar year to June 1 through May 31. 5. Red Porgy Commercial and recreational: -Retained 14" TL size limit and seasonal closure (retention limited to the bag limit); -Specified a commercial quota of 127,000 lb gw and prohibit sale/purchase and prohibit harvest and/or possession beyond the bag limit when quota is taken and/or during January through April; -Increased commercial trip limit from 50 lb ww to 120 red porgy (210 lb gw) during May through December;--Increased recreational bag limit from one to three red porgy per person per day.
Notice of Control Date	3/8/07	72 FR 60794	-Considered measures to limit participation in the snapper grouper for-hire sector.
Amendment #15A (2008)	3/14/08	73 FR 14942	- Established rebuilding plans and status determination criteria for snowy grouper, black sea bass, and red porgy.
Notice of Control Date	12/4/08	74 FR 7849	-Established a control date for the golden tilefish portion of the snapper grouper fishery in the South Atlantic.
Notice of Control Date	12/4/08	74 FR 7849	-Established control date for black sea bass pot sector in the South Atlantic.
Amendment #14 (2007)	2/12/09	PR: 73 FR 32281 FR: 74 FR 1621	-Established eight deepwater Type II marine protected areas (MPAs) to protect a portion of the population and habitat of long-lived deepwater snapper grouper species.
Amendment #16 (2009)	7/29/09	PR: 74 FR 6297 FR: 74 FR 30964	-Specified status determination criteria for gag and vermilion snapper; For gag: -Specified interim allocations 51% commercial & 49% recreational; -Recreational and commercial shallow water grouper spawning closure January through April; -Directed commercial quota= 352,940 lb gw; -Reduced 5-fish aggregate grouper bag limit.

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			including tilefish species, to a 3-fish aggregate; -Captain and crew on for-hire trips cannot retain the bag limit of vermilion snapper and species within the 3-fish grouper aggregate; For vermilion snapper: -Specified interim allocations 68% commercial & 32% recreational; -Directed commercial quota split Jan-June=315,523 lb gw and 302,523 lb gw July-Dec; -Reduced bag limit from 10 to 5 and a recreational closed season November through March; -Required dehooking tools.
Amendment #15B (2008)	2/15/10	PR: 74 FR 30569 FR: 74 FR 58902	-Prohibited the sale of bag-limit caught snapper grouper species; -Reduced the effects of incidental hooking on sea turtles and smalltooth sawfish; -Adjusted commercial renewal periods and transferability requirements; -Implemented plan to monitor and assess bycatch; -Established reference points for golden tilefish; -Established allocations for snowy grouper (95% commercial & 5% recreational) and red porgy (50% commercial & 50% recreational).
Amendment #19 Comprehensive Ecosystem-Based Amendment 1 (CE-BA1) (2009)	7/22/10	PR: 75 FR 14548 FR: 75 FR 35330	-Provided presentation of spatial information for EFH and EFH-HAPC designations under the Snapper Grouper FMP; -Designation of deepwater coral HAPCs.
Amendment #17A (2010)	12/3/10 red snapper closure;	PR: 75 FR 49447 FR: 75 FR 76874	-Required use of non-stainless steel circle hooks when fishing for snapper grouper species with hook-and-line gear north of 28 deg. N latitude in the South Atlantic EEZ;

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	circle hooks 3/3/2011		-Specified an annual catch limit (ACL) and an accountability measure (AM) for red snapper with management measures to reduce the probability that catches will exceed the stocks' ACL; -Specified a rebuilding plan for red snapper; -Specified status determination criteria for red snapper; -Specified a monitoring program for red snapper.
Emergency Rule	12/3/10	75 FR 76890	-Delayed the effective date of the area closure for snapper grouper species implemented through Amendment 17A.
Amendment #17B (2010)	1/30/11	PR: 75 FR 62488 FR: 75 FR 82280	-Specified ACLs, annual catch targets (ACT), and AMs, where necessary, for 9 species undergoing overfishing -Modified management measures as needed to limit harvest to the ACL or ACT; -Updated the framework procedure for specification of total allowable catch; -Prohibited harvest of 6 deepwater species seaward of 240 feet to curb bycatch of speckled hind and warsaw grouper.
Regulatory Amendment #10 (2010)	5/31/11	PR: 76 FR 9530 FR: 76 FR 23728	-Eliminated closed area for snapper grouper species approved in Amendment 17A.
Regulatory Amendment #9 (2011)	Bag limit: 6/22/11 Trip limits: 7/15/11	PR: 76 FR 23930 FR: 76 FR 34892	-Established trip limits for vermilion snapper and gag; -Increased trip limit for greater amberjack; -Reduced bag limit for black sea bass.
Amendment #23 Comprehensive Ecosystem-based Amendment 2 (CE-BA2)	1/30/12	PR: 76 FR 69230 FR: 76 FR 82183	-Designated the Deepwater MPAs as EFH-HAPCs; -Limit harvest of snapper grouper species in SC SMZs to the bag limit; -Modify sea turtle release gear.

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(2011)			
Amendment # 25 Comprehensive Annual Catch Limit Amendment; (2011)	4/16/12	PR: 76 FR 74757 Amended PR: 76 FR 82264 FR: 77 FR 15916	-Established acceptable biological catch (ABC) control rules, establish ABCs, ACLs, and AMs for species not undergoing overfishing; -Removed some species from South Atlantic FMU and designate others as ecosystem component species; -Specified allocations between the commercial and, recreational sectors for species not undergoing overfishing; -Limited the total mortality for federally managed species in the South Atlantic to the ACLs.
Regulatory Amendment #11 (2011)	5/10/12	PR: 76 FR 78879 FR: 77 FR 27374	-Eliminated 240 ft harvest prohibition for six deepwater species.
Amendment #18A (2012)	7/1/12	PR: 77 FR 16991 FR: 77FR3 2408	-Limited participation and effort in the black sea bass sector; -Modifications to management of the black sea bass pot sector; -Improved the accuracy, timing, and quantity of fisheries statistics.
Amendment #24 (2011)	7/11/12	PR: 77 FR 19169 FR: 77 FR 34254	-Specified MSY, rebuilding plan (including ACLs, AMs, and OY, and allocations for red grouper.
Regulatory Amendment #12 (2012)	10/9/12	FR: 77 FR 61295	-Adjusted the ACL and OY for golden tilefish; -Considered specifying a commercial ACT; -Revised recreational AMs for golden tilefish;

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Amendment #20A (2012)	10/26/12	PR: 77 FR 19165 FR: 77 FR 59129	-Redistributed latent shares for the wreckfish individual transfer quota (ITQ) program.
Amendment #18B (2013)	5/23/13	PR: 77 FR 75093 FR: 77 FR 23858	-Limited participation and effort in the golden tilefish commercial sector through establishment of a longline endorsement; -Modified trip limits; -Specified allocations for gear groups (longline and hook and line);
Regulatory Amendment #13 (2013)	7/17/13	PR: 78 FR 17336 FR: 78 FR 36113	-Revised the ABCs, ACLs (including sector ACLs), and ACTs implemented by the Comprehensive ACL Amendment. The revisions may prevent a disjunction between the established ACLs and the landings used to determine if AMs are triggered.
Amendment #28 (2013)	8/23/13	PR: 78 FR 25047 FR: 78 FR 44461	-Established regulations to allow harvest of red snapper in the South Atlantic.
Regulatory Amendment #18 (2013)	9/5/13	PR: 78 FR 26740 FR: 78 FR 47574	-Adjusted ACLs for vermilion snapper and red porgy, and remove the 4-month recreational closure for vermilion snapper.
Regulatory Amendment #15 (2013)	9/12/13	PR: 78 FR 31511 FR: 78 FR 49183	-Modified the existing specification of OY and ACL for yellowtail snapper in the South Atlantic; -Modified the existing gag commercial ACL and AM for gag that requires a closure of all other shallow water groupers (black grouper, red grouper, scamp, red hind, rock hind, graysby, coney, yellowmouth grouper, and yellowfin grouper) in the South Atlantic when the gag commercial ACL is met or projected to be met.

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Regulatory Amendment #19 (2013)	ACL: 9/23/13 Pot closure: 10/23/13	PR: 78 FR 39700 FR: 78 FR 58249	-Adjusted the ACL for black sea bass and implement an annual closure on the use of black sea bass pots from November 1 to April 30.
Amendment #27 (2014)	1/27/14	PR:78 FR 78770 FR: 78 FR 57337	-Established the South Atlantic Council as the responsible entity for managing Nassau grouper throughout its range including federal waters of the Gulf of Mexico; -Modified the crew member limit on dual-permitted snapper grouper vessels; -Modified the restriction on retention of bag limit quantities of some snapper grouper species by captain and crew of for-hire vessels; -Minimized regulatory delay when adjustments to snapper grouper species' ABC, ACLs, and ACTs are needed as a result of new stock assessments; -Addressed harvest of blue runner by commercial fishermen who do not possess a South Atlantic Snapper Grouper Permit.
Amendment #31 Joint South Atlantic and Gulf of Mexico Generic Headboat Reporting Amendment (2013)	1/27/14	PR:78 FR 59641 FR: 78 FR 78779	-Included under the Generic charter/headboat reporting amendment, that modified required logbook reporting for headboat vessels to require electronic reporting, regarding snapper grouper landings.
Regulatory Amendment # 21 (2014)	11/6/2014	PR: 79 FR 44735 FR: 79 FR 60379	-Modified the definition of the overfished threshold for red snapper, blueline tilefish, gag, black grouper, yellowtail snapper, vermilion snapper, red porgy, and greater amberjack

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Regulatory Amendment #14 (2014)	12/8/14	PR: 79 FR 22936 FR: 79 FR 66316	-Modified the fishing year for greater amberjack; -Modified the fishing year for black sea bass; -Modified the AMs for vermilion snapper and black sea bass; -Modify the trip limit for gag.
Amendment #32 (2015)	3/30/2015	PR: 80 FR 3207 FR: 80 FR 16583	-End overfishing of blueline tilefish; -Separated blueline tilefish from the deepwater complex; -Specified ACLs for blueline tilefish and the deepwater complex; -Specified AMs for blueline tilefish; -Revised AMs for the deepwater complex; -Specify recreational ACTs for blueline tilefish.
Amendment #29 (2015)	7/1/2015	NOA:79 FR 69819 PR: 79 FR 72567 FR: 80 FR 30947	-Updated the Council's ABC control rule to incorporate methodology for determining the ABC of unassessed species, adjust ABCs for fourteen unassessed snapper-grouper species, adjust ACLs and ACTs for three species complexes and four snapper-grouper species based on revised ABCs; -Modified and implement gray triggerfish minimum size limits; -Established a commercial split season and commercial trip limits for gray triggerfish.
Regulatory Amendment #16	TBD	TBD	-Revise the prohibition of fishing with black sea bass pots from Nov.1-April 30.
Regulatory Amendment #17	Not Developed	Not Developed	-Alternatives for Marine Protected Areas that would help diminish bycatch of speckled hind and warsaw grouper.
Regulatory Amendment #20 (2015)	8/20/15	PR: 80 FR 18797 FR: 80 FR 43033	-Increase the recreational and commercial ACLs for snowy grouper, adjust the rebuilding strategy, increase the commercial trip limit, and modify the recreational fishing season.

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Regulatory Amendment #22 (2015)	8/12/15 (Wreckfish comm. ACL) 9/11/15 (Wreckfish rec. ACL & comm./rec. ACLs for gag)	PR: 80 FR 31880 FR: 80 FR 48277	-Adjust ACLs and OY for gag and wreckfish.
Regulatory Amendment #23	TBD	TBD	-Change fishing year for golden tilefish hook-and-line sector; modify the trip limit for Jacks complex.
Amendment # 20B	TBD	TBD	-Update wreckfish ITQ according to reauthorized Magnuson-Stevens Act.
Amendment # 22	Not Developed	Not Developed	-Establish a recreational tagging program for snapper grouper species with small ACLs
Amendment # 26 Comprehensive Ecosystem-Based Amendment 3 (CE-BA3)	TBD	TBD	-Modifies bycatch and discard reporting for commercial and for-hire vessels.
Amendment # 33 Dolphin Wahoo Amendment 7 and Snapper Grouper Amendment	TBD	PR: 80 FR 60601 FR:	-Exempt dolphin and wahoo from regulations that require head and fins to be intact, two fillets would be equal to one fish, and require skin to be intact on dolphin, wahoo, and snapper grouper species harvested in the Bahamas.

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Amendment #34 Generic Accountability Measures and Dolphin Allocation Amendment (Snapper Grouper 34)	TBD	PR: 80 FR 58448 FR:	-Modify AMs for snapper-grouper species -Modify the AM for commercial golden crab fishery -Adjust sector allocations for dolphin.
Amendment #35	TBD	TBD	-Remove four species from the Snapper Grouper FMP and address golden tilefish longline endorsement issue.
Amendment #36	TBD	TBD	-Establish special management zones to enhance protection for snapper-grouper species in spawning condition including speckled hind and warsaw grouper.
Amendment #37	TBD	TBD	-Modify the management unit for hogfish, specify fishing levels for the Georgia-North Carolina (GA-NC) and Florida Keys/East Florida (FLK/EFL) stocks of hogfish, and modify or establish management measures. Establish a rebuilding plan for the FLK/EFL stock of hogfish to increase hogfish biomass to sustainable levels.
Amendment #38	TBD	TBD	-Expand the management boundaries for species in the snapper grouper fishery management unit.
Amendment #41	TBD	TBD	-Modify the ACLs and AMs for mutton snapper.

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Regulatory Amendment #25	TBD	TBD	-Modify the ACLs and AMs for blueline tilefish, fishing year for yellowtail snapper, and recreational bag limit for black sea bass.

Appendix D. Bycatch Practicability Analysis

Population Effects for the Bycatch Species

Background

In 2014, a stock assessment for hogfish was conducted under the Southeast Data, Assessment, and Review process with data through 2012 (SEDAR 37). Based on genetic evidence, SEDAR 37 determined that hogfish in the South Atlantic should be treated as two separate stocks, one for Georgia-North Carolina (GA-NC), and the other for Florida Keys/East Florida (FLK/EFL). SEDAR 37 also determined the status of the GA-NC stock of hogfish to be unknown, and the FLK/EFL stock of hogfish to be overfished and undergoing overfishing. In Amendment 37 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 37), the South Atlantic Fishery Management Council (Council) is proposing to modify the management unit for hogfish, specify fishing levels based on the Council's Scientific and Statistical Committee's recommendations for the GA-NC and FLK/EFL stocks of hogfish, and modify or establish management measures. For the FLK/EFL stock of hogfish, the Council is proposing to establish a rebuilding plan to increase hogfish biomass to sustainable levels within a specified time period.

Commercial Sector

Regulations (50 C.F.R. § 622.176) require participants in the South Atlantic snapper grouper fishery who are selected by the Science and Research Director (SRD) to maintain and submit a fishing record on forms provided by the SRD. Fishermen in the snapper-grouper fishery are also required to submit logbooks with trip and effort information. Hogfish have been caught commercially with a variety of gears including spear/diving, vertical line/hook-and-line, and traps (SEDAR 37 2014). Effort from the commercial logbooks showed a declining trend in effort for hook and line fisheries in both the GA-NC stock and the FLK/EFL stock. Effort from 1993-2012 for the spear fishery in the FLK/EFL stock generally declined since a high in 2002, but experienced a substantial increase from a low in 2010 through 2012 (SEDAR 37 2014). According to SEDAR 37 (2014), reports of hogfish discards were infrequent and because of those low sample sizes discard rates were the mean rate over the years 2002-2013 within each gear and region stratum. Divers reported 45% of discarded hogfish as all the fish were dead or the majority of the fish were dead. An additional 49% of hogfish were reported as kept by divers, while 4.4% of discarded hogfish were reported as "majority alive" by divers. Vertical line fishers (both hand and electric) reported 79% of discarded hogfish were alive with another 19.8% reported as kept (SEDAR 37 2014).

Recreational Sector

For the recreational sector, estimates of the number of recreational landings and discards are available from Marine Recreational Fishery Statistics Survery (MRFSS, 1981-2012), Marine Recreational Information Program (MRIP, 2004-2012), and the NMFS Southeast Headboat

Survey. Early MRFSS data were calibrated to the MRIP data following the procedures of Salt et al. (2012) in SEDAR 37 (2014). SEDAR 37 (2014) reports that recreational fishing for hogfish is associated primarily with spearfishing, with the majority of the landings coming from South/Southeastern and Western Florida. Despite Hogfish being caught infrequently on hook and line (Kingsley 2004), landings from hook and line make up a substantial fraction of the recorded landings, given that the majority of recreational trips are hook-and-line. For the Florida stocks, recent landings (2004-2012 from MRIP) estimated approximately 20% of the total recreational harvest from hook-and-line, while for the GA-NC stocks, approximately 90% was estimated as hook-and-line. Recreational harvest of hogfish was primarily from private boats, with only a small proportion from either charter boats, shore-based fishinh, or headboats (SEDAR 37 2014).

1.1 Finfish Bycatch Mortality

Data in SEDAR 37 (2014) reveal that hogfish are primarily landed by spearfishing, so there are minimal data regarding catch and release mortality. Release mortality for the hook-and-line gear is suspected to be minimal due to the fact that most hogfish in deeper water (where barotrauma is more likely to occur) are of legal size (> 12"fork length (FL); Collins and McBride 2011), and are therefore unlikely to be released under the current management regime (12" FL minimum size limit and no closed seasons). The extent of mortality due to divers shooting sublegal fish is unknown. SEDAR 37 (2014) assumed a discard mortality rate of 10% for hook and line gear and 100% for spear gear.

During 2009-2013, the commercial sector had fewer discards of Snapper Grouper species including hogfish compared to the recreational sector (Table D-1). Recreational discards of several Snapper Grouper species in the Private mode were higher than the landings for Headboat and Charterboat modes (Table D-1). However, discards for hogfish were highest in the Headboat mode (Table D-1).

Table D-1. South Atlantic snapper grouper headboat, charter, private, and commercial mean estimates of landings and discards (2009-2013).

	HEADBOAT			CHARTER			PRIVATE			COMMERCIAL	
Species	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (lbs)	Discards (N)
Almaco jack	3,276	246	8%	2,581	1,211	47%	3,900	6,108	157%	197,432	800
Atlantic spadefish	133	35	27%	262	48	18%	101,741	114,598	113%	27,045	0
Banded rudderfish	15,614	2,665	17%	2,658	2,428	91%	7,603	6,474	85%	68,163	115
Bank sea bass	5,607	0	0%	792	2,084	263%	2,708	10,135	374%	540	0
Bar jack	341	59	17%	0	141		2,818	8,995	319%	4,457	0
Black grouper	337	1,339	397%	900	8,002	889%	6,589	24,499	372%	51,616	1,351
Black sea bass	165,443	553,232	334%	62,295	182,704	293%	257,417	2,682,646	1042%	510,102	60,568
Black snapper	0	0	0%	0	0		0	0		9	0
Blackfin snapper	79	59	75%	68	0	0%	1,843	0	0%	1,546	0
Blue runner	19,715	9,236	47%	10,749	15,023	140%	627,727	658,209	105%	227,134	1,762
Blueline tilefish	4,148	78	2%	9,576	459	5%	19,680	650	3%	341,160	234
Coney	50	51	101%	11	19	181%	723	174	24%	54	3
Cottonwick	13	0	0%	0	0		148	0	0%	0	0
Cubera snapper	367	19	5%	4	0	0%	1,960	111	6%	4,395	0
Dog snapper	48	12	25%	57	0	0%	822	0	0%	308	0
Gag	2,479	4,678	189%	2,688	16,025	596%	14,258	80,697	566%	471,689	7,004
Golden crab	0	0		0	0		0	0		634,192	0
Golden tilefish	8,868	0	0%	120,672	30,875	26%	904,657	520,822	58%	472,484	12
Goliath grouper	0	30	14966%	0	0		0	8,054		0	215
Gray snapper	43,916	6,465	15%	16,081	1,236	8%	279,017	1,292,452	463%	122,538	26,114
Gray triggerfish	57,539	12,135	21%	35,115	7,709	22%	92,990	111,012	119%	401,615	2,138
Graysby	1,604	1,306	81%	1,136	418	37%	5,467	10,518	192%	618	23
Greater amberjack	3,448	1,811	53%	16,390	6,814	42%	20,143	23,684	118%	897,173	1,635

Species	HEADBOAT			CHARTER			PRIVATE			COMMERCIAL	
	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (lbs)	Discards (N)
Hogfish	140	231	165%	41	3	7%	29,102	3,190	11%	42,219	41
Jolthead porgy	6,690	114	2%	3,014	0	0%	10,681	1,240	12%	5,055	0
Knobbed porgy	5,562	182	3%	727	0	0%	7,769	326	4%	22,913	0
Lane snapper	18,673	2,290	12%	11,644	3,506	30%	45,257	130,718	289%	3,057	210
Lesser amberjack	207	31	15%	12	0	0%	51	0	0%	17,374	23
Longspine porgy	6	0	0%	0	0		290	170	59%	0	0
Mahogany snapper	45	4	8%	0	0		35	0	0%	45	0
Margate	765	206	27%	188	59	32%	3,436	3,952	115%	3,876	23
Misty grouper	0	0		0	0		0	0		655	1
Mutton snapper	13,001	3,436	26%	19,547	8,826	45%	75,902	113,500	150%	73,908	597
Ocean triggerfish	729	0	0%	304	77	25%	4,107	3,769	92%	0	0
Queen snapper	5	0	0%	1	0	0%	0	0		3,087	84
Red grouper	1,373	10,547	768%	945	5,631	596%	18,781	52,502	280%	258,312	1,614
Red hind	212	64	30%	85	0	0%	460	564	123%	7,781	47
Red porgy	20,697	14,510	70%	9,527	3,034	32%	16,657	5,350	32%	170,004	9,800
Red snapper	5,398	44,889	832%	4,246	16,805	396%	20,521	94,894	462%	82,133	13,272
Rock hind	1,319	574	44%	83	18	22%	517	2,324	450%	13,147	11
Rock sea bass	8	0	0%	177	238	134%	2,524	6,330	251%	389	16
Sailors choice	286	0	0%	37	1,367	3740%	16,170	12,371	77%	0	0
Sand tilefish	796	952	120%	396	3,439	868%	4,863	22,423	461%	995	159
Saucereye porgy	148	1	0%	0	0		1,462	0	0%	0	0
Scamp	2,547	2,016	79%	2,275	1,361	60%	4,080	2,406	59%	194,931	740
Schoolmaster	244	0	0%	2	0	0%	4,873	2,435	50%	30	0
Scup	9,968	1,866	19%	294	28	9%	647	1,508	233%	0	414

Species	HEADBOAT			CHARTER			PRIVATE			COMMERCIAL	
	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (N)	Discards (N)	Ratio (D:L)	Landings (lbs)	Discards (N)
Silk Snapper	1,322	108	8%	276	34	12%	153	855	558%	10,166	7
Snowy grouper	151	51	34%	984	341	35%	861	331	38%	86,858	264
Tomtate	51,944	59,693	115%	1,159	6,544	565%	65,439	227,285	347%	176	620
Vermilion snapper	145,661	87,183	60%	37,198	18,308	49%	52,666	50,317	96%	966,504	9,033
White grunt	143,151	36,412	25%	19,706	9,601	49%	195,099	184,863	95%	108,712	389
Whitebone porgy	4,910	159	3%	2,893	9	0%	9,109	1,088	12%	13	0
Yellowedge grouper	20	2	9%	35	0	0%	44	0	0%	15,619	6
Yellowfin grouper	13	5	42%	0	0		97	0	0%	3,275	6
Yellowmouth grouper	12	5	43%	15	0	0%	0	0		204	0
Yellowtail snapper	99,863	33,144	33%	179,508	76,571	43%	287,217	715,637	249%	1,216,264	71,453

Sources: MRIP data from SEFSC Recreational ACL Dataset (Jan 2015), Headboat data from SEFSC Headboat Logbook CRNF files (expanded; July 2014), Commercial landings data from SEFSC Commercial ACL Dataset (July 2014) with discard estimates from expanded SEFSC Commercial Logbook (Nov 2014) and Commercial Discard Logbook (Nov 2014).
Note: Commercial gray triggerfish includes "triggerfishes, unclassified" category; commercial white grunt includes "grunts, unclassified" category.

Release Mortality Rates

Release mortality rates are unknown for many managed species. Recent SEDAR assessments include estimates of release mortality rates based on published studies. Stock assessment reports can be found at http://www.sefsc.noaa.gov/sedar/.

For hogfish, SEDAR 37 (2014) assumed a discard mortality rate of 10% for hook and line gear and 100% for spear gear. SEDAR 17 (2008) recommended a release mortality rate for vermilion snapper of 41% for the commercial sector and 38% for the recreational sector. The recent stock assessment for yellowtail snapper chose a rate of 10% release mortality as an approximation for the lower bound on release mortality for yellowtail snapper (SEDAR 27A 2012). SEDAR 10 (2006) estimated release mortality rates of 40% and 25% for gag taken by commercial and recreational fishermen, respectively. SEDAR 24 (2010) used release mortality rates of 48% commercial; 41% for-hire, and 39% private recreational for red snapper. Commercial and recreational release mortality rates were estimated as 20% for black grouper and red grouper in SEDAR 19 (2010). SEDAR 15 (2008) estimated a 20% release mortality rate for greater amberjack. SEDAR 32, which is under development, assumes a 12.5% release mortality rate for gray triggerfish. Snowy grouper are primarily caught in water deeper than 300 feet and golden tilefish are taken at depths greater than 540 feet; therefore, release mortality of the species are probably near 100% (SEDAR 4 2004, SEDAR 25 2011). Release mortality of black sea bass is considered to be low (7% for the recreational sector and 1% for the commercial sector) (SEDAR 25 2011) indicating minimum size limits are probably an effective management tool for black sea bass. Commercial sector discard mortality for red porgy is 35%, and 8% for the recreational sector (SEDAR Update 2012). SEDAR 32 (2013), estimates discard mortality for blueline tilefish is 100%, consistent with other deep-water species (i.e., snowy grouper, and golden tilefish); however, if new management is implemented to reduce the discard mortality rate, it might be appropriate for population projections to consider something lower than 100% (SEDAR 32 2013).

1.2 Practicability of Management Measures in Directed Fisheries Relative to their Impact on Bycatch and Bycatch Mortality

Expected Impacts on Bycatch for the Proposed Action

Need to update after December 2015 Council meet., after all preferreds are available.

The snapper grouper fishery represents many species occupying the same location at the same time. Thompson and Switzer (2015) reported on habitat selection and overlap in terms of location, abiotic, and habitat variables of six co-occurring species including gag, lane snapper, gray snapper, black sea bass, white grunt, and hogfish. Results showed that hogfish were the least sympatric with the co-occurring species, with gag and the snappers co-occurring much more commonly (Thompson and Switzer 2015). Bycatch of other species is incidental in the

hook-and-line fishery for hogfish, with no bycatch of other co-occurring species expected in the spear fishery for hogfish.

Preferred Alternative 2 and **Preferred Sub-alternative 2c** in **Action 1** would modify the snapper grouper fishery management unit to specify two separate stocks of hogfish, one from GA-NC, and the other from the Georgia-Florida state boundary south to a line just south of Cape Sable running due west (25^0 09'.000 North Latitude). According to local law enforcement officials, this would be a good demarcation point because it is far enough north of the Keys and far enough south of Naples and Marco Island, which might translate to less fishing effort across this boundary, and in turn help reduce bycatch. **Preferred Alternative 2** in **Action 2** would define maximum sustainable yield (MSY) for both the hogfish stocks equal to the yield produced by F_{MSY} or the F_{MSY} proxy ($F_{30\%SPR}$). MSY and F_{MSY} are recommended by the most recent SEDAR/SSC. **Preferred Alternative 4** in **Action 3** would define minimum stock size threshold (MSST) equal to 75% of SSB_{MSY} for both the stocks of hogfish and is consistent with how the Council has approached defining MSST for other snapper grouper stocks with low natural mortality estimates. Natural mortality for the FLK/EFL stock of hogfish is estimated at 0.179. **Preferred Alternative 2** in **Action 4** would establish ACL equal to optimum yield (OY) equal to acceptable biological catch (ABC) for the GA-NC stock of hogfish. The status of this stock is unknown as per SEDAR 37 (2014) and setting the ACL equal to the ABC could help reduce discards without compromising best scientific information available, since the ABC was recommended by the Council's SSC and based on their ABC Control Rule. Additionally, the Southeast Fisheries Science Center (SEFSC) worked with NMFS, the Gulf of Mexico Fishery Management Council (Gulf of Mexico Council), and South Atlantic Council to develop a Joint Dealer Reporting Amendment, which will be implemented on August 7, 2014 (SAFMC 2013a). The Joint Dealer Reporting Amendment will increase required reporting frequency for dealers to once per week, and require a single dealer permit for all finfish dealers in the Southeast Region. On January 27, 2014, the Generic For-Hire Reporting Amendment was implemented (78 FR 78779, SAFMC 2013b), which required all federally-permitted headboats in the South Atlantic to report landings information electronically and on a weekly basis. The commercial landings monitoring system (CLM), the for-hire reporting, and the new dealer reporting requirements constitute major improvements to how commercial and for-hire fisheries are monitored, and go far beyond monitoring efforts that were in place when the National Standard 1 guidelines were developed. The new CLM quota monitoring system and actions in the Joint Generic Dealer and Generic For-Hire Reporting amendments are expected to provide more timely and accurate data reporting and would thus reduce the incidence of quota overages. Thus, **Preferred Alternative 2** in **Action 4** is not expected to affect the magnitude of bycatch of hogfish in the recreational or commercial sectors. **Preferred Alternative 3** in **Action 5** would establish a rebuilding plan for the FLK/EFL stock of hogfish using a rebuilding strategy setting ABC equal to a constant fishing mortality rate, under which the stock would be expected to rebuild in 10 years with a 72.5% probability of rebuilding success. This alternative is more conservative than ones considered under this action, and could result in more discards in the short term. However, with a higher probability of success of rebuilding the stock in 10 years, there would be less discards in the long term after the stock has been rebuilt. **Preferred Sub-alternative 2a** in **Action 6** would establish ACL=OY=ABC for the FLK/EFL stock of hogfish. Similar to Action 4, this approach would be expected to result in fewer discards and is based on the findings of the latest stock assessment

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(SEDAR 37 2014). In **Action 7**, **Preferred Sub-alternatives 2b** and **3b** would establish an annual catch target (ACT) of 85% of the recreational ACL, for the recreational sector for the GA-NC and FLK/EFL stocks, respectively. This action would have not be expected to affect discards and/or bycatch, since the only consequence of reaching the ACT would be to monitor the landings, which MRIP does anyway. **Preferred Sub-alternative 2e** in **Action 8** would increase the commercial and recreational minimum size limit for the GA-NC stock from 12" fork length (FL) to 20" FL; and **Preferred Sub-alternative 3b** in **Action 8** would increase the commercial and recreational minimum size limit for the FLK/EFL stock from 12" fork length (FL) to 15" FL. Changes in size limits can lead to regulatory discards, however, extensive scientific evidence related to life history studies, spawning, and social structure (Davis 1976; Colin 1982; McBride and Johnson 2007; McBride et al. 2008, Munoz et al. 2010; and Collins and McBride 2011) listed in SEDAR 37 (2014) recommend an increase in the size limit, which would be beneficial to the hogfish stocks and aid in rebuilding. Bycatch and discards would not be expected to increase by the increase in size limit, since the dominant mode of harvest is by spearfishing, which is highly selective in nature, and fishers using spear would be targeting the larger sized fish instead of the current ones at 12" FL. Preferred Alternative ? would establish a commercial trip limit of ? for the GA-NC stock of hogfish; and Preferred Alternative ? would establish a commercial trip limit of ? for the FLK/EFL stock. Preferred Alternative ? would establish a recreational bag limit of ? for the GA-NC stock of hogfish; and Preferred Alternative ? would establish a recreational bag limit of ? for the FLK/EFL stock. The current recreational bag limit is 5 fish per person per day off Florida, with no recreational bag limit off Georgia, South Carolina, and North Carolina. Reducing the recreational bag limits would be expected in increase discards, however, analysis in Amendment 37 revealed that during 2012-2014, 100% of the headboats harvested no more than 1 hogfish per angler; among private recreational anglers 78% harvested 1-2 hogfish per angler, 14% harvested 3-4 hogfish, and 8% harvested 5 hogfish or more per angler. Therefore, decreasing the recreational bag limit is not expected to result in an increase in discards and bycatch of hogfish. Preferred Alternatives ? and ? would establish a recreational fishing season for the GA-NC and FLK/EFL stocks of hogfish, respectively. Reducing the recreational fishing season could lead to an increase in discards….however, analysis in Amendment 37 reveals….

Commented [NM2]: Update after Council picks preferreds.

Commented [NM3]: Update after Council picks preferreds, or delete if Council discards this action.

Past, Current, and Future Actions to Prevent Bycatch and Improve Monitoring of Harvest, Discards, and Discard Mortality.

Need to update after Cumulative effects section in Am. 37 is finalized

The Comprehensive Ecosystem-Based Amendment 2 (CE-BA 2; SAFMC 2011g) included actions that removed harvest of octocorals off Florida from the Coral, Coral Reefs, and Live/Hard Bottom Habitat Fishery Management Plan (Coral FMP); set the octocoral ACL for Georgia, South Carolina, and North Carolina equal to 0; modified management of special management zones (SMZs) off South Carolina; revised sea turtle release gear requirements for the snapper grouper fishery that were established in Amendment 15B to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP; SAFMC 2008); and designated new essential fish habitat (EFH) and EFH-Habitat Areas of Particular Concern in the South Atlantic. There is no bycatch associated with octocoral harvest within the management area of the Coral FMP since harvest is prohibited. CE-BA 2 also

included an action that limited harvest and possession of snapper grouper and coastal migratory pelagics (CMP) species to the bag limit in SMZs off South Carolina. This action could reduce bycatch of regulatory discards around SMZs by restricting commercial harvest in the area, but it would probably have very little effect on the magnitude of overall bycatch of snapper grouper species in the South Atlantic.

Other actions have been taken in recently implemented amendments that could reduce bycatch of and bycatch mortality of federally-managed species in the South Atlantic. Amendment 13C to Snapper Grouper FMP (SAFMC 2006) required the use of 2 inch mesh in the back panel of black sea bass pots, which has likely reduced the magnitude of regulatory discards. Amendment 16 to the Snapper Grouper FMP (SAFMC 2009) required the use of dehooking devices, which could help reduce bycatch mortality of vermilion snapper, black sea bass, gag, red grouper, black grouper, and red snapper. Dehooking devices can allow fishermen to remove hooks with greater ease and more quickly from snapper grouper species without removing the fish from the water. If a fish does need to be removed from the water, dehookers could still reduce handling time in removing hooks, thus increasing survival (Cooke et al. 2001). Furthermore, Amendment 17A to the Snapper Grouper FMP (SAFMC 2010a) required circle hooks for snapper grouper species north of 28 degrees latitude, which is expected to reduce bycatch mortality of snapper grouper species. Amendment 17B to the Snapper Grouper FMP (SAFMC 2010b) established ACLs and AMs and address overfishing for eight species in the snapper grouper management complex: golden tilefish, snowy grouper, speckled hind, warsaw grouper, black sea bass, gag, red grouper, black grouper, and vermilion snapper. Overfishing is no longer occurring for golden tilefish, black sea bass, snowy grouper, red grouper, black grouper, and vermilion snapper.

The Comprehensive ACL Amendment (SAFMC 2011b) implemented ACLs and AMs for species not undergoing overfishing in the Fishery Management Plans for snapper grouper, dolphin and wahoo, golden crab and *Sargassum*, in addition to other actions such as allocations and establishing annual catch targets for the recreational sector. The Comprehensive ACL Amendment (SAFMC 2011b) also established additional measures to reduce bycatch in the snapper grouper fishery with the establishment of species complexes based on biological, geographic, economic, taxonomic, technical, social, and ecological factors. ACLs were assigned to these species complexes, and when the ACL for the complex is met or projected to be met, fishing for species included in the entire species complex is prohibited for the fishing year. ACLs and AMs will likely reduce bycatch of target species and species complexes as well as incidentally caught species.

Amendment 18A to the Snapper Grouper FMP (SAFMC 2011f), included actions that could reduce bycatch of black sea bass and the potential for interactions with protected species. Actions in Amendment 18A limited the number of participants in the black sea bass pot sector, required fishermen bring pots back to port at the completion of a trip, and limited the number of pots a fishermen can deploy. Amendment 24 to the Snapper Grouper FMP (SAFMC 2011h) established a rebuilding plan for red grouper, which was overfished and undergoing overfishing. Red grouper is no longer undergoing overfishing or overfished. Amendment 24 (SAFMC 2011h) also established ACLs and AMs for red grouper, which could help to reduce bycatch of red grouper and co-occurring species.

The final rule (78 FR 23858; April 23, 2013) for Amendment 18B to the Snapper-Grouper FMP (SAFMC 2012), established an endorsement program for the commercial golden tilefish longline sector, which could have positive effects for habitat and protected species. Regulatory Amendment 14 to the Snapper Grouper FMP, which has been approved by the Council, includes actions that could adjust management measures for a number of snapper grouper species, some of which could reduce the magnitude of discards. The final rule (78 FR 49183; September 12, 2013) for Regulatory Amendment 15 to the Snapper Grouper FMP included actions for yellowtail snapper and gag that are expected to reduce bycatch of snapper-grouper species. Amendment 36 to the Snapper Grouper FMP, which is under development, includes actions that affect marine protected areas, and could reduce bycatch of many snapper grouper species, especially speckled hind and warsaw grouper.

The Council's For-Hire Reporting Amendment, which went into effect on January 27, 2014, has changed the reporting frequency for landings by headboats from monthly to weekly, and requires that reports be submitted electronically. The action is expected to provide more timely information on landings and discards. Improved information on landings would help ensure ACLs are not exceeded. Furthermore, more timely and accurate information would be expected to provide a better understanding of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

The Council is developing a joint amendment with the Gulf of Mexico Fishery Management Council (Gulf of Mexico Council) to require that all federally-permitted charter vessels reporting landings information to the Southeast Fisheries Science Center (SEFSC) electronically. Additionally, these two Councils will also begin development of a joint amendment to require that all federally-permitted commercial fishing vessels in the southeast also report their logbook landings information electronically. These future actions will help to improve estimates on the composition and magnitude of catch and bycatch of snapper grouper species, as well as all other federally-managed species in the southeast region.

Additional information on fishery related actions from the past, present, and future considerations can be found in **Chapter 6** (Cumulative effects) of the environmental assessment.

1.3 Ecological Effects Due to Changes in the Bycatch

The ecological effects of bycatch mortality are the same as fishing mortality from directed fishing efforts. If not properly managed and accounted for, either form of mortality could potentially reduce stock biomass to an unsustainable level. As mentioned in the above section, actions have been taken, and are underway to reduce bycatch and enhance data reporting for snapper grouper species. Better bycatch and discard data would provide a better understanding

of the composition and magnitude of catch and bycatch, enhance the quality of data provided for stock assessments, increase the quality of assessment output, and lead to better decisions regarding additional measures to reduce bycatch. Management measures that affect gear and effort for a target species can influence fishing mortality in other species. Therefore, enhanced catch and bycatch monitoring would provide better data that could be used in multi-species assessments.

As summarized in **Section 1.3** of this BPA, most actions in Amendment 37 are not expected to result in significant changes in bycatch of hogfish. Additionally, as stated in **Chapter 3,** and analyzed in detail in **Chapter 4**, the biological (and consequently ecological) effects due to changes in the bycatch would likely be negligible.

1.4 Changes in the Bycatch of Other Fish Species and Resulting Population and Ecosystem Effects

Amendment 37 is not expected to affect major changes in bycatch of other fish species. As mentioned in **Section 1.3** of this BPA, hogfish were the least sympatric with the co-occurring species such as gag, lane snapper, gray snapper, black sea bass, and white grunt, with gag and the snappers co-occurring much more commonly (Thompson and Switzer 2015). Bycatch of other species is incidental in the hook-and-line fishery for hogfish, with no bycatch of other co-occurring species expected in the spear fishery for hogfish. Furthermore, improved data monitoring and reporting measures have been implemented, and will continue to improve in the near future, that could be expected to reduce bycatch and discards.

1.5 Effects on Marine Mammals and Birds

Under Section 118 of the Marine Mammal Protection Act (MMPA), NMFS must publish, at least annually, a List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. Of the gear utilized within the snapper grouper fishery, only the black sea bass pot is considered to pose an entanglement risk to marine mammals. The southeast U.S. Atlantic black sea bass pot sector is included in the grouping of the Atlantic mixed species trap/pot fisheries, which the 2015 LOF classifies as a Category II (79 FR 77919, December 29, 2014). Gear types used in these fisheries are determined to have occasional incidental mortality and serious injury of marine mammals. However, hogfish are not harvested using this gear in either the commercial or the recreational sector. For the South Atlantic snapper grouper fishery, the best available data on protected species interactions are from the SEFSC Supplementary Discard Data Program (SDDP) initiated in July of 2000. The SDDP sub-samples 20% of the vessels with an active permit. Since August 2001, only three interactions with marine mammals have been documented; each was taken by handline gear and each released alive (McCarthy SEFSC database). The longline and hook-and-line gear components of the snapper grouper in the South Atlantic are classified in the 2015 LOF as Category III fisheries.

The Bermuda petrel and roseate tern occur within the action area. Bermuda petrels are occasionally seen in the waters of the Gulf Stream off the coasts of North Carolina and South Carolina during the summer. Sightings are considered rare and only occurring in low numbers (Alsop 2001). Roseate terns occur widely along the Atlantic coast during the summer but in the southeast region, they are found mainly off the Florida Keys (unpublished US Fish and Wildlife Service data). Interaction with fisheries has not been reported as a concern for either of these species.

Fishing effort reductions have the potential to reduce the amount of interactions between the fishery and marine mammals and birds. Although, the Bermuda petrel and roseate tern occur within the action area, these species are not commonly found and neither has been described as associating with vessels or having had interactions with the snapper grouper fishery. Thus, it is believed that the snapper grouper fishery is not likely to negatively affect the Bermuda petrel and the roseate tern.

1.6 Changes in Fishing, Processing, Disposal, and Marketing Costs

Research and monitoring is ongoing to understand the effectiveness of proposed management measures and their effect on bycatch. In 1990, the Southeast Fisheries Science Center (SEFSC) initiated a logbook program for vessels with federal permits in the snapper grouper fishery from the Gulf of Mexico and South Atlantic. Approximately 20% of commercial fishermen are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. The SEFSC is developing electronic logbooks, which could be used to enable fishery managers to obtain information on species composition, size distribution, geographic range, disposition, and depth of fishes that are released. Further, the Joint Commercial Logbook Reporting Amendment is being developed by the South Atlantic Council and the Gulf of Mexico Council, which would require electronic reporting of landings information by federally-permitted commercial vessels to increase the timeliness and accuracy of landings and discard data.

Recreational discards are obtained from MRIP and logbooks from the NMFS headboat program. Additional data collection activities for the recreational sector are being considered by the South Atlantic Council that could allow for a better monitoring of snapper grouper bycatch in the future. Some observer information has been provided by Marine Fisheries Initiative and Cooperative Research Programs (CRP), but more is desired for the snapper grouper fishery. In December 2012, the Southeast Region Headboat Survey underwent a transition from paper logbooks to electronic logbooks, which is expected to improve the quality of data in that sector. As of January 1, 2013, the paper logbook form has been replaced by a new electronic logbook. The form is available through a password protected Web site on the internet, which can be accessed by personal computer, computer tablet, or “smart phone”. The South Atlantic Council approved the For-Hire Amendment at their March 2013 meeting, which was approved and

implemented in January 2014. This amendment requires weekly electronic reporting by the headboat sector.

Cooperative research projects between science and industry are being used to a limited extent to collect bycatch information on the snapper grouper fishery in the South Atlantic. For example, Harris and Stephen (2005) characterized the entire (retained and discarded) catch of reef fishes from a selected commercial fisherman in the South Atlantic including total catch composition and disposition of fishes that were released. The Gulf and South Atlantic Fisheries Foundation, Inc. conducted a fishery observer program within the snapper grouper vertical hook-and-line (bandit rig) fishery of the South Atlantic United States. Through contractors they randomly placed observers on cooperating vessels to collect a variety of data quantifying the participation, gear, effort, catch, and discards within the fishery.

In the spring 2010, Archipelago Marine Research Ltd. worked with North Carolina Sea Grant and several South Atlantic Unlimited Snapper Grouper Permit holders to test the effectiveness of electronic video monitoring to measure catch and bycatch. A total of 93 trips were monitored with video monitoring, 34 by self-reported fishing logbooks, and 5 by observers. Comparisons between electronic video monitoring data and observer data showed that video monitoring was a reliable source of catch and bycatch data.

Research funds for observer programs, as well as gear testing and testing of electronic devices are also available each year in the form of grants from the Marine Fisheries Initiative, Saltonstall-Kennedy program, and the CRP. Efforts are made to emphasize the need for observer and logbook data in requests for proposals issued by granting agencies. A condition of funding for these projects is that data are made available to the Councils and NMFS upon completion of a study.

Additional administrative and enforcement efforts would help to implement and enforce fishery regulations. NMFS established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast U.S. waters, addressing both immediate and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

Economic effects of the actions proposed in Amendment 37 are addressed in **Chapter 4**, as well as **Appendices E** (Regulatory Impact Review) and **F** (Regulatory Flexibility Act Analysis).

1.7 Changes in Fishing Practices and Behavior of Fishermen

Actions proposed in Amendment 37 could result in a modification of fishing practices by commercial and recreational fishermen. However, as discussed in **Sections 1.1**, **1.2**, and **1.3** of this BPA, the magnitude of discards is not expected to be significantly affected by the proposed actions. It is difficult to quantify any of the measures in terms of reducing discards until bycatch

has been monitored over several years. Commercial and recreational bycatch information is collected by NMFS, and that information will continue to be analyzed to determine what changes, if any, have taken place in terms of fishing practices and fishing behavior as a result of the actions implemented through this amendment.

Social effects of actions proposed in Amendment 37 are addressed in **Chapter 4** of this document. **Section 3.3.3** includes information on environmental justice.

1.8 Changes in Research, Administration, and Enforcement Costs and Management Effectiveness

Research and monitoring is ongoing to understand the effectiveness of proposed management measure and their effect on bycatch. In 1990, the SEFSC initiated a logbook program for vessels with federal permits in the snapper grouper fishery from the Gulf of Mexico and South Atlantic. In 1999, logbook reporting was initiated for vessels catching king and Spanish mackerel (Gulf of Mexico and South Atlantic Fishery Management Councils). Approximately 20% of commercial fishermen from snapper grouper, dolphin wahoo, and CMP fisheries are asked to fill out discard information in logbooks; however, a greater percentage of fishermen could be selected with emphasis on individuals that dominate landings. Recreational discards are obtained from the MRIP and logbooks from the NMFS headboat program.

Additional data collection activities for the recreational sector of the snapper grouper, dolphin wahoo, and CMP fisheries are being considered by the Council that could allow for a better monitoring of bycatch in the future. The Council is also developing an amendment to improve commercial logbook reporting for these fisheries. Some observer information for the snapper grouper fishery has been provided by the SEFSC, Marine Fisheries Initiative, and Cooperative Research Programs (CRP), but more is desired for the snapper grouper, dolphin wahoo, and CMP fisheries. Currently, for the snapper grouper fishery, headboats are required to carry observers, if selected.

Cooperative research projects between science and industry are being used to a limited extent to collect bycatch information on the snapper grouper fishery in the South Atlantic. For example, Harris and Stephen (2005) characterized the entire (retained and discarded) catch of reef fishes from a selected commercial fisherman in the South Atlantic including total catch composition and disposition of fishes that were released. The Gulf and South Atlantic Fisheries Foundation, Inc. (Foundation) conducted a fishery observer program within the snapper grouper vertical hook-and-line (bandit rig) fishery of the South Atlantic United States. Through contractors they randomly placed observers on cooperating vessels to collect a variety of data quantifying the participation, gear, effort, catch, and discards within the fishery.

In the spring 2010, Archipelago Marine Research Ltd. worked with North Carolina Sea Grant and several South Atlantic Unlimited Snapper Grouper Permit holders to test the effectiveness of electronic video monitoring to measure catch and bycatch. A total of 93 trips were monitored with video monitoring, 34 by self-reported fishing logbooks, and 5 by observers. Comparisons

between electronic video monitoring data and observer data showed that video monitoring was a reliable source of catch and bycatch data.

Research funds for observer programs, as well as gear testing and testing of electronic devices are also available each year in the form of grants from the Foundation, Marine Fisheries Initiative, Saltonstall-Kennedy program, and the CRP. Efforts are made to emphasize the need for observer and logbook data in requests for proposals issued by granting agencies. A condition of funding for these projects is that data are made available to the Councils and NMFS upon completion of a study.

Stranding networks have been established in the Southeast Region. The NMFS SEFSC is the base for the Southeast United States Marine Mammal Stranding Program (http://sero.nmfs.noaa.gov/pr/strandings.htm). NMFS authorizes organizations and volunteers under the MMPA to respond to marine mammal strandings throughout the United States. These organizations form the stranding network whose participants are trained to respond to, and collect samples from live and dead marine mammals that strand along southeastern United State beaches. The SEFSC is responsible for: coordinating stranding events; monitoring stranding rates; monitoring human caused mortalities; maintaining a stranding database for the southeast region; and conducting investigations to determine the cause of unusual stranding events including mass strandings and mass mortalities (http://www.sefsc.noaa.gov/species/mammals/strandings.htm).

The Southeast Regional Office and the SEFSC participate in a wide range of training and outreach activities to communicate bycatch related issues. The NMFS Southeast Regional Office issues public announcements, Southeast Fishery Bulletins, or News Releases on different topics, including use of turtle exclusion devices, bycatch reduction devices, use of methods and devices to minimize harm to turtles and sawfish, information intended to reduce harm and interactions with marine mammals, and other methods to reduce bycatch for the convenience of constituents in the southern United States. These are mailed out to various organizations, government entities, commercial interests and recreational groups. This information is also included in newsletters and publications that are produced by NMFS and the various regional fishery management councils. Announcements and news released are also available on the internet and broadcasted over NOAA weather radio.

NMFS established the South East Fishery-Independent Survey in 2010 to strengthen fishery-independent sampling efforts in southeast U.S. waters, addressing both immediate and long-term fishery-independent data needs, with an overarching goal of improving fishery-independent data utility for stock assessments. Meeting these data needs is critical to improving scientific advice to the management process, ensuring overfishing does not occur, and successfully rebuilding overfished stocks on schedule.

1.9 Changes in the Economic, Social, or Cultural Value of Fishing Activities and Non-Consumptive Uses of Fishery Resources

The preferred management measures and any changes in economic, social, or cultural values are discussed in **Chapter 4** of Amendment 37. Further analysis can be found in **Appendices E** (Regulatory Impact Review) and **F** (Regulatory Flexibility Act Analysis).

1.10 Changes in the Distribution of Benefits and Costs

The distribution of benefits and costs expected from proposed actions in the environmental assessment are discussed in **Chapter 3**. Economic and social effects of the proposed actions are addressed in **Chapter 4** of this document.

1.11 Social Effects

The social effects of all the measures are described in **Chapter 4** of Amendment 37.

1.12 Conclusion

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR 600.350(d)(3)(i). In summary, measures proposed in Amendment 37 are intended to modify the management unit for hogfish, specify fishing levels based on the Council SSC's recommendations for the GA-NC and FLK/EFL stocks of hogfish, and modify or establish management measures. For the FLK/EFL stock of hogfish, this amendment would establish a rebuilding plan to increase hogfish biomass to sustainable levels within a specified time period based on results of the recent stock assessment (SEDAR 37 2014). These actions are necessary to align the management boundaries for hogfish with the best available science (i.e., genetic information), and end overfishing and rebuild the FLK/EFL stock of hogfish while minimizing, to the extent practicable, adverse social and economic effects. As summarized in **Section 1.3** of this BPA, the actions in Amendment 37 are not expected to result in significant changes in bycatch of hogfish.

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Appendix E. Regulatory Impact Review

Appendix F. Regulatory Flexibility Analysis

Appendix G. Other Applicable Laws

1.1 Administrative Procedure Act (APA)

All federal rulemaking is governed under the provisions of the APA (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Among other things under the APA, the National Marine Fisheries Service (NMFS) is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider and respond to public comment on those rules before they are finalized. The APA also establishes a 30-day wait period from the time a final rule is published until it takes effect, with some exceptions. Amendment 37 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Amendment 37) complies with the provisions of the APA through the South Atlantic Fishery Management Council's (South Atlantic Council) extensive use of public meetings, requests for comments and consideration of comments. The proposed rule associated with this amendment will have a request for public comments, which complies with the APA, and upon publication of the final rule, unless the rule falls within an APA exception, there will be a 30-day wait period before the regulations are effective.

1.2 Information Quality Act (IQA)

The IQA (Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Public Law 106-443)) which took effect October 1, 2002, directed the Office of Management and Budget (OMB) to issue government-wide guidelines that "provide policy and procedural guidelines to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." OMB directed each federal agency to issue its own guidelines, establish administrative mechanisms allowing affected persons to seek and obtain correction of information that does not comply with OMB guidelines, and report periodically to OMB on the number and nature of complaints. The NOAA Section 515 Information Quality Guidelines require a series of actions for each new information product subject to the IQA. Amendment 37 has used the best available information and made a broad presentation thereof. The information contained in this document was developed using best available scientific information. Therefore, this document is in compliance with the IQA.

1.3 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the federal CZMA of 1972 requires that all federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. While it is the goal of the South Atlantic Council to have management measures that complement those of the states, federal and state administrative procedures vary and regulatory changes are unlikely to be fully instituted at the same time. The South Atlantic Council believes the actions in this amendment are consistent to the maximum extent practicable with the Coastal Zone Management Plans of Florida, Georgia, South Carolina, and North Carolina. Pursuant to Section 307 of the CZMA, this determination will be submitted

to the responsible state agencies who administer the approved Coastal Zone Management Programs in the States of Florida, South Carolina, Georgia, and North Carolina.

1.4 Endangered Species Act (ESA)

The ESA of 1973 (16 U.S.C. Section 1531 et seq.) requires that federal agencies must ensure actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or the habitat designated as critical to their survival and recovery. The ESA requires NMFS to consult with the appropriate administrative agency (itself for most marine species, and the U.S. Fish and Wildlife Service for all remaining species) when proposing an action that may affect threatened or endangered species or adversely modify critical habitat. Consultations are necessary to determine the potential impacts of the proposed action. They are concluded informally when proposed actions may affect but are "not likely to adversely affect" threatened or endangered species or designated critical habitat. Formal consultations, resulting in a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" threatened or endangered species or adversely modify designated critical habitat. NMFS completed a biological opinion (NMFS 2006) in 2006 evaluating the impacts of the continued authorization of the South Atlantic snapper grouper fishery under the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region (Snapper Grouper FMP) and Amendment 13C to the Snapper Grouper FMP on ESA-listed species (see **Chapter 3**). The opinion stated the fishery was not likely to adversely affect North Atlantic right whale critical habitat, seabirds, or marine mammals (see NMFS 2006 for discussion on these species). However, the opinion did state that the snapper grouper fishery would adversely affect sea turtles and smalltooth sawfish, but would not jeopardize their continued existence. An incidental take statement was issued for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles, as well as smalltooth sawfish. Reasonable and prudent measures to minimize the impact of these incidental takes were specified, along with terms and conditions to implement them. See NMFS (2006) for a full discussion of impacts to smalltooth sawfish.

Table G-1. Three-year South Atlantic anticipated takes 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.

Sea turtles are vulnerable to capture by bottom longline and vertical hook-and-line gear. 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 G-1**).

The SDDP does not provide data on recreational fishing interactions with ESA-listed sea turtle species. However, anecdotal information indicates that recreational fishermen occasionally take sea turtles with hook-and-line gear. The biological opinion also used the extrapolated data from the SDDP to estimate the magnitude of recreational fishing on sea turtles (**Table G-1**).

Regulations implemented through Amendment 15B to the Snapper Grouper FMP (74 FR 31225; June 30, 2009) required all commercial or charter/headboat vessels with a South Atlantic snapper grouper permit, carrying hook-and-line gear on board, to possess required literature and release gear to aid in the safe release of incidentally caught sea turtles and smalltooth sawfish. These regulations are thought to decrease the mortality associated with accidental interactions with sea turtles and smalltooth sawfish.

Subsequent to the June 7, 2006, opinion, NMFS made several modifications to the list of protected species for which they are responsible. These changes included (1) the listing of two species of *Acropora* coral (71 FR 26852, May 9, 2006), (2) the designation of *Acropora* critical habitat (73 FR 72210, November 26, 2008), (3) the determination that the loggerhead sea turtle population consists of nine DPSs (76 FR 58868, September 22, 201 1), (4) the listing of five DPSs of Atlantic sturgeon (77 FR 5914, February 6, 2012, and 77 FR 5880, February 6, 2012), and (5) the listing of five additional coral species (79 FR 53851, September 10, 2014).

NMFS addressed these ESA changes in a series of consultation memoranda. In separate memoranda, NMFS concluded the continued authorization of the South Atlantic snapper-grouper fishery is not likely to adversely affect elkhorn or staghorn coral (*Acropora* spp.; July 9, 2007), *Acropora* critical habitat (December 2, 2008), and Atlantic sturgeon (February 15, 2012). The February 15, 2012, memorandum also stated that because the 2006 biological opinion had evaluated the impacts of the snapper-grouper fishery on the loggerhead sea turtle subpopulations now wholly contained within the Northwest Atlantic DPS, the biological opinion's conclusion that the fishery is not likely to jeopardize the continued existence of loggerhead sea turtles remains valid. In a memorandum dated January 23, 2013, NMFS concluded new information provided in the proposed reclassification (uplisting) of *Acropora* did not change the previous effects determination that the fishery was not likely to adversely affect *Acropora*. No new information was included in the final listing rule (79 FR 53851, September 10, 2014) that indicates NMFS's previous effects determinations regarding the potential impacts of the snapper-grouper fishery on *Acropora* were incorrect.

The final listing rule published on September 10, 2014, listed 20 new coral species under the ESA. Five of those new species occur in the Caribbean (including Florida) and all of these are listed as threatened. In a memorandum dated September 11, 2014, NMFS evaluated the effects of continued authorization of the snapper-grouper fishery on those newly listed coral species.

NMFS concluded that any adverse effects on these species from the snapper-grouper fishery are extremely unlikely to occur and are therefore discountable.

Additionally, on July 10, 2014, NMFS designated 5 habitat types across 38 marine areas in the Gulf of Mexico and South Atlantic that encompassed the 15 primary constituent elements (PCEs) of critical habitat for the northwest Atlantic Ocean (NWA) loggerhead sea turtle DPS. In a memorandum dated September 16, 2014, NMFS evaluated the potential impacts all federally managed fisheries in the Gulf of Mexico and South Atlantic regions may have on the NWA loggerhead sea turtle DPS critical habitat. The evaluation concluded the snapper-grouper fishery uses fishing methods and gear types that will either have no effect or are highly unlikely to adversely affect any of the PCEs; thus, any adverse effects from this fishery are discountable.

1.5 Executive Order 12612: Federalism

E.O. 12612 requires agencies to be guided by the fundamental federalism principles when formulating and implementing policies that have federalism implications. The purpose of the Order is to guarantee the division of governmental responsibilities between the federal government and the states, as intended by the framers of the Constitution. No federalism issues have been identified relative to the actions proposed in this document and associated regulations. Therefore, preparation of a Federalism assessment under E.O. 13132 is not necessary.

1.6 Executive Order 12866: Regulatory Planning and Review

E.O. 12866, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that implement a new fishery management plan (FMP) or that significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society associated with proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Act. A regulation is significant if it is likely to result in an annual effect on the economy of at least $100,000,000 or if it has other major economic effects.

In accordance with E.O. 12866, the following is set forth by the South Atlantic Council: (1) this rule is not likely to have an annual effect on the economy of more than $100 million or to adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) this rule is not likely to create any serious inconsistencies or otherwise interfere with any action taken or planned by another agency; (3) this rule is not likely to materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; (4) this rule is not likely to raise novel or policy issues arising out of legal mandates, or the principles set forth in the Executive Order; and (5) this rule is not controversial.

This amendment includes the RIR as **Appendix E**.

1.7 Executive Order 12898: Environmental Justice

E.O. 12898 requires that "to the greatest extent practicable and permitted by law…each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, 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 and possessions.…"

The alternatives being considered in this document are not expected to result in any disproportionate adverse human health or environmental effects to minority populations or low-income populations of Florida, North Carolina, South Carolina, or Georgia, rather the impacts would be spread across all participants in the snapper grouper fishery regardless of race or income. A detailed description of the communities impacted by the actions contained in this document and potential socioeconomic impacts of those actions are contained in **Chapters 3** and **4** of this document

1.8 Executive Order 12962: Recreational Fisheries

E.O. 12962 requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods. Additionally, the Order establishes a seven-member National Recreational Fisheries Coordination Council responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The National Recreational Fisheries Coordination Council also is responsible for developing, in cooperation with federal agencies, states and tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the Order requires NMFS and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the ESA.

The alternatives considered in this document are consistent with the directives of E.O. 12962.

1.9 Executive Order 13089: Coral Reef Protection

E.O. 13089, signed by President William Clinton on June 11, 1998, recognizes the ecological, social, and economic values provided by the Nation's coral reefs and ensures that federal agencies are protecting these ecosystems. More specifically, the Order requires federal agencies to identify actions that may harm U.S. coral reef ecosystems, to utilize their program and authorities to protect and enhance the conditions of such ecosystems, and to ensure that their actions do not degrade the condition of the coral reef ecosystem.

The alternatives considered in this document are consistent with the directives of E.O. 13089.

1.10 Executive Order 13158: Marine Protected Areas (MPAs)

E.O. 13158 was signed on May 26, 2000, to strengthen the protection of U.S. ocean and coastal resources through the use of Marine Protected Areas. The E.O. defined MPAs as "any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein". It directs federal agencies to work closely with state, local and non- governmental partners to create a comprehensive network of MPAs "representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources".

The alternatives considered in this document are consistent with the directives of E.O. 13158.

1.11 Marine Mammal Protection Act (MMPA)

The MMPA established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas. It also prohibits the importing of marine mammals and marine mammal products into the United States. Under the MMPA, the Secretary of Commerce (authority delegated to NMFS) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The Secretary of the Interior is responsible for walruses, sea otters, polar bears, manatees, and dugongs. Part of the responsibility that NMFS has under the MMPA involves monitoring populations of marine mammals to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted". A conservation plan is then developed to guide research and management actions to restore the population to healthy levels.

In 1994, Congress amended the MMPA, to govern the taking of marine mammals incidental to commercial fishing operations. This amendment required the preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction; development and implementation of take-reduction plans for stocks that may be reduced or are being maintained below their optimum sustainable population levels due to interactions with commercial fisheries; and studies of pinniped-fishery interactions. The MMPA requires a commercial fishery to be placed in one of three categories, based on the relative frequency of incidental serious injuries and mortalities of marine mammals. Category I designates fisheries with frequent serious injuries and mortalities incidental to commercial fishing; Category II designates fisheries with occasional serious injuries and mortalities; and Category III designates fisheries with a remote likelihood or no known serious injuries or mortalities.

Under the MMPA, to legally fish in a Category I and/or II fishery, a fisherman must take certain steps. For example, owners of vessels or gear engaging in a Category I or II fishery, are required to obtain a marine mammal authorization by registering with the Marine Mammal Authorization Program (50 CFR 229.4). They are also required to accommodate an observer if requested (50 CFR 229.7(c)) and they must comply with any applicable take reduction plans. The commercial hook-and-line components of the South Atlantic snapper grouper fishery (i.e., bottom longline, bandit gear, and handline), which targets snapper grouper species are listed as part of a Category

III fishery (79 FR 77919, December 29, 2014) because there have been no documented interactions between these gear and marine mammals. The black sea bass pot component of the South Atlantic snapper grouper fishery is part of the Atlantic mixed species trap/pot fishery, a Category II fishery, in the final 2015 LOF (79 FR 77919, December 29, 2014). The Atlantic mixed species trap/pot fishery designation was created in 2003 (68 FR 41725, July 15, 2003), by combining several separately listed trap/pot fisheries into a single group. This group was designated Category II as a precaution because of known interactions between marine mammals and gear similar to those included in this group. Prior to this consolidation, the black sea bass pot fishery in the South Atlantic was a part of the "U.S. Mid-Atlantic and Southeast U.S. Atlantic Black Sea Bass Trap/Pot" fishery (Category III). There has never been a documented interaction between marine mammals and black sea bass trap/pot gear in the South Atlantic. The actions in this EA are not expected to negatively impact the provisions of the MMPA

1.12 National Environmental Policy Act (NEPA)

This document has been written and organized in a manner that meets NEPA requirements, and thus is a consolidated NEPA document, including an EA, as described in NOAA Administrative Order (NAO) 216- 6, Section 6.03.a.2.

Purpose and Need for Action

The purpose and need for this action are described in **Chapter 1**.

Alternatives

The alternatives for this action are described in **Chapter 2**.

Affected Environment

The affected environment is described in **Chapter 3**.

Impacts of the Alternatives

The impacts of the alternatives on the environment are described in **Chapter 4**.

1.13 National Marine Sanctuaries Act (NMSA)

Under the NMSA (also known as Title III of the Marine Protection, Research and Sanctuaries Act of 1972), as amended, the U.S. Secretary of Commerce is authorized to designate National Marine Sanctuaries to protect distinctive natural and cultural resources whose protection and beneficial use requires comprehensive planning and management. The National Marine Sanctuary Program is administered by the Sanctuaries and Reserves Division of NOAA. The NMSA provides authority for comprehensive and coordinated conservation and management of these marine areas. The National Marine Sanctuary Program currently comprises 13 sanctuaries around the country, including sites in American Samoa and Hawaii. These sites include significant coral reef and kelp forest habitats, and breeding and feeding grounds of whales, sea

lions, sharks, and sea turtles. The three sanctuaries in the South Atlantic exclusive economic zone are the USS Monitor, Gray's Reef, and Florida Keys National Marine Sanctuaries.

The alternatives considered in this document are not expected to have any adverse impacts on the resources managed by the National Marine Sanctuaries.

1.14 Paperwork Reduction Act (PRA)

The purpose of the PRA is to minimize the burden on the public. The PRA is intended to ensure that the information collected under the proposed action is needed and is collected in an efficient manner (44 U.S.C. 3501 (1)). The authority to manage information collection and record keeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications. The PRA requires NMFS to obtain approval from the OMB before requesting most types of fishery information from the public. Actions in this document are not expected to affect PRA.

1.15 Regulatory Flexibility Act (RFA)

The RFA of 1980 (5 U.S.C. 601 et seq.) requires federal agencies to assess the impacts of regulatory actions implemented through notice and comment rulemaking procedures on small businesses, small organizations, and small governmental entities, with the goal of minimizing adverse impacts of burdensome regulations and record-keeping requirements on those entities. Under the RFA, NMFS must determine whether a proposed fishery regulation would have a significant economic impact on a substantial number of small entities. If not, a certification to this effect must be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration. Alternatively, if a regulation is determined to significantly impact a substantial number of small entities, the RFA requires the agency to prepare an initial and final Regulatory Flexibility Analysis to accompany the proposed and final rule, respectively. These analyses, which describe the type and number of small businesses, affected, the nature and size of the impacts, and alternatives that minimize these impacts while accomplishing stated objectives, must be published in the *Federal Register* in full or in summary for public comment and submitted to the chief counsel for advocacy of the Small Business Administration. Changes to the RFA in June 1996 enable small entities to seek court review of an agency's compliance with the RFA's provisions.

As NMFS has determined whether a proposed fishery regulation would have a significant economic impact on a substantial number of small entities, a certification to this effect will be prepared and submitted to the Chief Counsel for Advocacy of the Small Business Administration.

This amendment includes the RFA as **Appendix F**.

1.16 Small Business Act (SBA)

Enacted in 1953, the SBA requires that agencies assist and protect small-business interests to the extent possible to preserve free competitive enterprise. The objectives of the SBA are to foster business ownership by individuals who are both socially and economically disadvantaged; and to promote the competitive viability of such firms by providing business development assistance including, but not limited to, management and technical assistance, access to capital and other forms of financial assistance, business training, and counseling, and access to sole source and limited competition federal contract opportunities, to help firms achieve competitive viability. Because most businesses associated with fishing are considered small businesses, NMFS, in implementing regulations, must make an assessment of how those regulations will affect small businesses.

1.17 Public Law 99-659: Vessel Safety

Public Law 99-659 amended the Magnuson-Stevens Fishery Conservation and Management Act to require that a FMP or FMP amendment must consider, and may provide for, temporary adjustments (after consultation with the U.S. Coast Guard and persons utilizing the fishery) regarding access to a fishery for vessels that would be otherwise prevented from participating in the fishery because of safety concerns related to weather or to other ocean conditions. No vessel would be forced to participate in South Atlantic fisheries under adverse weather or ocean conditions as a result of the imposition of management regulations proposed in this amendment. No concerns have been raised by South Atlantic fishermen or by the U.S. Coast Guard that the proposed management measures directly or indirectly pose a hazard to crew or vessel safety under adverse weather or ocean conditions.

Appendix H. Essential Fish Habitat and Ecosystem-based Management

South Atlantic Fishery Management Council Habitat Conservation, Ecosystem Coordination and Collaboration

The Council, using the Essential Fish Habitat Plan as the cornerstone, adopted a strategy to facilitate the move to an ecosystem-based approach to fisheries management in the region. This approach required a greater understanding of the South Atlantic ecosystem and the complex relationships among humans, marine life, and the environment including essential fish habitat. To accomplish this, a process was undertaken to facilitate the evolution of the Habitat Plan into a Fishery Ecosystem Plan (FEP), thereby providing a more comprehensive understanding of the biological, social, and economic impacts of management necessary to initiate the transition from single species management to ecosystem-based management in the region.

Moving to Ecosystem-Based Management

The Council adopted broad goals for Ecosystem-Based Management to include maintaining or improving ecosystem structure and function; maintaining or improving economic, social, and cultural benefits from resources; and maintaining or improving biological, economic, and cultural diversity. Development of a regional FEP (SAFMC 2009a) provided an opportunity to expand the scope of the original Council Habitat Plan and compile and review available habitat, biological, social, and economic fishery and resource information for fisheries in the South Atlantic ecosystem. The South Atlantic Council views habitat conservation as the core of the move to EBM in the region. Therefore, development of the FEP was a natural next step in the evolution and expands and significantly updates the SAFMC Habitat Plan (SAFMC 1998a) incorporating comprehensive details of all managed species (SAFMC, South Atlantic States, ASMFC, and NOAA Fisheries Highly Migratory Species and Protected Species) including their biology, food web dynamics, and economic and social characteristics of the fisheries and habitats essential to their survival. The FEP therefore serves as a source document and presents more complete and detailed information describing the South Atlantic ecosystem and the impact of fisheries on the environment. This FEP updated information on designated Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern; expanded descriptions of biology and status of managed species; presented information that will support ecosystem considerations for managed species; and described the social and economic characteristics of the fisheries in the region. In addition, it expanded the discussion and description of existing research programs and needs to identify biological, social, and economic research needed to fully address ecosystem-based management in the region. It is anticipated that the FEP will provide a greater degree of guidance by fishery, habitat, or major ecosystem consideration of bycatch reduction, prey-predator interactions, maintaining biodiversity, and spatial management needs. This FEP serves as a living source document of biological, economic, and social information for all Fishery Management Plans (FMP). Future Environmental Assessments and Environmental Impact

Statements associated with subsequent amendments to Council FMPs will draw from or cite by reference the FEP.

The Fishery Ecosystem Plan for the South Atlantic Region encompasses the following volume structure:
FEP Volume I - Introduction and Overview of FEP for the South Atlantic Region
FEP Volume II - South Atlantic Habitats and Species
FEP Volume III - South Atlantic Human and Institutional Environment
FEP Volume IV - Threats to South Atlantic Ecosystem and Recommendations
FEP Volume V - South Atlantic Research Programs and Data Needs
FEP Volume VI - References and Appendices

Comprehensive Ecosystem-Based Amendment (CE-BA) 1 (SAFMC 2009b) is supported by this FEP and updated EFH and EFH-HAPC information and addressed the Final EFH Rule (e.g., GIS presented for all EFH and EFH-HAPCs). Management actions implemented in CE-BA 1 established deepwater Coral HAPCs to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine, deepwater coral ecosystems in the world.

The Fishery Ecosystem Plan, slated to be revised every 5 years, will again be the vehicle to update and refine information supporting designation and future review of EFH and EFH-HAPCs for managed species. Planning for the update is being conducted in cooperation with the Habitat Advisory Panel during the fall and winter of 2013 with initiation during 2014.

Ecosystem Approach to Deepwater Ecosystem Management
The South Atlantic Council manages coral, coral reefs and live/hard bottom habitat, including deepwater corals, through the Fishery Management Plan for Coral, Coral Reefs and Live/Hard Bottom Habitat of the South Atlantic Region (Coral FMP). Mechanisms exist in the FMP, as amended, to further protect deepwater coral and live/hard bottom habitats. The SAFMC's Habitat and Environmental Protection Advisory Panel and Coral Advisory Panel have supported proactive efforts to identify and protect deepwater coral ecosystems in the South Atlantic region. Management actions in Comprehensive Ecosystem-Based Amendment (CE-BA 1) (SAFMC 2009b) established deepwater coral HAPCs (C- HAPCs) to protect what is thought to be the largest continuous distribution (>23,000 square miles) of pristine deepwater coral ecosystems in the world. In addition, CE-BA 1 established areas within the CHAPC, which provide for traditional fishing in limited areas, which do not impact deepwater coral habitat. CE-BA 1, supported by the FEP, also addressed non-regulatory updates for existing EFH and EFH- HAPC information and addressed the spatial requirements of the Final EFH Rule (i.e., GIS presented for all EFH and EFH-HAPCs). Actions in this amendment included modifications in the management of the following: octocorals; special management zones (SMZs) off the coast of South Carolina; and sea turtle release gear requirements for snapper grouper fishermen. The amendment also designated essential fish habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPCs).

CE-BA 2 established annual catch limits (ACL) for octocorals in the South Atlantic as well as modifying the Fishery Management Unit (FMU) for octocorals to remove octocorals off the coast of Florida from the FMU (SAFMC 2011). The amendment also limited the possession of

managed species in the SMZs off South Carolina to the recreational bag limit for snapper grouper and coastal migratory pelagic species; modified sea turtle release gear requirements for the snapper grouper fishery based upon freeboard height of vessels; amends Council fishery management plans (FMPs) to designate or modify EFH and EFH-HAPCs, including the FMP for Pelagic Sargassum Habitat; amended the Coral FMP to designate EFH for deepwater Coral HAPCs designated under CE-BA 1; and amended the Snapper Grouper FMP to designate EFH-HAPCs for golden and blueline tilefish and the deepwater Marine Protected Areas. The final rule was published in the federal register on December 30, 2011, and regulations became effective on January 30, 2012.

Building from a Habitat to an Ecosystem Network to Support the Evolution

Starting with our Habitat and Environmental Protection Advisory Panel, the Council expanded and fostered a comprehensive Habitat network in our region to develop the Habitat Plan of the South Atlantic Region completed in 1998 to support the EFH rule. Building on the core regional collaborations, the Council facilitated an expansion to a Habitat and Ecosystem network to support development of the FEP and CE-BA as well as coordinate with partners on other regional efforts.

Integrated Ocean Observing System (IOOS) and Southeast Coastal and Ocean Observing Regional Association (SECOORA)

The Integrated Ocean Observing System (IOOS®) is a partnership among federal, regional, academic, and private sector parties that works to provide new tools and forecasts to improve safety, enhance the economy, and protect our environment. IOOS supplies critical information about our Nation's oceans, coasts, and Great Lakes. Scientists working to understand climate change, governments adapting to changes in the Arctic, municipalities monitoring local water quality, and industries affected by coastal and marine spatial planning all have the same need: reliable, timely, and sustained access to data and information that inform decision making. Improving access to key marine data and information supports several purposes. IOOS data sustain national defense, marine commerce, and navigation safety. Scientists use these data to issue weather, climate, and marine forecasts. IOOS data are also used to make decisions for energy siting and production, economic development, and ecosystem-based resource management. Emergency managers and health officials need IOOS information to make decisions about public safety. Teachers and government officials rely on IOOS data for public outreach, training, and education.

SECOORA is one of 11 Regional Associations established nationwide through the US IOOS whose primary source of funding is through a 5-year cooperative agreement titled "Coordinated Monitoring, Prediction, and Assessment to Support Decision-Makers Needs for Coastal and Ocean Data and Tools". However, SECOORA was recently awarded funding via a NOAA Regional Ocean Partnership grant through the Governors' South Atlantic Alliance. SECOORA is the regional solution to integrating coastal and ocean observing data in the Southeast United States to inform decision makers and the general public. The SECOORA region encompasses 4 states, over 42 million people, and spans the coastal ocean from North Carolina to the west Coast of Florida and is creating customized products to address these thematic areas: Marine Operations; Coastal Hazards; Ecosystems, Water Quality, Living Marine Resources; and Climate Change. The Council is a voting member and Council staff was recently re-elected to serve on the

Board of Directors for the Southeast Coastal Regional Ocean Observing Association (SECOORA) to guide and direct priority needs for observation and modeling to support fisheries oceanography and integration into stock assessments through SEDAR. Cooperation through SECOORA is envisioned to facilitate the following:

- Refining current or water column designations of EFH and EFH-HAPCs (e.g., Gulf Stream and Florida Current).
- Providing oceanographic models linking benthic, pelagic habitats, and food webs.
- Providing oceanographic input parameters for ecosystem models.
- Integration of OOS information into Fish Stock Assessment process in the SA region.
- Facilitating OOS system collection of fish and fishery data and other research necessary to support the Council's use of area-based management tools in the SA Region including but not limited to EFH, EFH-HAPCs, Marine Protected Areas, Deepwater Coral Habitat Areas of Particular Concern, Special Management Zones, and Allowable Gear Areas.
- Integration of OOS program capabilities and research Needs into the South Atlantic Fishery Ecosystem Plan.
- Collaboration with SECOORA to integrate OOS products with information included in the Council's Habitat and Ecosystem Web Services and Atlas to facilitate model and tool development.
- Expanding Map Services and the Regional Habitat and Ecosystem Atlas in cooperation with SECOORAs Web Services that will provide researchers access to data or products including those collected/developed by SA OOS partners.

SECOORA researchers are developing a comprehensive data portal to provide discovery of, access to, and metadata about coastal ocean observations in the southeast US. Below are various ways to access the currently available data.

One project recently funded by SECOORA initiated development of species specific habitat models that integrate remotely sensed and in situ data to enhance stock assessments for species managed by the Council. The project during 2013/2014 was initiated to address red porgy, gray triggerfish, black seabass, and vermilion snapper. Gray triggerfish and red porgy are slated for assessment through SEDAR in 2014/15 and 2015/16 respectively.

National Fish Habitat Plan and Southeast Aquatic Resource Partnership (SARP)

In addition, the Council serves on the National Habitat Board and, as a member of the Southeast Aquatic Resource Partnership (SARP), has highlighted this collaboration by including the Southeast Aquatic Habitat Plan (SAHP) and associated watershed conservation restoration targets into the FEP. Many of the habitat, water quality, and water quantity conservation needs identified in the threats and recommendations Volume of the FEP are directly addressed by on-the-ground projects supported by SARP. This cooperation results in funding fish habitat restoration and conservation intended to increase the viability of fish populations and fishing opportunity, which also meets the needs to conserve and manage
Essential Fish Habitat for Council managed species or habitat important to their prey. To date, SARP has funded 53 projects in the region through this program. This work supports conservation objectives identified in the SAHP to improve, establish, or maintain riparian zones, water quality, watershed connectivity, sediment flows, bottoms and shorelines, and fish passage, and addresses other key factors associated with the loss and degradation of fish habitats. SARP

also developed the Southern Instream Flow Network (SIFN) to address the impacts of flow alterations in the Southeastern US aquatic ecosystems which leverages policy, technical experience, and scientific resources among partners based in 15 states. Maintaining appropriate flow into South Atlantic estuarine systems to support healthy inshore habitats essential to Council managed species is a major regional concern and efforts of SARP through SIFN are envisioned to enhance state and local partners ability to maintain appropriate flow rates.

Governor's South Atlantic Alliance (GSAA)

Initially discussed as a South Atlantic Eco-regional Compact, the Council has also cooperated with South Atlantic States in the formation of a Governor's South Atlantic Alliance (GSAA). This will also provide regional guidance and resources that will address State and Council broader habitat and ecosystem conservation goals. The GSAA was initiated in 2006. An Executive Planning Team (EPT), by the end of 2007, had created a framework for the Governors South Atlantic Alliance. The formal agreement between the four states (NC, SC, GA, and FL) was executed in May 2009. The Agreement specifies that the Alliance will prepare a "Governors South Atlantic Alliance Action Plan" which will be reviewed annually for progress and updated every five years for relevance of content. The Alliance's mission and purpose is to promote collaboration among the four states, and with the support and interaction of federal agencies, academe, regional organizations, non-governmental organizations, and the private sector, to sustain and enhance the region's coastal and marine resources. The Alliance proposes to regionally implement science-based actions and policies that balance coastal and marine ecosystems capacities to support both human and natural systems. The GSAA Action Plan was released in December 2010 and describes the four Priority Issue Areas that were identified by the Governors to be of mutual importance to the sustainability of the region's resources: Healthy Ecosystems; Working Waterfronts; Clean Coastal and Ocean Waters; and Disaster-Resilient Communities. The goals, objectives, actions, and implementation steps for each of these priorities were further described in the GSAA Implementation Plan released in July 2011. The final Action Plan was released on December 1, 2010 and marked the beginning of intensive work by the Alliance Issue Area Technical Teams (IATTs) to develop implementation steps for the actions and objectives. The GSAA Implementation Plan was published July 6, 2011, and the Alliance has been working to implement the Plan through the IATTs and two NOAA-funded Projects. The Alliance also partners with other federal agencies, academia, non-profits, private industry, regional organizations, and others. The Alliance supports both national and state-level ocean and coastal policy by coordinating federal, state, and local entities to ensure the sustainability of the region's economic, cultural, and natural resources. The Alliance has organized itself around the founding principles outlined in the GSAA Terms of Reference and detailed in the GSAA Business Plan. A team of natural resource managers, scientists, and information management system experts have partnered to develop a Regional Information Management System (RIMS) and recommend decision support tools that will support regional collaboration and decision-making. In addition to regional-level stakeholders, state and local coastal managers and decision makers will also be served by this project, which will enable ready access to new and existing data and information. The collection and synthesis of spatial data into a suite of visualization tools is a critical step for long-term collaborative planning in the South Atlantic region for a wide range of coastal uses. The Council's Atlas presents the spatial representations of Essential Fish Habitat, managed areas, regional fish and fish habitat

distribution, and fishery operation information and it can be linked to or drawn on as a critical part of the collaboration with the RIMS.

South Atlantic Landscape Conservation Cooperative
One of the more recent collaborations is the Council's participation as Steering Committee member for the newly establish South Atlantic Landscape Conservation Cooperative (SALCC). Landscape Conservation Cooperatives (LCCs) are applied conservation science partnerships focused on a defined geographic area that informs on-the-ground strategic conservation efforts at landscape scales. LCC partners include DOI agencies, other federal agencies, states, tribes, non-governmental organizations, universities, and others. The newly formed Department of Interior Southeast Climate Services Center (CSC) has the LCCs in the region as their primary clients. One of the initial charges of the CSCs is to downscale climate models for use at finer scales.

The SALCC developed a Strategic Plan through an iterative process that began in December 2011. The plan provides a simple strategy for moving forward over the next few years. An operations plan was developed under direction from the SALCC Steering Committee to redouble efforts to develop version 1.0 of a shared conservation blueprint by spring-summer of 2014. The SALCC is developing the regional blueprint to address the rapid changes in the South Atlantic including but not limited to climate change, urban growth, and increasing human demands on resources which are reshaping the landscape. While these forces cut across political and jurisdictional boundaries, the conservation community does not have a consistent cross-boundary, cross-organization plan for how to respond. The South Atlantic Conservation Blueprint will be that plan. The blueprint is envisioned to be a spatially-explicit map depicting the places and actions need to sustain South Atlantic LCC objectives in the face of future change. The steps to creating the blueprint include development of: indicators and targets (shared metrics of success); the State of the South Atlantic (past, present, and future condition of indicators); and a Conservation Blueprint. Potential ways the blueprint could be used include: finding the best places for people and organizations to work together; raising new money to implement conservation actions; guiding infrastructure development (highways, wind, urban growth, etc.); creating incentives as an alternative to regulation; bringing a landscape perspective to local adaptation efforts; and locating places and actions to build resilience after major disasters (hurricanes, oil spills, etc.). Integration of connectivity, function, and threats to river, estuarine and marine systems supporting Council managed species is supported by the SALCC and enhanced by the Council being a voting member of its Steering Committee. In addition, the Council's Regional Atlas presents spatial representations of Essential Fish Habitat, managed areas, regional fish and fish habitat distribution, and fishery operation information and it be linked to or drawn on as a critical part of the collaboration with the recently developed SALCC Conservation Planning Atlas.

Building Tools to support EBM in the South Atlantic Region
The Council has developed a Habitat and Ecosystem Section of the website http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx and, in cooperation with the Florida Wildlife Research Institute (FWRI), developed a Habitat and Ecosystem Internet Map Server (IMS). The IMS was developed to support Council and regional partners' efforts in the transition to EBM. Other regional partners include NMFS Habitat Conservation, South Atlantic States, local management authorities, other Federal partners,

universities, conservation organizations, and recreational and commercial fishermen. As technology and spatial information needs evolved, the distribution and use of GIS demands greater capabilities. The Council has continued its collaboration with FWRI in the now evolution to Web Services provided through the regional SAFMC Habitat and Ecosystem Atlas (http://ocean.floridamarine.org/safmc_atlas/) and the SAFMC Digital Dashboard (http://ocean.floridamarine.org/safmc_dashboard/). The Atlas integrates services for the following:

Species distribution and spatial presentation of regional fishery independent data from the SEAMAP-SA, MARMAP, and NOAA SEFIS systems; SAFMC Fisheries: (http://ocean.floridamarine.org/SA_Fisheries/)

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern; SAFMC EFH: (http://ocean.floridamarine.org/sa_efh/)

Spatial presentation of managed areas in the region; SAFMC Managed Areas: (http://ocean.floridamarine.org/safmc_managedareas/)

An online life history and habitat information system supporting Council managed, State managed, and other regional species was developed in cooperation with FWRI. The Ecospecies system is considered dynamic and presents, as developed, detailed individual species life history reports and provides an interactive online query capability for all species included in the system: http://atoll.floridamarine.org/EcoSpecies

Web Services System Updates:
Essential Fish Habitat (EFH) – displays EFH and EFH-HAPCS for SAFMC managed species and NOAA Fisheries Highly Migratory Species.
Fisheries - displays Marine Resources Monitoring, Assessment, and Prediction (MARMAP) and Southeast Area Monitoring and Assessment Program South Atlantic (SEAMAP-SA) data.
Managed Areas - displays a variety of regulatory boundaries (SAFMC and Federal) or management boundaries within the SAFMC's jurisdiction.
Habitat – displays habitat data collected by SEADESC, Harbor Branch Oceanographic Institute (HBOI), and Ocean Exploration dives, as well as the SEAMAP shallow and ESDIM deepwater bottom mapping projects, multibeam imagery, and scientific cruise data.
Multibeam Bathymetry - displays a variety of multibeam data sources and scanned bathymetry charts.
Nautical Charts – displays coastal, general, and overview nautical charts for the SAFMC's jurisdictional area.

Ecosystem Based Action, Future Challenges and Needs
The Council has implemented ecosystem-based principles through several existing fishery management actions including establishment of deepwater Marine Protected Areas for the Snapper Grouper fishery, proactive harvest control rules on species (e.g., dolphin and wahoo) which are not overfished, implementing extensive gear area closures which in most cases eliminate the impact of fishing gear on Essential Fish Habitat, and use of other spatial management tools including Special Management Zones. Pursuant to development of the

Comprehensive Ecosystem-Based Amendment, the Council has taken an ecosystem approach to protect deepwater ecosystems while providing for traditional fisheries for the Golden Crab and Royal Red shrimp in areas where they do not impact deepwater coral habitat. The stakeholder based process taps in on an extensive regional Habitat and Ecosystem network. Support tools facilitate Council deliberations and with the help of regional partners, are being refined to address long-term ecosystem management needs.

One of the greatest challenges to the long-term move to EBM in the region is funding high priority research, including but not limited to, comprehensive benthic mapping and ecosystem model and management tool development. In addition, collecting detailed information on fishing fleet dynamics including defining fishing operation areas by species, species complex, and season, as well as catch relative to habitat is critical for assessment of fishery, community, and habitat impacts and for Council use in place based management measures. Additional resources need to be dedicated to expand regional coordination of modeling, mapping, characterization of species use of habitats, and full funding of regional fishery independent surveys (e.g., MARMAP, SEAMAP, and SEFIS) which are linking directly to addressing high priority management needs. Development of ecosystem information systems to support Council management should build on existing tools (e.g., Regional Habitat and Ecosystem GIS and Arc Services) and provide resources to regional cooperating partners for expansion to address long-term Council needs.

The FEP and CE-BA 1 complement, but do not replace, existing FMPs. In addition, the FEP serves as a source document to the CE-BAs. NOAA should support and build on the regional coordination efforts of the Council as it transitions to a broader management approach. Resources need to be provided to collect information necessary to update and refine our FEP and support future fishery actions including but not limited to completing one of the highest priority needs to support EBM, the completion of mapping of near-shore, mid-shelf, shelf edge, and deepwater habitats in the South Atlantic region. In developing future FEPs, the Council will draw on SAFEs (Stock Assessment and Fishery Evaluation reports) which NMFS is required to provide the Council for all FMPs implemented under the Magnuson-Stevens Act. The FEP, which has served as the source document for CE-BAs, could also meet some of the NMFS SAFE requirements if information is provided to the Council to update necessary sections.

EFH and EFH-HAPC Designations Translated to Cooperative Habitat Policy Development and Protection

The Council actively comments on non-fishing projects or policies that may impact fish habitat. Appendix A of the Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region (SAFMC 1998b) outlines the Council's comment and policy development process and the establishment of a four-state Habitat Advisory Panel. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. AP members bring projects to the Council's attention, draft comment letters, and attend public meetings. With guidance from the Advisory Panel, the Council has developed and approved policies on:

1. Energy exploration, development, transportation, and hydropower re-licensing;
2. Beach dredging and filling and large-scale coastal engineering;
3. Protection and enhancement of submerged aquatic vegetation;

4. Alterations to riverine, estuarine, and nearshore flows;
5. Marine aquaculture;
6. Marine Ecosystems and Non-Native and Invasive Species: and
7. Estuarine Ecosystems and Non-Native and Invasive Species.

NOAA Fisheries, State and other Federal agencies apply EFH and EFH-HAPC designations and protection policies in the day-to-day permit review process. The revision and updating of existing habitat policies and the development of new policies is being coordinated with core agency representatives on the Habitat and Coral Advisory Panels. Existing policies are included at the end of this Appendix.

The Habitat and Environmental Protection Advisory Panel, as part of their role in providing continued policy guidance to the Council, is during 2013/14, reviewing and proposing revisions and updates to the existing policy statements and developing new ones for Council consideration. The effort is intended to enhance the value of the statements and support cooperation and collaboration with NOAA Fisheries Habitat Conservation Division and State and Federal partners in better addressing the Congressional mandates to the Council associated with designation and conservation of EFH in the region.

South Atlantic Bight Ecopath Model

The Council worked cooperatively with the University of British Columbia and the Sea Around Us project to develop a straw-man and preliminary food web models (Ecopath with Ecosim) to characterize the ecological relationships of South Atlantic species, including those managed by the Council. This effort was envisioned to help the Council and cooperators in identifying available information and data gaps while providing insight into ecosystem function. More importantly, the model development process provides a vehicle to identify research necessary to better define populations, fisheries, and their interrelationships. While individual efforts are still underway in the South Atlantic, only with significant investment of new resources through other programs will a comprehensive regional model be further developed.

The latest collaboration builds on the previous Ecopath model developed through the Sea Around Us project for the South Atlantic Bight with a focus on beginning a dialogue on the implications of potential changes in forage fish populations in the region that could be associated with environmental or climate change or changes in direct exploitation of those populations.

Essential Fish Habitat and Essential Fish Habitat Areas of Particular Concern

Following is a summary of the current South Atlantic Council's EFH and EFH-HAPCs. Information supporting their designation was updated (pursuant to the EFH Final Rule) in the Council's Fishery Ecosystem Plan and Comprehensive Ecosystem Amendment:

Snapper Grouper FMP

Essential fish habitat for snapper grouper species includes coral reefs, live/hard bottom, submerged aquatic vegetation, artificial reefs, and medium to high profile outcroppings on and around the shelf break zone from shore to at least 600 feet (but to at least 2,000 feet for wreckfish) where the annual water temperature range is sufficiently warm to maintain adult populations of members of this largely tropical complex. EFH includes the spawning area in the

water column above the adult habitat and the additional pelagic environment, including *Sargassum*, required for larval survival and growth up to and including settlement. In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse snapper grouper larvae.

For specific life stages of estuarine dependent and nearshore snapper grouper species, essential fish habitat includes areas inshore of the 100-foot contour, such as attached macroalgae; submerged rooted vascular plants (seagrasses); estuarine emergent vegetated wetlands (saltmarshes, brackish marsh); tidal creeks; estuarine scrub/shrub (mangrove fringe); oyster reefs and shell banks; unconsolidated bottom (soft sediments); artificial reefs; and coral reefs and live/hard bottom.

Areas which meet the criteria for EFH-HAPCs for species in the snapper-grouper management unit include medium to high profile offshore hard bottoms where spawning normally occurs; localities of known or likely periodic spawning aggregations; nearshore hard bottom areas; The Point, The Ten Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump (South Carolina); mangrove habitat; seagrass habitat; oyster/shell habitat; all coastal inlets; all state-designated nursery habitats of particular importance to snapper grouper (e.g., Primary and Secondary Nursery Areas designated in North Carolina); pelagic and benthic *Sargassum*; Hoyt Hills for wreckfish; the *Oculina* Bank Habitat Area of Particular Concern; all hermatypic coral habitats and reefs; manganese outcroppings on the Blake Plateau; and Council-designated Artificial Reef Special Management Zones (SMZs). In addition, the Council through CEBA 2 (SAFMC 2011) designated the deepwater snapper grouper MPAs and golden tilefish and blueline tilefish habitat as EFH-HAPCs under the Snapper Grouper FMP as follows:

EFH-HAPCs for golden tilefish to include irregular bottom comprised of troughs and terraces inter-mingled with sand, mud, or shell hash bottom. Mud-clay bottoms in depths of 150-300 meters are HAPC. Golden tilefish are generally found in 80-540 meters, but most commonly found in 200-meter depths.

EFH-HAPC for blueline tilefish to include irregular bottom habitats along the shelf edge in 45-65 meters depth; shelf break or upper slope along the 100-fathom contour (150-225 meters); hardbottom habitats characterized as rock overhangs, rock outcrops, manganese-phosphorite rock slab formations, or rocky reefs in the South Atlantic Bight; and the Georgetown Hole (Charleston Lumps) off Georgetown, SC.

EFH-HAPCs for the snapper grouper complex to include the following deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA, and East Hump MPA.

Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 are designated as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC.

Shrimp FMP
For penaeid shrimp, Essential Fish Habitat includes inshore estuarine nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies as described in the Habitat Plan. Inshore nursery areas include tidal freshwater (palustrine), estuarine, and marine emergent wetlands (e.g., intertidal marshes); tidal palustrine forested areas; mangroves; tidal freshwater, estuarine, and marine submerged aquatic vegetation (e.g., seagrass); and subtidal and intertidal non- vegetated flats. This applies from North Carolina through the Florida Keys.

For rock shrimp, essential fish habitat consists of offshore terrigenous and biogenic sand bottom habitats from 18 to 182 meters in depth with highest concentrations occurring between 34 and 55 meters. This applies for all areas from North Carolina through the Florida Keys. Essential fish habitat includes the shelf current systems near Cape Canaveral, Florida, which provide major transport mechanisms affecting planktonic larval rock shrimp. These currents keep larvae on the Florida Shelf and may transport them inshore in spring. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse rock shrimp larvae.

Essential fish habitat for royal red shrimp include the upper regions of the continental slope from 180 meters (590 feet) to about 730 meters (2,395 feet), with concentrations found at depths of between 250 meters (820 feet) and 475 meters (1,558 feet) over blue/black mud, sand, muddy sand, or white calcareous mud. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse royal red shrimp larvae.

Areas which meet the criteria for EFH-HAPCs for penaeid shrimp include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas), and state-identified overwintering areas.

Coastal Migratory Pelagics FMP
Essential fish habitat for coastal migratory pelagic species includes sandy shoals of capes and offshore bars, high profile rocky bottom, and barrier island ocean-side waters, from the surf to the shelf break zone, but from the Gulf Stream shoreward, including *Sargassum*. In addition, all coastal inlets and all state-designated nursery habitats of particular importance to coastal migratory pelagics (for example, in North Carolina this would include all Primary Nursery Areas and all Secondary Nursery Areas).

For Cobia essential fish habitat also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse coastal migratory pelagic larvae.

For king and Spanish mackerel and cobia essential fish habitat occurs in the South Atlantic and Mid-Atlantic Bights.

Areas which meet the criteria for EFH-HAPCs include sandy shoals of Capes Lookout, Cape Fear, and Cape Hatteras from shore to the ends of the respective shoals, but shoreward of the

Gulf stream; The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and Hurl Rocks (South Carolina); The Point off Jupiter Inlet (Florida); *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; nearshore hard bottom south of Cape Canaveral; The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; Pelagic *Sargassum*; and Atlantic coast estuaries with high numbers of Spanish mackerel and cobia based on abundance data from the ELMR Program. Estuaries meeting this criteria for Spanish mackerel include Bogue Sound and New River, North Carolina; Bogue Sound, North Carolina (Adults May-September salinity >30 ppt); and New River, North Carolina (Adults May-October salinity >30 ppt). For Cobia they include Broad River, South Carolina; and Broad River, South Carolina (Adults & juveniles May-July salinity >25ppt).

Golden Crab FMP
Essential fish habitat for golden crab includes the U.S. Continental Shelf from Chesapeake Bay south through the Florida Straits (and into the Gulf of Mexico). In addition, the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse golden crab larvae. The detailed description of seven essential fish habitat types (a flat foraminferan ooze habitat; distinct mounds, primarily of dead coral; ripple habitat; dunes; black pebble habitat; low outcrop; and soft-bioturbated habitat) for golden crab is provided in Wenner et al. (1987). There is insufficient knowledge of the biology of golden crabs to identify spawning and nursery areas and to identify HAPCs at this time. As information becomes available, the Council will evaluate such data and identify HAPCs as appropriate through the framework.

Spiny Lobster FMP
Essential fish habitat for spiny lobster includes nearshore shelf/oceanic waters; shallow subtidal bottom; seagrass habitat; unconsolidated bottom (soft sediments); coral and live/hard bottom habitat; sponges; algal communities (*Laurencia*); and mangrove habitat (prop roots). In addition the Gulf Stream is an essential fish habitat because it provides a mechanism to disperse spiny lobster larvae.

Areas which meet the criteria for EFH-HAPCs for spiny lobster include Florida Bay, Biscayne Bay, Card Sound, and coral/hard bottom habitat from Jupiter Inlet, Florida through the Dry Tortugas, Florida.

Coral, Coral Reefs, and Live/Hard Bottom Habitats FMP
Essential fish habitat for corals (stony corals, octocorals, and black corals) incorporate habitat for over 200 species. EFH for corals include the following:

A. Essential fish habitat for hermatypic stony corals includes rough, hard, exposed, stable substrate from Palm Beach County south through the Florida reef tract in subtidal waters to 30 m depth; subtropical (15°-35° C), oligotrophic waters with high (30-35$^{o}/_{oo}$) salinity and turbidity levels sufficiently low enough to provide algal symbionts adequate sunlight penetration for photosynthesis. Ahermatypic stony corals are not light restricted and their essential fish habitat includes defined hard substrate in subtidal to outer shelf depths throughout the management area.

B. Essential fish habitat for *Antipatharia* (black corals) includes rough, hard, exposed, stable substrate, offshore in high (30-35$^{o}/_{oo}$) salinity waters in depths exceeding 18 meters (54 feet), not restricted by light penetration on the outer shelf throughout the management area.

C. Essential fish habitat for octocorals excepting the order Pennatulacea (sea pens and sea pansies) includes rough, hard, exposed, stable substrate in subtidal to outer shelf depths within a wide range of salinity and light penetration throughout the management area.

D. Essential fish habitat for Pennatulacea (sea pens and sea pansies) includes muddy, silty bottoms in subtidal to outer shelf depths within a wide range of salinity and light penetration.

Areas which meet the criteria for EFH-HAPCs for coral, coral reefs, and live/hard bottom include: The 10-Fathom Ledge, Big Rock, and The Point (North Carolina); Hurl Rocks and The Charleston Bump (South Carolina); Gray's Reef National Marine Sanctuary (Georgia); The *Phragmatopoma* (worm reefs) reefs off the central east coast of Florida; Oculina Banks off the east coast of Florida from Ft. Pierce to Cape Canaveral; nearshore (0-4 meters; 0-12 feet) hard bottom off the east coast of Florida from Cape Canaveral to Broward County); offshore (5-30 meter; 15-90 feet) hard bottom off the east coast of Florida from Palm Beach County to Fowey Rocks; Biscayne Bay, Florida; Biscayne National Park, Florida; and the Florida Keys National Marine Sanctuary. In addition, the Council through CEBA 2 (SAFMC 2011) designated the Deepwater Coral HAPCs as EFH-HAPCs under the Coral FMP as follows:

Deepwater Coral HAPCs designated in Comprehensive Ecosystem-Based Amendment 1 as Snapper Grouper EFH-HAPCs: Cape Lookout Coral HAPC, Cape Fear Coral HAPC, Blake Ridge Diapir Coral HAPC, Stetson-Miami Terrace Coral HAPC, and Pourtalés Terrace Coral HAPC.

Dolphin and Wahoo FMP

EFH for dolphin and wahoo is the Gulf Stream, Charleston Gyre, Florida Current, and pelagic *Sargassum*. This EFH definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (SAFMC 1998b) (dolphin was included within the Coastal Migratory Pelagics FMP at that time).

Areas which meet the criteria for EFH-HAPCs for dolphin and wahoo in the Atlantic include The Point, The Ten-Fathom Ledge, and Big Rock (North Carolina); The Charleston Bump and The Georgetown Hole (South Carolina); The Point off Jupiter Inlet (Florida); The Hump off Islamorada, Florida; The Marathon Hump off Marathon, Florida; The "Wall" off of the Florida Keys; and Pelagic *Sargassum*. This EFH-HAPC definition for dolphin was approved by the Secretary of Commerce on June 3, 1999 as a part of the South Atlantic Council's Comprehensive Habitat Amendment (dolphin was included within the Coastal Migratory Pelagics FMP at that time).

Pelagic *Sargassum* Habitat FMP

The Council through CEBA 2 (SAFMC 2011) designated the top 10 meters of the water column in the South Atlantic EEZ bounded by the Gulfstream, as EFH for pelagic Sargassum.

Actions Implemented That Protect EFH and EFH-HAPCs

Snapper Grouper FMP

- Prohibited the use of the following gears to protect habitat: bottom longlines in the EEZ inside of 50 fathoms or anywhere south of St. Lucie Inlet, Florida; bottom longlines in the wreckfish fishery; fish traps; bottom tending (roller- rig) trawls on live bottom habitat; and entanglement gear.
- Established the *Oculina* Experimental Closed Area where the harvest or possession of all species in the snapper grouper complex is prohibited.

Established deepwater Marine Protected Areas (MPAs) as designated in Snapper Grouper Amendment 14: Snowy Grouper Wreck MPA, Northern South Carolina MPA, Edisto MPA, Charleston Deep Artificial Reef MPA, Georgia MPA, North Florida MPA, St. Lucie Hump MPA, and East Hump MPA.

Shrimp FMP

- Prohibition of rock shrimp trawling in a designated area around the *Oculina* Bank,
- Mandatory use of bycatch reduction devices in the penaeid shrimp fishery,
- Mandatory Vessel Monitoring System (VMS) in the Rock Shrimp Fishery.
- A mechanism that provides for the concurrent closure of the EEZ to penaeid shrimping if environmental conditions in state waters are such that the overwintering spawning stock is severely depleted.

***Pelagic Sargassum* Habitat FMP**

- Prohibited all harvest and possession of *Sargassum* from the South Atlantic EEZ south of the latitude line representing the North Carolina/South Carolina border (34° North Latitude).
- Prohibited all harvest of *Sargassum* from the South Atlantic EEZ within 100 miles of shore between the 34° North Latitude line and the Latitude line representing the North Carolina/Virginia border.
- Harvest of *Sargassum* from the South Atlantic EEZ is limited to the months of November through June.
- Established an annual Total Allowable Catch (TAC) of 5,000 pounds landed wet weight.
- Required that an official observer be present on each *Sargassum* harvesting trip. Require that nets used to harvest *Sargassum* be constructed of four inch stretch mesh or larger fitted to a frame no larger than 4 feet by 6 feet.

Coastal Migratory Pelagics FMP

- Prohibited of the use of drift gillnets in the coastal migratory pelagic fishery.

Golden Crab FMP

- In the northern zone, golden crab traps can only be deployed in waters deeper than 900 feet; in the middle and southern zones traps can only be deployed in waters deeper than 700 feet.

Northern zone - north of the 28°N. latitude to the North Carolina/Virginia border;
Middle zone - 28°N. latitude to 25° N. latitude; and
Southern zone - south of 25°N. latitude to the border between the South Atlantic and Gulf of Mexico Fishery Management Councils.

Coral, Coral Reefs and Live/Hard Bottom FMP

- Established an optimum yield of zero and prohibiting all harvest or possession of these resources which serve as essential fish habitat to many managed species.
- Designated the *Oculina* Bank Habitat Area of Particular Concern.
- Expanded the *Oculina* Bank Habitat Area of Particular Concern (HAPC) to an area bounded to the west by 80°W. longitude, to the north by 28°30' N. latitude, to the south by 27°30' N. latitude, and to the east by the 100 fathom (600 feet) depth contour.
- Established the following two Satellite *Oculina* HAPCs: (1) Satellite *Oculina* HAPC #1 is bounded on the north by 28°30'N. latitude, on the south by 28°29'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude; and (2) Satellite *Oculina* HAPC #2 is bounded on the north by 28°17'N. latitude, on the south by 28°16'N. latitude, on the east by 80°W. longitude, and on the west by 80°3'W. longitude.
- Prohibited the use of all bottom tending fishing gear and fishing vessels from anchoring or using grapples in the *Oculina* Bank HAPC.
- Established a framework procedure to modify or establish Coral HAPCs.
- Established the following five deepwater CHAPCs:

Cape Lookout Lophelia Banks CHAPC;
Cape Fear Lophelia Banks CHAPC;
Stetson Reefs, Savannah and East Florida Lithoherms, and Miami Terrace (Stetson- Miami Terrace) CHAPC;
Pourtales Terrace CHAPC; and
Blake Ridge Diapir Methane Seep CHAPC.

- Within the deepwater CHAPCs, the possession of coral species and the use of all bottom damaging gear are prohibited including bottom longline, trawl (bottom and mid-water), dredge, pot or trap, or the use of an anchor, anchor and chain, or grapple and chain by all fishing vessels.

South Atlantic Council Policies for Protection and Restoration of Essential Fish Habitat

SAFMC Habitat and Environmental Protection Policy

In recognizing that species are dependent on the quantity and quality of their essential habitats, it is the policy of the SAFMC to protect, restore, and develop habitats upon which fisheries species depend; to increase the extent of their distribution and abundance; and to improve their productive capacity for the benefit of present and future generations. For purposes of this policy, "habitat" is defined as the physical, chemical, and biological parameters that are necessary for continued productivity of the species that is being managed. The objectives of the SAFMC policy will be accomplished through the recommendation of no net loss or significant environmental degradation of existing habitat. A long-term objective is to support and promote a net-gain of fisheries habitat through the restoration and rehabilitation of the productive capacity of habitats that have been degraded, and the creation and development of productive habitats where increased fishery production is probable. The SAFMC will pursue these goals at state, Federal, and local levels. The Council shall assume an aggressive role in the protection and enhancement of habitats important to fishery species, and shall actively enter Federal, decision making processes where proposed actions may otherwise compromise the productivity of fishery resources of concern to the Council.

SAFMC EFH Policy Statements

In addition to implementing regulations to protect habitat from fishing related degradation, the Council in cooperation with NOAA Fisheries, actively comments on non-fishing projects or policies that may impact fish habitat. The Council adopted a habitat policy and procedure document that established a four-state Habitat Advisory Panel and adopted a comment and policy development process. Members of the Habitat Advisory Panel serve as the Council's habitat contacts and professionals in the field. With guidance from the Advisory Panel, the Council has developed and approved a number of habitat policy statements which are available on the Habitat and Ecosystem section of the Council website (http://www.safmc.net/ecosystem/Home/EcosystemHome/tabid/435/Default.aspx).

References:

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Appendix I. Fishery Impact Statement

Appendix J. Other Effects (Unavoidable Adverse Effects, Relationship Between Short-Term Uses and Long-Term Productivity, Mitigation, Monitoring, and Enforcement Measures, and Irreversible and Irretrievable Commitments of Resources)

1.1 Unavoidable Adverse Impacts

There are no unavoidable adverse effects on the human environment that may result from the implementation of Amendment 37 to the Snapper Grouper Fishery Management Plan in the South Atlantic Region (Amendment 37).

Actions considered in this amendment should not have adverse effects on public health or safety because these measures should not alter actual fishing practices, just how, when, and where activities can occur. Unique characteristics of the geographic area are highlighted in **Chapters 3 and 6**. These sections conclude little impact on the physical environment should occur from actions proposed in this document.

1.2 Effects of the Fishery on Essential Fish Habitat

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) require the National Marine Fisheries Service (NMFS) and the Councils to describe and identify Essential Fish Habitat (EFH) for each life stage of each managed species. The Magnuson-Stevens Act also directs NMFS and the Councils to identify actions to encourage the conservation and enhancement of EFH and identify measures to minimize to the extent practicable the adverse effects of fishing on EFH.

The biological and administrative impacts of the proposed actions are described in **Section 4.0**, including impacts on habitat. No actions proposed in this document are anticipated to have any adverse impact on EFH or EFH-Habitat Areas of Particular Concern (HAPC) for managed species including species in the snapper grouper complex. No additional impacts of fishing on EFH were identified during the public hearing process. Therefore the South Atlantic Fishery Management Council (Council) has determined no new measures to address impacts on EFH are necessary at this time.

Although the proposed actions are not considered to have an adverse impact on EFH requiring consultation, having particular habitat types designated as EFH for multiple life stages of multiple species provides a relative indicator of the overall value of a particular habitat which serve to strengthen the basis of NMFS EFH Conservation Recommendations. However, because the proposed action will not result in any individual habitat type or geographic area previously identified as EFH to lose that designation, the Councils' intent to protect and conserve EFH and NMFS's authority to implement that conservation mandate through the EFH consultation process is not considered to be eliminated.

The Council's adopted habitat policies, which may directly affect the area of concern, are available for download through the Habitat/Ecosystem section of the South Atlantic Council's website:
http://www.safmc.net/EcosystemManagement/HabitatProtection/HabitatPolicies/tabid/245/Default.aspx.

NOTE: The Final EFH Rule, published on January 17, 2002, (67 FR 2343) replaced the interim Final Rule of December 19, 1997 on which the original EFH and EFH-HAPC designations were made. The Final Rule directs the Councils to periodically update EFH and EFH-HAPC information and designations within fishery management plans. As was done with the original Habitat Plan, a series of technical workshops were conducted by Council habitat staff and a draft plan that includes new information has been completed pursuant to the Final EFH Rule.

1.3 Damage to Ocean and Coastal Habitats

The alternatives and proposed actions are not expected to have any adverse effect on the ocean and coastal habitat.

Management measures implemented in the original Snapper Grouper Fishery Management Plan through Amendment 7 (SAFMC 1994a) combined have significantly reduced the impact of the snapper grouper fishery on essential fish habitat (EFH). The Council has reduced the impact of the fishery and protected EFH by prohibiting the use of poisons and explosives; prohibiting use of fish traps and entanglement nets in the exclusive economic zone; banning use of bottom trawls on live/hard bottom habitat north of Cape Canaveral, Florida; restricting use of bottom longline to depths greater than 50 fathoms north of St. Lucie Inlet; and prohibiting use of black sea bass pots south of Cape Canaveral, Florida. These gear restrictions have significantly reduced the impact of the fishery on coral and live/hard bottom habitat in the South Atlantic Region.

Additional management measures in Amendment 8 (SAFMC 1997a), including specifying allowable bait nets and capping effort, have protected habitat by making existing regulations more enforceable. Establishing a controlled effort program limited overall fishing effort and to the extent there is damage to the habitat from the fishery (e.g. black sea bass pots, anchors from fishing vessels, impacts of weights used on fishing lines and bottom longlines), limited such impacts.

In addition, measures in Amendment 9 (SAFMC 1998b), that include further restricting longlines to retention of only deepwater species and requiring that black sea bass pot have escape panels with degradable fasteners, reduce the catch of undersized fish and bycatch and ensure that the pot, if lost, will not continue to "ghost" fish. Amendment 13C (SAFMC 2006) increased mesh size in the back panel of pots, which has reduced bycatch and retention of undersized fish. Amendment 15B (SAFMC 2008b) implemented sea turtle bycatch release equipment requirements, and sea turtle and smalltooth sawfish handling protocols and/or guidelines in the permitted commercial and for-hire snapper grouper fishery.

Amendment 16 (SAFMC 2009a), implemented an action to reduce bycatch by requiring fishermen to use dehooking devices. Limiting the overall fishing mortality reduces the likelihood of over-harvesting of species with the resulting loss in genetic diversity, ecosystem diversity, and sustainability.

Measures adopted in the Coral and Shrimp FMPs have further restricted access by fishermen that had potential adverse impacts on essential snapper grouper habitat. These measures include the designation of the *Oculina* Bank HAPC and the rock shrimp closed area (see the Shrimp and Coral FMP/Amendment documents for additional information).

The Council's Comprehensive Habitat Amendment (SAFMC 1998d) contains measures that expanded the *Oculina* Bank Habitat of Particular Concern (HAPC) and added two additional satellite HAPCs. Amendment 14 (SAFMC 2007), established marine protected areas where fishing for or retention of snapper grouper species would be prohibited. Furthermore, the Comprehensive Ecosystem Based Amendment 1 (CE-BA 1) (SAFMC 2010c) established deepwater coral habitat of particular concern to protect what is believed to be the largest distribution (>23,000 square miles) of pristine deepwater coral ecosystems in the world. CE-BA 1 also created allowable gear areas for the golden crab fishery and shrimp fishery access areas for the deepwater shrimp fishery. The establishment of these areas allows for the continuation of these fisheries in their historical fishing grounds with little or no negative impacts to protected deepwater coral habitat.

Coral Amendment 8, if implemented, would expand the Stetson-Miami Terrace Deepwater Coral HAPC, the Cape Lookout Deepwater Coral HAPC, the *Oculina* Bank HAPC, while implementing a transit provision through the Oculina Bank HAPC.

Management measures implemented in the Golden Crab FMP (SAFMC 1995) has reduced the impact of the golden crab fishery on EFH. The Golden Crab FMP set up a management program for the golden crab fishery in the South Atlantic EEZ, established a limited entry system, and divided the fishery into three zones.

The Dolphin Wahoo FMP (SAFMC 2003a) has reduced the impact of the dolphin and wahoo fishery on EFH. The Dolphin Wahoo FMP closed the longline fisheries for dolphin and wahoo in areas closed to the use of such gear for highly migratory pelagic species, and specified EFH and EFH habitat areas of particular concern.

1.4 Relationship of Short-Term Uses and Long-Term Productivity

The relationship between short-term uses and long-term productivity will not be affected by Amendment 37. The effects of the actions and alternatives in this amendment on fishermen and associated communities vary with the temporal and spatial characteristics of the allowable catch through annual catch limits (ACLs). While the ACLs for the Florida Keys/East Florida (FLK/EFL) stock of hogfish will be decreased from current catch levels, the rebuilding plan will ensure that the FLK/EFL stock rebuilds in 10 years, subsequent to which, the ACLs could be increased based on the results of a stock assessment. Furthermore, management actions such as commercial trip limits, recreational bag limits, size limits, and accountability measures are also considered in Amendment 37 to extend the fishing season for both stocks of hogfish despite the ACLs being lowered from current levels.

1.5 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments are defined as commitments that cannot be reversed, except perhaps in the extreme long-term, whereas irretrievable commitments are lost for a period of time. There are no irreversible and irretrievable commitments in Amendment 37.

1.6 Unavailable or Incomplete Information

The Council on Environmental Quality, in its implementing regulations for the National Environmental Policy Act (NEPA), addressed incomplete or unavailable information at 40 CFR 1502.22 (a) and (b). There are two tests to be applied: 1) Does the incomplete or unavailable information involve "reasonable foreseeable adverse effects…;" and 2) is the information about these effects "essential to a reasoned choice among alternatives…".

A stock assessment has been conducted for hogfish. Status determinations for hogfish were derived from the Southeast Data Assessment and Review (SEDAR) process, which involves a series of three workshops designed to ensure each stock assessment reflects the best available scientific information. The findings and conclusions of each SEDAR workshop are documented in a series of reports, which are ultimately reviewed and discussed by the South Atlantic Council and their Scientific and Statistical Committee (SSC). SEDAR participants, the Council advisory committees, the Council, and NMFS staff reviewed and considered any concerns about the adequacy of the data. The Council's SSC determined that the hogfish assessment is based on the best available data.

While stock assessment findings can be associated with different degrees of uncertainty, there is no reason to assume such uncertainty leads to unrealistically optimistic conclusions about stock status. Rather, the stock could be in worse shape than indicated by the stock assessment. Uncertainty due to unavailable or incomplete information should not be used as a reason to avoid taking action. Therefore, there are reasonable foreseeable significant adverse effects of not taking action in Amendment 37. Failure to take action would not meet the purpose and need as stated in the environmental impact statement.