Amendment 37

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

Public Hearing Summary

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

January 12, 2016

The South Atlantic Fishery Management Council is **requesting public comment on Amendment 37 until 5:00 p.m. on February 10, 2016.** Comments may be submitted in writing at the Council address on the last page of this summary document. Comments may also be submitted via fax (843-769-4520) or email (Mike.Collins@safmc.net) with the subject line "Am 37".

A **Q & A webinar** will be held on **Thursday January 21, 2016 at 6:00 p.m.** See the back of this document or go to www.safmc.net for information on how to register.

Background

What Actions Are Being Proposed in this Amendment?

Amendment 37 includes 12 actions to address:

- Separating the hogfish fishery management unit into two stocks: Georgia through North Carolina (GA-NC stock) and Florida Keys/East Florida (FLK/EFL stock)
- Specifying of Acceptable Biological Catch, Annual Catch Limits, and Optimum Yield for both stocks
- Rebuilding the FLK/EFL stock
- Developing commercial and recreational management measures for both stocks
- Developing accountability Measures for both stocks

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 and for dolphin and wahoo from East Florida through Maine.

Why are the Council and NMFS Considering Action?

Hogfish in the South Atlantic can be split into two genetically distinct stocks: one off Georgia and the Carolinas (GA-NC) and one Florida Keys/East Florida (FLK/EFL) stock. This recommended split is based on recent research completed by the Florida Fish and Wildlife Conservation Commission (FWC). The stock status for the GA-NC stock is unknown due to insufficient data for a stock assessment to be accepted. The FLK/EFL stock of hogfish is undergoing overfishing and is overfished based on a completed stock assessment in 2014 (SEDAR 37 2014). Since the FLK/EFL stock is overfished a rebuilding plan is needed.

Amendment 37 would specify the boundary between the FLK/EFL hogfish stock, managed by the South Atlantic Council (Council), and the Gulf of Mexico stock, managed by the Gulf Council. This demarcation would aid in enforcing regulations and properly tracking landings 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.

What is Being Considered for Hogfish in Georgia and the Carolinas?

Because of insufficient data, the status of the GA-NC stock of hogfish is unknown. An acceptable biological catch (level of total removals that is biologically safe) has been estimated based on an approach that uses only landings data. The acceptable biological catch for this stock is 35,716 pounds whole weight (lbs ww) and is set slightly greater than the average catch from 2010 to 2014. Below are some of the management changes the Council is considering for the GA-NC stock:

- Define the management unit from the Georgia/Florida state boundary northward to the North Carolina/Virginia state boundary – **Action 1**
- Re-calculate sector allocations based on the redefined geographic boundary to maintain current apportionment - the re-calculated allocations would be 69.1% commercial and 30.9% recreational – **Action 4**
- Commercial annual catch limit (based on recalculated allocation) = 23,456 lbs (the average of commercial landings from 2010 to 2014 is 20,454 lbs) – **Action 4**
- Recreational annual catch limit (based on re-calculated allocation) = 988 fish (the average of recreational landings from 2010 to 2014 is 545 fish) – **Action 4**
- Increase in minimum size limit (for both sectors) to 17 inches fork length (currently the limit is 12 inches fork length) – **Action 8**
- Commercial trip limit of 500 pounds (currently there is no trip limit in federal waters) – **Action 9**
- Decrease the recreational bag limit to 2 fish per person per day from current 5 fish limit – **Action 10**

What is Being Considered for Hogfish in Florida and the Florida Keys?

The stock assessment results showed that the hogfish stock in Florida and the Florida Keys is overfished and undergoing overfishing. When a stock is overfished, the Council must put in place a rebuilding plan to bring the population back up to a sustainable level. The stock assessment produced estimates of the maximum sustainable yield (MSY) and minimum stock size threshold (MSST) for this stock, and the Council is adopting them through this amendment. In addition, the Council must decide how to rebuild the stock (i.e., over what time period and at what level of fishing). Below are some of the management changes the Council is considering for this stock:

- Define the management unit from the Georgia/Florida state boundary to a line just south of Cape Sable, Florida, running due west (25^0 09'.000 North Latitude) – **Action 1**
- A rebuilding plan that sets the acceptable biological catch 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 (this was the recommendation from the Council's Scientific and Statistical Committee) – **Action 5**

- Re-calculate sector allocations based on the redefined geographic boundary to maintain current apportionment - the re-calculated allocations would be 9.6% commercial and 90.4% recreational – **Action 6**
- Commercial annual catch limit (based on recalculated allocation) = 3,512 lbs (the average of commercial landings from 2010 to 2014 is 13,976 lbs) – **Action 6**
- Recreational annual catch limit (based on re-calculated allocation) = 17,804 fish (the average of recreational landings from 2010 to 2014 is 121,329 fish) – **Action 6**
- Increase in minimum size limit (for both sectors) to 15 inches fork length (currently the limit is 12 inches fork length) – **Action 8**
- Commercial trip limit of 25 pounds (currently there is no trip limit in federal waters) – **Action 9**
- Decrease the recreational bag limit to 1 fish per person per day from current 5 fish limit – **Action 10**
- Establish an annual recreational fishing season from July through September – **Action 11**

Proposed Actions and Alternatives

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.

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).

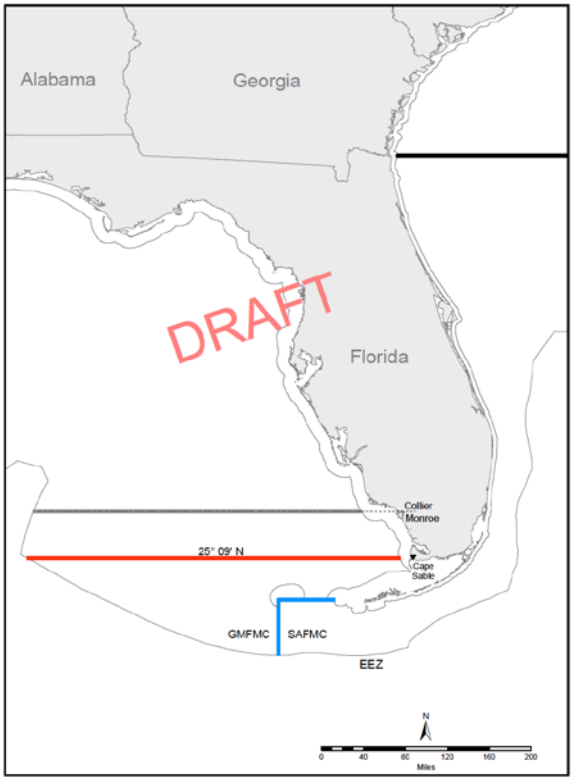


Figure S-1. Preferred Sub-alternative 2c boundary (red): a line due west from a point just south of Cape Sable on Florida's west coast (25^o09'.000 N lat.).

Discussion and Preliminary Analyses

Alternative 1 (No Action) would make no changes to specify separate stocks of hogfish within the snapper grouper fishery management unit (FMU). **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). **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."

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**

Discussion and Preliminary Analyses

Maximum Sustainable Yield (MSY) is the largest long-term average catch that can be taken from a stock under prevailing ecological and environmental conditions. MSY for snapper grouper species was initially specified in Amendment 11 (SAFMC 1998). 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 that stock but not for the GA-NC stock. The Council needs to take action to adopt the new definition and value for MSY. Selecting a definition for MSY would allow for 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 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**.

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.

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**

Discussion and Preliminary Analyses

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. Regulatory Amendment 21 changed the definition for MSST for some snapper grouper species with low natural mortality (M) to MSST = 75% SSB_{MSY}. Other amendments changed MSST to 75% SSB_{MSY} for snowy grouper, golden tilefish, and red grouper because natural mortality rate for those species is also low. When the natural mortality rate is low (i.e., less than 0.25), even small changes in biomass due to natural variations may cause a stock to vary between an overfished or rebuilt condition. 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. MSST has not been specified for the GA-NC and FLK/EFL stocks. For the GA-NC stock, the MSST remains unknown because a stock assessment could not be conducted fort hat stock. Natural mortality for the FLK/EFL stock of hogfish is estimated at 0.179, which is within the range of values for other snapper grouper species addressed in Regulatory Amendment 21 and other amendments. **Alternative 2** would retain the current MSST formula but apply it to each of the two hogfish stocks. **Alternative 3** would specify MSST = 50% of SSB_{MSY}, which would result in a lower threshold than that proposed under **Preferred Alternative 4** (75% SSB_{MSY}).

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 134,824 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%).

Preferred 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 (69.1% commercial and 30.9% recreational). The ABC for the GA-NC stock = 35,716 pounds whole weight (lbs ww).

Sub-alternative 2a. ACL = OY = ABC

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

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

Discussion and Preliminary Analyses

Because the SEDAR 37 stock assessment could not be applied to the GA-NC stock of hogfish, the Acceptable Biological Catch (ABC) for that stock was obtained using an approach for "Only Reliable Catch Stocks". The approach (which is Level 4 of the Council's ABC Control Rule) 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 Scientific and Statistical Committee (SSC) provides the first two criteria for each stock, and the Council specifies their risk tolerance level. **Table S-1** presents the values and scalars used in the calculation of the acceptable biological catch for hogfish in the GA-NC sub-region.

Table S-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**

Table S-2 shows the proposed total annual catch limit (ACL) and sector ACLs for the GA-NC hogfish stock. Sector allocations differ from those currently in place because splitting the stock makes it necessary to re-calculate sector allocations using landings for the relevant geographic area. That is, only landings from Georgia and the Carolinas were used to calculate sector allocations based on the existing allocation formula. The allocation formula from the Comprehensive ACL Amendment (SAFMC 2011) was used to specify commercial and recreational allocations for both hogfish stocks: (0.5 * catch history) + (0.5 * current trend) where catch history = average landings 1986-2008, current trend = average landings 2006-2008.

Commercial and recreational landings data used to re-calculate sector allocations for the GA-NC stock are shown in **Table S-3.**

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 10.60 lbs, the average weight of an individual fish belonging to the GA-NC stock.

Commercial:
Average commercial landings 2010-2014 = 20,454 lbs
Proposed ACL = 23,456 lbs
➔No reduction in commercial harvest needed

Recreational:
Average recreational landings 2010-2014 = 545 fish
Proposed ACL = 988 fish
➔No reduction in recreational harvest needed

Table S-2. 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 (Preferred)	**33,930**	**10,474**	**988**	**23,456**
2c	32,144	9,923	936	22,222

Table S-3. 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

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 = 2017.

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 = 2017.

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 = 2017.

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 = 2017.

Discussion and Preliminary Analyses

Acceptable biological catch values (in pounds whole weight) for the proposed rebuilding alternatives are shown in **Table S-4**.

Since the stock assessment for the FLK/EFL stock falls under Tier 1 of the Council's 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.

Table S-4. Acceptable Biological Catch (ABC) in pounds whole weight (lbs ww) for the FLK/EFL stock of hogfish under proposed rebuilding alternatives. Preferred alternative indicated in bold.

	Alt 2	Preferred Alt 3	Alt 4	Alt 5
Year	**ABC (lbs)**	**ABC (lbs)**	**ABC (lbs)**	**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**	---	---

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 134,824 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%).

Commercial:
Average commercial landings 2010-2014 = 13,976 lbs
Proposed ACL = 3,512 lbs
➔Needed reduction in commercial harvest = 75%

Recreational:
Average recreational landings 2010-2014 = 121,329 fish Proposed ACL = 17,804 fish
➔Needed reduction in recreational harvest = 85%

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 (9.6% commercial and 90.4% recreational).

Sub-alternative 2a. ACL = OY = ABC
Preferred Sub-alternative 2b. ACL = OY = 95% ABC
Sub-alternative 2c. ACL = OY = 90% ABC

Discussion and Preliminary Analyses

As explained above, Splitting the hogfish stock into two makes it necessary to re-calculate sector allocations using the appropriate landings figures for the relevant geographic area. That is, only landings from Florida should be used to derive sector allocations for the FLK/EFL stock based on the existing allocation formula (see discussion under Action 4). Commercial and recreational landings data used to re-calculate sector allocations for the FLK/EFL stock are shown in **Table S-5**.

Table S-6 shows the proposed total ACL and sector ACLs for the FLK/EFL hogfish stock. 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 1.85 lbs, the average weight of an individual fish belonging to the FLK/EFL stock.

Table S-5. 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

Table S-6. Sector ACLs in pounds and numbers (recreational) for ACL sub-alternatives in Action 6 and based on ABC projections from Preferred Alternative 3 in Action 5. Recreational ACL in numbers of fish is based on average weight of 1.85 lbs ww. Preferred indicated in bold.

Sub-alternative 2a: ACL=OY=ABC				
Year	**Total ACL (lbs)**	**Rec ACL (lbs)**	**Rec ACL (numbers)**	**Commercial ACL (lbs)**
2017	38,367	34,670	18,741	3,697
2018	49,449	44,685	24,154	4,764
2019	61,982	56,010	30,276	5,972
2020	75,710	68,415	36,981	7,295
2021	90,469	81,752	44,190	8,717
2022	106,059	95,840	51,806	10,219
2023	122,197	110,423	59,688	11,774
2024	138,566	125,215	67,684	13,351
2025	154,851	139,931	75,638	14,920
2026	170,750	154,298	83,404	16,452
2027	186,018	168,095	90,862	17,923
Preferred Sub-alternative 2b: ACL=OY= 95%ABC				
Year	**Total ACL (lbs)**	**Rec ACL (lbs)**	**Rec ACL (numbers)**	**Commercial ACL (lbs)**
2017	**36,449**	**32,937**	**17,804**	**3,512**
2018	**46,977**	**42,450**	**22,946**	**4,526**
2019	**58,883**	**53,210**	**28,762**	**5,673**
2020	**71,925**	**64,995**	**35,132**	**6,930**
2021	**85,946**	**77,665**	**41,981**	**8,281**
2022	**100,756**	**91,048**	**49,215**	**9,708**
2023	**116,087**	**104,902**	**56,704**	**11,185**
2024	**131,638**	**118,954**	**64,300**	**12,683**
2025	**147,108**	**132,935**	**71,857**	**14,174**
2026	**162,213**	**146,583**	**79,234**	**15,629**
2027	**176,717**	**159,690**	**86,319**	**17,027**
Sub-alternative 2c: ACL=OY=90%ABC				
2017	34,530	31,203	16,867	3,327
2018	44,504	40,216	21,738	4,288
2019	55,784	50,409	27,248	5,375
2020	68,139	61,574	33,283	6,565
2021	81,422	73,577	39,771	7,845
2022	95,453	86,256	46,625	9,197
2023	109,977	99,381	53,719	10,596
2024	124,709	112,694	60,916	12,016
2025	139,366	125,938	68,075	13,428
2026	153,675	138,868	75,064	14,807
2027	167,416	151,286	81,776	16,130

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

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%**

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**

Discussion and Preliminary Analyses

Annual Catch Targets (ACTs) can be used to prevent ACLs from being exceeded. In managing the snapper grouper fishery, however, Council has chosen not to use ACTs to trigger accountability measures because it is anticipated that improvements in reporting will significantly reduce management uncertainty.

Table S-7 shows recreational Annual Catch Targets (ACTs) for the GA-NC stock of hogfish based on the proposed recreational ACL alternatives in **Action 4**.

Table S-7. 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. Preferred indicated in bold.

	ACL=ABC		**ACL=95%ABC (Preferred, Action 4)**		**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 S-8 shows recreational ACTs for the Florida Keys/ East Florida (FLK/EFK) stock. Recreational ACTs are specified in numbers of fish based on **Preferred Sub-alternative 2a** under **Action 6**.

Table S-8. Recreational Annual Catch Targets (in pounds and numbers) under consideration for the Florida Keys/East Florida (FLK/EFL) stock of hogfish for each of the recreational ACL sub-alternatives in Action 6. Preferred indicated in bold.

			ACT=rec ACL(1-PSE)		ACT=85%recACL (Preferred)		ACT=75%recACL	
Year	**Rec ACL (#)**	**Rec ACL (lbs)**	**numbers**	**pounds**	**numbers**	**pounds**	**numbers**	**pounds**
2017	17,804	32,937	14,154	26,185	**15,133**	27,996	13,353	24,703
2018	22,946	42,450	18,242	33,748	**19,504**	36,083	17,210	31,838
2019	28,762	53,210	22,866	42,302	**24,448**	45,228	21,571	39,907
2020	35,132	64,995	27,930	51,671	**29,862**	55,245	26,349	48,746
2021	41,981	77,665	33,375	61,743	**35,684**	66,015	31,486	58,249
2022	49,215	91,048	39,126	72,383	**41,833**	77,391	36,911	68,286
2023	56,704	104,902	45,080	83,397	**48,198**	89,167	42,528	78,677
2024	64,300	118,954	51,118	94,569	**54,655**	101,111	48,225	89,216
2025	71,857	132,935	57,126	105,683	**61,078**	112,994	53,892	99,701
2026	79,234	146,583	62,991	116,534	**67,349**	124,596	59,426	109,938
2027	86,319	159,690	68,624	126,954	**73,371**	135,737	64,739	119,768

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

Preferred Sub-alternative 2b. 17 inches FL

Sub-alternative 2c. 18 inches FL

Sub-alternative 2d. 19 inches FL

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.

Discussion and Preliminary Analyses

Hogfish mature as females first, and eventually become male if they live long enough. For hogfish in the GA-NC stock, the size at which 50% of females transition to males was estimated to be 24 inches fork length (Scott Van Sant, SEFSC, unpublished data). Males have been observed as small as 15 inches fork length. No female hogfish have been observed greater than 30 inches fork length. These data are preliminary and will likely change when analyses are finalized; 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.

Among Florida hogfish, 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). Transition can happen between 8 and 29 inches and 1 to 11 years and is socially mediated (Collins and McBride 2011). Fifty percent of females between 6 and 7.6 inches fork length and between 0.9 and 1.6 years are sexually mature (McBride et al. 2008, Collins and McBride 2011). Males may occur as small as 7.8 inches fork length, but 50% of males in the Florida Keys that are 16.4 inches fork length and 7 years old are sexually mature (McBride et al. 2008). 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 fork length (**Sub-alternatives 3c, 3d** and **3e**) may provide hogfish the opportunity to form harems and transition to males.

Size distributions (in inches fork length) of recreationally harvested hogfish for the GA-NC and FLK/EFL stocks are shown in **Figure S-2**. Hogfish harvested recreationally in the GA-NC sub-region are well above the current minimum size limit of 12 inches fork length whereas the size distribution of hogfish harvested recreationally in Florida peaks at the current minimum size limit and ranges from 10 inches fork length to over 20 inches fork length. The average length of hogfish in the GA-NC sub-region harvested recreationally is 25.8 inches fork length (based on 2012 and 2013 landings) whereas that for hogfish harvested recreationally in Florida and the Florida Keys is 13.8 inches fork length (based on landings from 2012-2015) (**Tables S-9** and **S-10**, respectively).

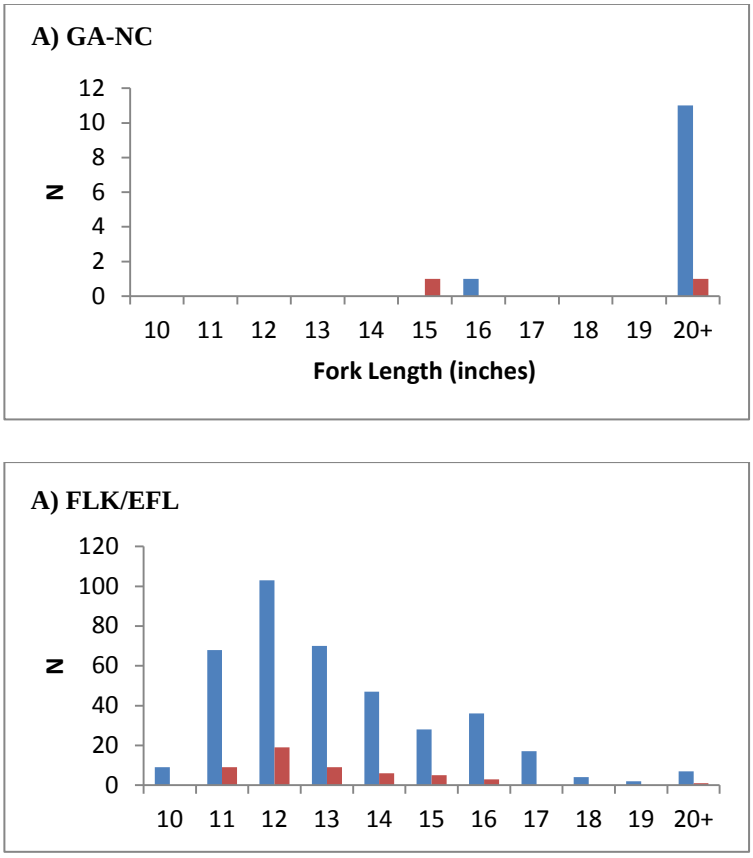


Figure S-2. Fork lengths (inches) of landed hogfish reported by the Headboat Survey (2011-2013; red) and MRIP (2012-2014; blue) for (A) GA-NC and (B) FLK/EFL stocks of hogfish.
Sources: NMFS SERO. MRIP (NMFS OST, accessed May 2015) and Southeast Headboat Survey (HBS bp72_13 file).

Table S-9. Average length (inches) of recreationally caught hogfish in Georgia and the Carolinas, 2012-2013.

Year	Landings	Avg Len
2012	1,219	26.4
2013	294	25.2
Avg		**25.8**

Source: SAFMC

Table S-10. Average length (inches) of recreationally caught hogfish in Florida and the Florida Keys, 2012-2015

Year	Landings	Avg Len
2012	147,522	14.1
2013	68,951	14.1
2014	211,979	13.5
2015	208,072	13.6
Avg		**13.8**

Source: SAFMC

Projected reductions in recreational hogfish harvest under proposed minimum size limits are shown in **Table S-11** for the GA-NC stock and **Table S-12** for the FLK/EFL stock. The projections use average recreational landings from 2012-2015 as the baseline landings. The projected landings at each minimum size were calculated using 2011-2013 headboat data and 2012-2014 MRIP data. For the GA-NC region, minimum size limits of 16 inches fork length and above would result in projected reductions in harvest from 3.2% to 4.6%. However, the projected reductions in harvest are based on limited available data and are, therefore, highly uncertain. In the FLK/EFL region, minimum size limits of 13 inches fork length and above, could result in reductions in harvest across all modes ranging from 32% to 88% (**Table S-12**).

Table S-11. Projected recreational landings (in numbers of fish) and percent reduction in harvest due to proposed size limits for the GA-NC hogfish stock. Preferred alternative indicated in bold.

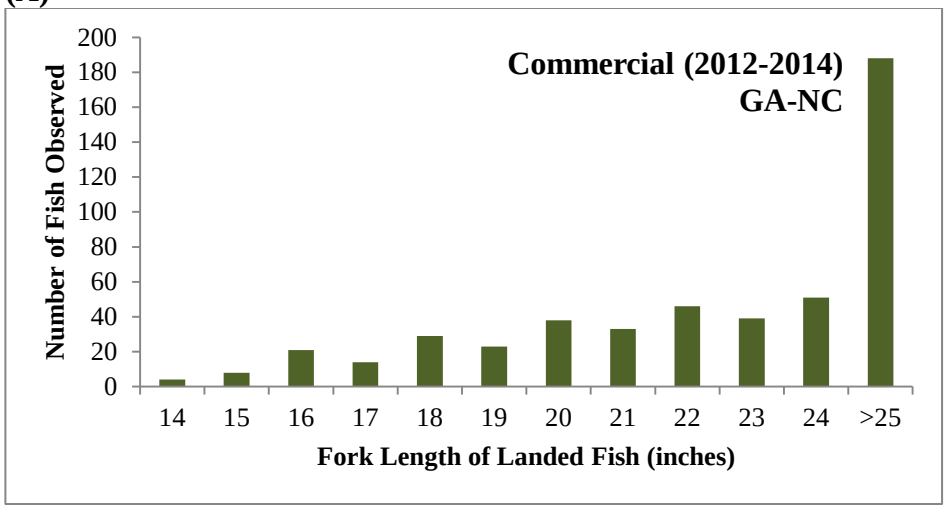
Size Lim (in)	Proj Landings	Reduction	% Reduction
12 (status quo)	431	-	-
16	417	14	3.2%
17 (Pref)	**411**	**20**	**4.6%**
18 -20	411	20	4.6%

Table S-12. Projected recreational landings (in numbers of fish) and percent reduction in harvest due to proposed size limits for the FLK/EFL hogfish stock. Preferred alternative indicated in bold.

Size Lim (in)	Proj Landings	Reduction	% Reduction
12 (status quo)	150,715	-	-
14	76,247	74,468	49.4%
15 (Pref)	**58,388**	**92,327**	**61.3%**
16	47,678	103,036	68.4%
17	32,331	118,384	78.5%
18	21,809	128,906	85.5%
19	18,725	131,990	87.6%
20	17,506	133,209	88.4%

The size distributions (inches fork length) of commercially harvested hogfish for the GA-NC and FLK/EFL stocks are shown in **Figure S-3**. The majority of commercially harvested hogfish in the GA-NC portion of the stock are 25 inches and greater with an average length of 23.6 inches fork length (**Table S-13**). In Florida, the majority of commercially harvested hogfish are at the 12-inch minimum size limit with an average size of 15.1 inches fork length (**Table S-14**). **Tables S-15** and **S-16** present the projected reduction in commercial harvest under the various proposed minimum size limits for the GA-NC and FLK/EFL stocks, respectively.

(A)



(B)

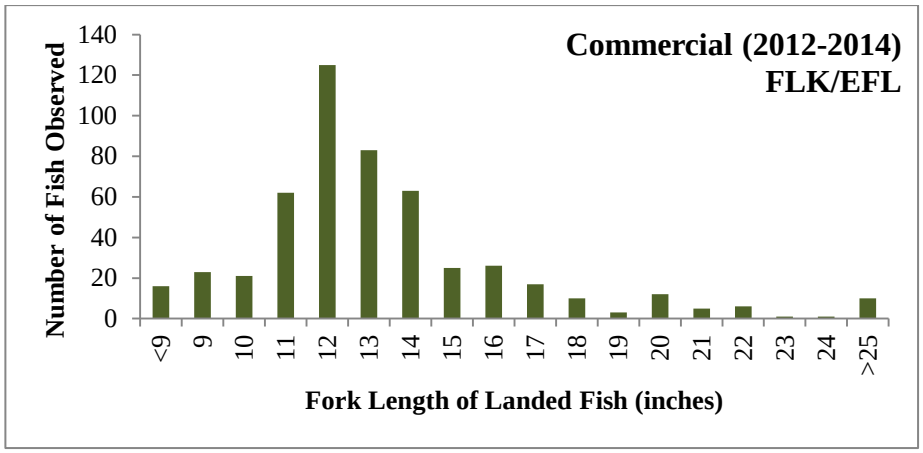


Figure S-3. Size distribution in inches fork length (FL) of hogfish landed commercially in two areas: (A) GA-NC and (B) Florida Keys/East Florida, 2012-2014.
Source: NMFS SERO. Commercial TIP data (L. Beerkircher, SEFSC, pers. comm.)

Table S-13. Average length (inches) of commercially caught hogfish in Georgia and the Carolinas, 2012-2014

Year	Samples	Avg Len
2012	103	24.1
2013	125	23.2
2014	226	23.6
Avg		**23.6**

Source: SAFMC

Table S-14. Average length (inches) of commercially caught hogfish in Florida and the Florida Keys, 2012 -2014.

Year	Samples	Tot Len	Avg Len
2012	80	1,319	16.5
2013	105	1,535	14.6
2014	371	5,253	14.2
Avg			**15.1**

Source: SAFMC

For the GA-NC region, the preferred minimum size limit of 17 inches fork length (**Preferred Sub-alternative 2b**) would result in an average reduction in commercial landings of only 2% (**Table S-15**). In Florida, the preferred minimum size limit of 15 inches FL (**Preferred Sub-alternative 3b**) would constrain harvest by about 50% (**Table S-16**).

Table S-15. Projected commercial landings (lbs ww) and percent reduction due to proposed size limits for the GA-NC hogfish stock. Preferred alternative indicated in bold.

Size Lim (in)	Proj Landings	Reduction	% Reduction
12 (status quo)	20,534	-	-
16	20,406	128	0.6%
17 (Pref)	**20,128**	**406**	**2.0%**
18	19,918	617	3.0%
19	19,398	1,137	5.5%
20	18,921	1,613	7.9%

Source: NMFS Southeast Regional Office

Table S-16. Projected commercial landings (lbs ww) and percent reduction due to proposed size limits for the FLK/EFL hogfish stock. Preferred alternative indicated in bold.

Size Lim (in)	Proj Landings	Reduction	% Reduction
12 (status quo)	28,406	-	-
14	17,233	11,173	39.3%
15 (Pref)	**14,385**	**14,021**	**49.4%**
16	12,466	15,940	56.1%
17	10,423	17,983	63.3%

Source: NMFS Southeast Regional Office

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.

Preferred 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.
Preferred Sub-alternative 2c. 500 lbs per trip.
Sub-alternative 2d. 750 lbs per trip.
Sub-alternative 2e. No trip limit.

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

Preferred 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.
Sub-alternative 3f. No trip limit.

Discussion and Preliminary Analyses

Commercial trip limits can be specified in pounds or in numbers of fish. For the FLK/EFL stock of hogfish, the trip limits under consideration are small enough that fishermen may prefer the specification in numbers of fish. **Table S-17** below shows the equivalent trip limit in numbers of fish for each of the proposed sub-alternatives under **Preferred Alternative 3**:

Table S-17. Proposed commercial trip limits for the FLK/EFL stock of hogfish in pounds and numbers of fish based on an average weight of 3.21 lbs per fish (from the SEDAR 37 stock assessment).

Comm trip limit Alternatives for the FLK/EFL stock	
lbs	**num**
25	8
50	16
75	23
100	31
150	47
200	62

Source: SAFMC

Hogfish are commercially harvested using spear and hook-and-line gear. **Figure S-4** 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 S-5** shows hogfish harvested commercially per trip (lbs ww) in two areas of the South Atlantic, GA-NC and FLK/EFL, during 2012-2014.

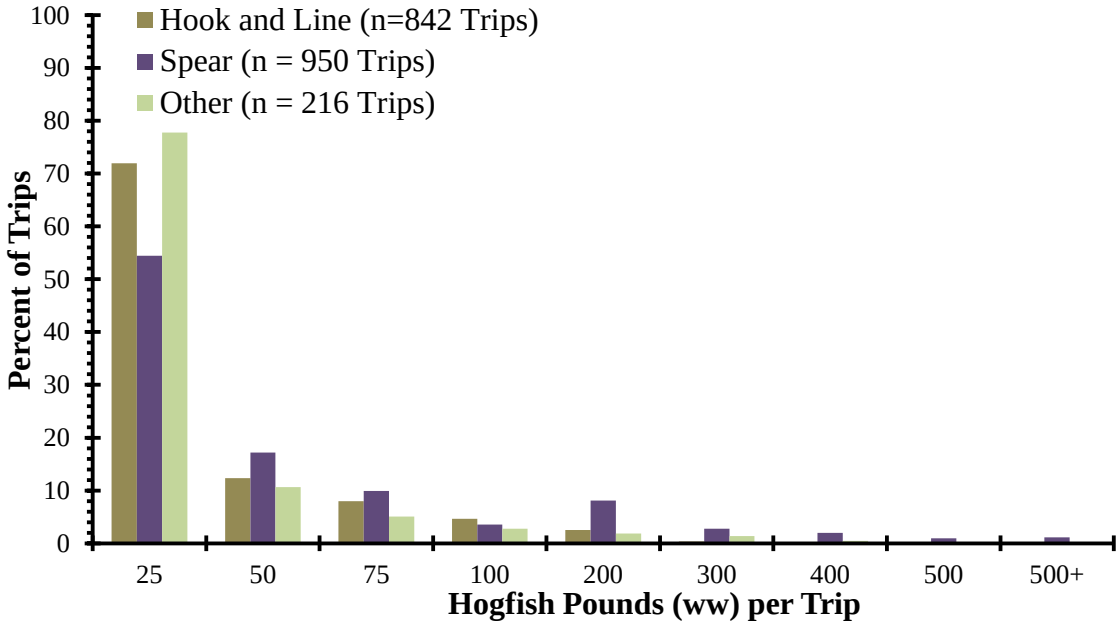


Figure S-4. Distribution of commercially harvested hogfish per trip (lbs ww) by gear, from 2012 through 2014, in the South Atlantic. Note: The "Other" gear type consists of hogfish landings from gill nets, traps, and if the gear type was not provided in the commercial logbook dataset.
Source: Commercial logbook dataset accessed April 2, 2015

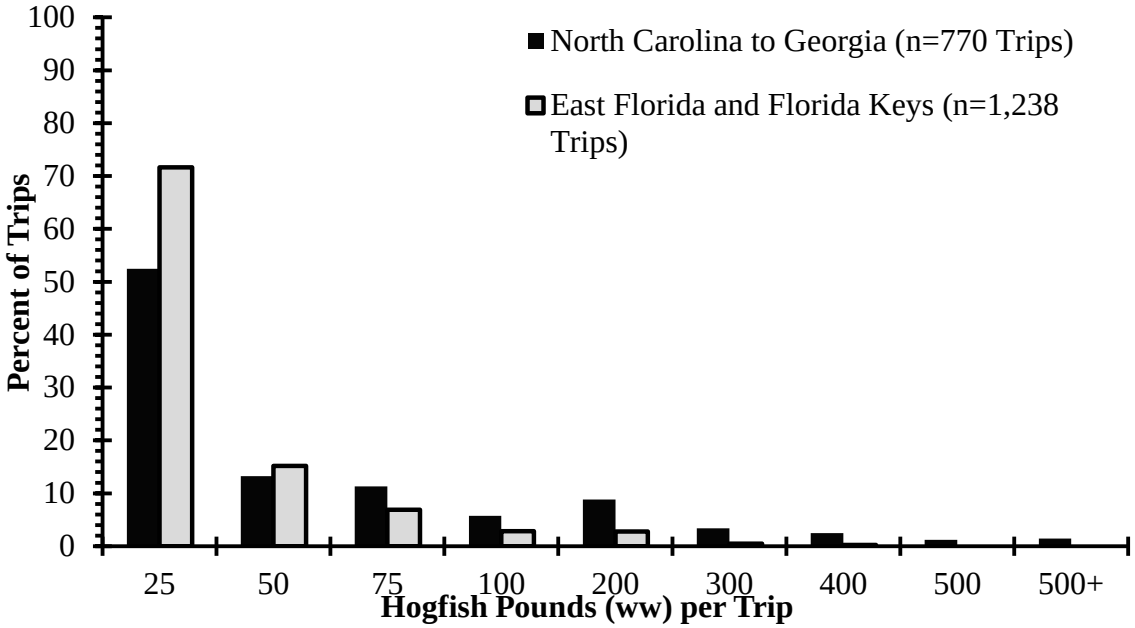


Figure S-5. Distribution of commercially harvested hogfish per trip (lbs ww) by area, from 2012 through 2014, in the South Atlantic.
Source: Commercial logbook dataset accessed April 2, 2015.

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 S-5**). In the GA-NC sub-region, 53% of the commercial trips landed 25 lbs ww or less per trip and only 1% landed 500 lbs ww (**Preferred**

Sub-alternative 2c) or more. In the FLK/EFL area, 72% of the commercial trips landed 25 lbs ww (**Preferred Sub-alternative 3a**) or less per trip.

Percent decrease in landings was calculated for the proposed trip limits for each stock (**Tables S-18** and **S-19**). The preferred commercial trip limit alternative for Georgia and the Carolinas (500 lbs) is expected to result in about a 6% reduction in commercial harvest (**Table S-18**). The projected landings for this stock under no commercial trip limit are below even the most conservative of the commercial ACL alternatives proposed in **Action 4**. Hence, it is not anticipate that a commercial closure would occur. For the FLK/EFL stock, the projected percent reduction under the preferred trip limit alternative (25 lbs) would be 43% (**Table S-19**).

Table S-18. Projected commercial landings (lbs) and percent reduction due to proposed trip limits for the GA-NC hogfish stock. Preferred alternative indicated in bold.

Trip Lim	Proj Landings	Reduction	% Reduction
None (status quo)	20,534	-	-
100	11,745	8,789	42.8%
250	16,554	3,981	19.4%
500 (Pref)	**19,339**	**1,195**	**5.8%**
750	19,951	584	2.8%

Source: NMFS Southeast Regional Office

Table S-19. Projected commercial landings (lbs) and percent reduction due to proposed trip limits for the FLK/EFL hogfish stock. Preferred alternative indicated in bold.

Trip Lim	Proj Landings	Reduction	% Reduction
None (status quo)	28,406	-	-
25 (Pref)	**16,065**	**12,340**	**43.4%**
50	21,763	6,643	23.4%
100	25,773	2,633	9.3%
150	26,950	1,456	5.1%
200	27,370	1,036	3.6%

Source: NMFS Southeast Regional Office

Table S-20 shows the estimated commercial fishing season length (days open) for the FLK/EFL stock of hogfish for the preferred ACL alternative in **Action 6** in combination with the proposed size limits alternatives in **Action 8** and trip limits alternatives in **Action 9**. For the preferred commercial ACL of 3,512 lbs ww (**Preferred Sub-alternative 2b** in **Action 6**) and size limit of 15 inches FL (**Preferred Sub-alternative 3b** in **Action 8**), **Preferred Sub-alternative 3b** in **Action 9** with a trip limit of 25 lbs ww would result in 159 open days for commercial fishing (**Table S-20**).

Table S-20. Estimated commercial season length (days open) for the FLK/EFL stock of hogfish under ACL **Preferred Alt 2b (3,512 lbs ww)** in Action 6 and proposed minimum size limit alternatives (Action 8) and trip limit (Action 9) alternatives in first year of implementation (2017). Preferred alternatives indicated in bold.

	Action 9 Trip Limit (lbs ww)					
Action 8 Size Limit (inches FL)	**25 (Pref Alt 3a)**	**50 (Alt 3b)**	**100 (Alt 3c)**	**150 (Alt 3d)**	**200 (Alt 3e)**	**No trip limit (Alt 3f)**
12 (Alt 1 – No Action)	92	71	62	59	59	58
14 (Alt 3a)	147	127	121	119	118	118
15 (Pref Alt 3b)	**159**	136	129	127	127	127
16 (Alt 3c)	181	141	133	131	131	131
17 (Alt 3d)	187	144	136	134	133	133
14/16 (Alt 3e*)	147	127	121	119	118	118

* Alt 3e in Action 8 is a step-wise increase, with an increase to 14 inches in year 1 and an increase to 16 inches in year 3. Model uncertainty is such that year 3 predictions would be highly uncertain. As such, estimates are for year 1 only and match those associated with Alt 3a in Action 8.
Source: NMFS Southeast Regional Office

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.

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

Preferred 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.

Preferred 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.
Preferred Sub-alternative 3c. 1 fish per person per day.
Sub-alternative 3d. 1 fish per vessel per day.

Discussion and Preliminary Analyses

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 S-21**).

Table S-21. 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.

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. For the private and charter modes, 78% of the trips harvested 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 S-6**).

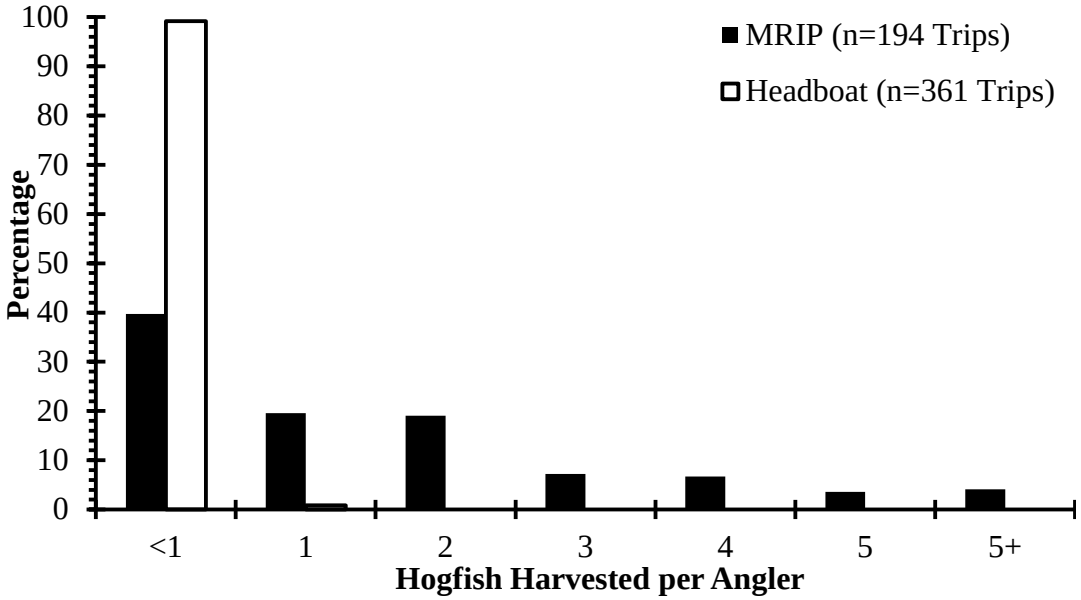


Figure S-6. Distribution of hogfish harvested per person from two recreational datasets (MRIP and Headboat) during 2012-2014, in the South Atlantic.
Source: NMFS Southeast Regional Office

Figure S-7 shows the distribution of hogfish harvested per vessel during 2012-2014. Among headboats trips, the majority (87%) harvested 1 hogfish per vessel. For 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 S-7**).

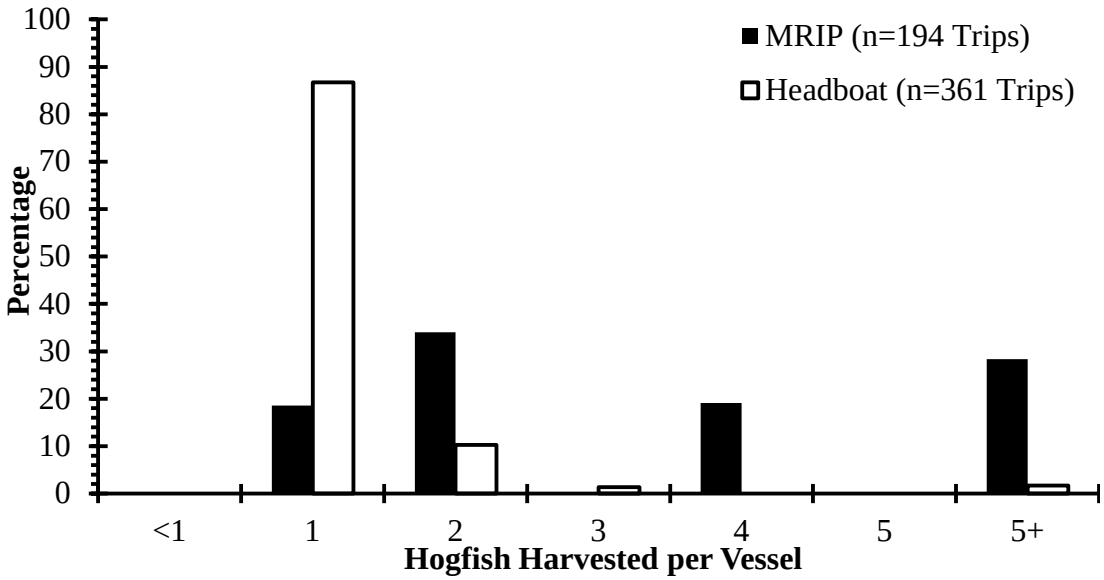


Figure S-7. Distribution of hogfish harvested per vessel from two recreational datasets (MRIP and Headboat) during 2012-2014, in the South Atlantic.
Source: NMFS Southeast Regional Office

The calculated percent decrease in landings for the bag limits under consideration are shown in **Tables S-22 and S-23** for each stock, respectively. There is no projected reduction in harvest for all modes under **Preferred Sub-alternative 2a** (2 fish per person) for the GA-NC stock. For the FLK/EFL stock, the expected reduction in recreational harvest due to the **Preferred Sub-alternative 3c** (1 fish per

person) would be 44%. For 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 S-22. Projected recreational landings (numbers of fish) and percent reduction due to proposed bag limits for the GA-NC hogfish stock. Preferred alternative indicated in bold.

Bag Lim	Proj Landings	Reduction	% Reduction
5pp (status quo)	431	-	-
2/person (Pref)	**431**	**0**	**0.0%**
1/person	429	1	0.3%
1/vessel	134	297	69.0%

Source: NMFS Southeast Regional Office

Table S-23. Projected recreational landings (numbers of fish) and percent reduction due to proposed bag limits for the FLK/EFL hogfish stock. Preferred alternative indicated in bold.

Bag Lim	Proj Landings	Reduction	% Reduction
5pp (status quo)	150,715	-	-
3/person	133,219	17,495	11.6%
2/person	115,690	35,025	23.2%
1/person (Pref)	**84,386**	**66,329**	**44.0%**
1/vessel	1,769	148,945	98.8%

Source: NMFS Southeast Regional Office

Action 11. Establish a recreational fishing season for the Florida Keys/East Florida (FLK/EFL) stock 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.

Preferred Alternative 2. Establish a recreational fishing season for the Florida Keys/East Florida (FLK/EFL) stock of hogfish in the South Atlantic region.

Sub-alternative 2a. May-June

Sub-alternative 2b. July-August

Preferred Sub-alternative 2c. July-September

Discussion and Preliminary Analyses

Peak spawning activity for hogfish in Florida and the Caribbean occurs 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).

Average recreational landings of hogfish throughout the South Atlantic during 2012-2014 peaked in July and August and decreased markedly thereafter (**Figure S-8**).

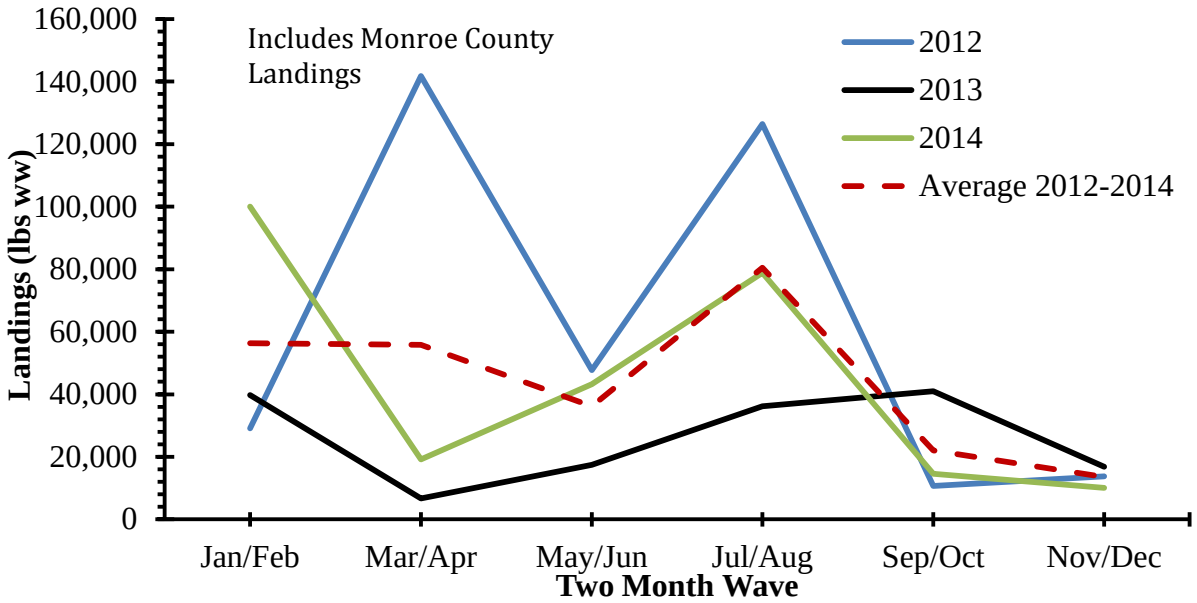


Figure S-8. Recreational landings (lbs ww) by two-month waves during 2012-2014 for the South Atlantic Region, including Monroe County, Florida.
Source: NMFS Southeast Regional Office

Of the proposed recreational season alternatives, **Sub-alternative 2b** (July-August) and **Preferred Sub-alternative 2c** (July-September) would capture the period of time during which average recreational landings have been highest. **Sub-alternative 2a** (May-June), on the other hand, would coincide with a decrease in average recreational landings. None of the proposed recreational season sub-alternatives would interfere with hogfish spawning activity off east Florida and the Florida Keys.

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.

Alternative 5. If recreational landings exceed the recreational annual catch limit (ACL) for two consecutive fishing years, then during the following (*i.e.*, third) 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 after two consecutive years of exceeding the recreational ACL in the following fishing year by the amount of the average annual 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.

Sub-alternative 5a. For the GA-NC stock of hogfish.
Sub-alternative 5b. For the Florida Keys/East Florida (FLK/EFL) stock of hogfish.

Discussion and Preliminary Analyses

The proposed action would contribute to creating a consistent regulatory environment in the South Atlantic. Amendment 34 to the Snapper Grouper FMP, currently pending approval, would make accountability measures for hogfish consistent with those for other snapper grouper species. However, since Amendment 37 proposes two hogfish stocks, accountability measures need to be specified for each stock. Current accountability measures for hogfish throughout the South Atlantic region are below.

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.

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 beneficial 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**, and **Alternative 5** 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 result in

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. 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. Under **Alternative 5**, if the recreational ACL is exceeded for two consecutive fishing years, recreational landings during the third year would be monitored for persistence in increased landings. If necessary, the recreational season *and* the recreational ACL would be reduced the third year, but only if the respective hogfish stock is overfished and the total ACL (commercial + recreational) is exceeded. **Alternative 5** is the least conservative alternative considered under this action, it would allow the recreational ACL to be exceeded for two years, possibly three, due to the delay in the availability of recreational data, and would result in the least biological benefits to the hogfish stock.

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.

Combined Economic Effects

Snapper Grouper Amendment 37 proposes multiple management measures for hogfish. Currently, hogfish are managed as a single stock. With implementation of Amendment 37, however, there would be two hogfish stocks. Therefore, comparing status quo management with proposed management is difficult. This analysis compares management measures as if the two stocks existed prior to this amendment. Also, because each stock required setting a separate ACL, this analysis uses the preferred ACL for the GA-NC stock (**Action 4, Preferred Alternative 2b**) and for the FLKEFL stock (**Action 6, Preferred Alternative 2b**). Because of these necessary assumptions, the comparison between current management and proposed management is not an exact comparison.

Tables S-24 and **S-25** compare as best as possible the status quo to the preferred alternatives of all the actions in Amendment 37 combined to give the overall economic effect. The full draft Amendment 37 document has the detailed analyses for each individual action taken independently.

Table S-24. Economic effects (in 2014$) of Amendment 37 preferred alternatives for the GA-NC stock.

	Sector	Open	Close	# (rec)/lbs (com) Landed	Consumer Surplus/ Ex-vessel Revenue
Current Management	Recreational	January 1	December 31	511	$5,331
	Commercial	January 1	December 31	23456	$84,761
Proposed Management	Recreational	January 1	December 31	511	$5,059
	Commercial	January 1	December 31	23456	$78,860

Source: SAFMC

Table S-25. Economic effects (in 2014$) of Amendment 37 preferred alternatives for the FLK/EFL stock.

	Sector	Open	Close	# (rec)/lbs (com) Landed	Consumer Surplus/ Ex-vessel Revenue
Current Management	Recreational	January 1	February 11	23,420	$14,081,537
	Commercial	January 1	December 31	3,512	$13,134
Proposed Management	Recreational	July 1	September 29	16,292	$13,990,903
	Commercial	January 1	December 31	3,512	$13,134

Source: SAFMC

Refer to the Amendment 37 public hearing draft document (available on the Council's website at www.safmc.net) for a description of expected social effects of the proposed actions.

What's Next?

The South Atlantic Fishery Management Council will hold a Question and Answer webinar to inform the public on proposed changes and answer questions. **The webinar will be held from 6:00 p.m. until 7:00 p.m. on Thursday, January 21, 2016**. Go to www.safmc.net for information on how to register.

Public hearings will be held from 4-7 pm (except Morehead City hearing) on the following dates and locations. This information is also available on the Council's website.

January 25, 2016 Richmond Hill City Center 520 Cedar Street Richmond Hill, GA 31324 Phone: 912-445-0043	**January 26, 2016** Hilton Garden Inn 5265 International Blvd. N. Charleston, SC 29418 Phone: 843-308-9330
January 27, 2016 Murrells Inlet Community Center 4450 Murrells Inlet Road Murrells Inlet, SC 29576 Phone: 843-651-4152	**January 28, 2016** ***(starts at 5 pm)*** N.C. Division of Marine Fisheries Central District Office 5285 Highway 70 West Morehead City, NC 28557 Phone: 252-726-7021
February 1, 2016 Hilton Garden Inn Fort Lauderdale Airport-Cruise Port 180 SW 18th Avenue Dania Beach/Ft. Lauderdale, FL 33004 Phone: 954-924-9204	**February 2, 2016** Hawks Cay 61 Hawks Cay Boulevard Duck Key, FL 33050 Phone: 305-289-5100
February 3, 2016 Marriott Key West Beachside 3841 N Roosevelt Boulevard Key West, FL 33040 Phone: 305-296-8100	**February 3, 2016** International Palms Resort 1300 N Atlantic Avenue Cocoa Beach, FL 32931 Phone: 321-783-2271

Written comments on Amendment 37 will be accepted until 5:00 p.m. on February 10, 2016. Comments may be submitted in writing at the Council address below. Comments may also be submitted via fax (843-769-4520) or email (Mike.Collins@safmc.net) with the subject line "Am 37".

Send Written Comments to:

Gregg Waugh
Executive Director
South Atlantic Fishery Management Council
4055 Faber Place Drive; Suite 201
North Charleston, SC 29405

For questions about the amendment contact Myra Brouwer at (843) 571-4366 or 1-866-safmc-10. You may also send emails to Myra.Brouwer@safmc.net. To download the draft amendment, please visit the Council's website at www.safmc.net.