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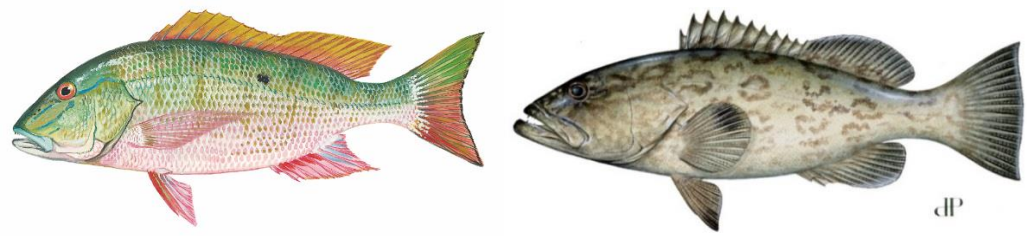
Modifications to Mutton Snapper and Gag Management Measures



Framework Action to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico

April 2017

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Name of Action

Framework Action to the Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico to Modify Mutton Snapper and Gag Management Measures.

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Type of Action

( ) Administrative
(X) Draft

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( ) Final

Summary/Abstract

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	Acceptable biological catch
ACL	Annual catch limit
ACT	Annual catch target
AMs	Accountability measures
B	Biomass
CPUE	Catch per unit effort
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EIS	Environmental impact statement
F	Instantaneous rate of fishing mortality
FL	Fork length
FLS	Federal logbook system
$F_{30\% SPR}$	Fishing mortality corresponding to 30% spawning potential ratio
FMP	Fishery Management Plan
FWC	Florida Fish and Wildlife Commission
FWRI	Florida Wildlife Research Institute
GMFMC	Gulf of Mexico Fishery Management Council
IRFA	Initial regulatory flexibility analysis
M	Mortality
MFMT	Maximum fishing mortality threshold
mp	Million pounds
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	Overfishing level
OY	Optimum yield
RFA	Regulatory Flexibility Act of 1980
RIR	Regulatory impact review
SEDAR	Southeast Data, Assessment and Review
SEFSC	Southeast Fisheries Science Center
SMZ	Special Management Zone
SSC	Scientific and Statistical Committee
SPR	Spawning potential ratio
TAC	Total allowable catch
ww	Whole weight
YPR	Yield per recruit

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CHAPTER 1. INTRODUCTION

1.1 Background

Mutton Snapper Annual Catch Limit, Recreational Bag Limit, and Minimum Size Limits

All mutton snapper in U.S. waters come from a single stock (Faunce et al. 2007). A stock assessment for mutton snapper was completed (SEDAR 15A Update 2015) by the Florida Fish and Wildlife Research Institute (FWRI) and reviewed by the South Atlantic and Gulf of Mexico (Gulf) Fishery Management Councils' (Council[s]) Scientific and Statistical Committees (SSCs). Based on this assessment, both SSCs agreed that the stock was not overfished and overfishing was not occurring (Table 1.1.1). However, the results of the stock assessment indicated that the adult population of mutton snapper is smaller than previously estimated (SEDAR 15A 2008), and a reduction in harvest is necessary to ensure that overfishing does not occur. While the 2015 assessment does not indicate that management changes beyond a quota reduction are needed at this time, the Gulf Council will also be considering changes to recreational and commercial mutton snapper regulations.

Table 1.1.1. Status determination criteria and stock status of mutton snapper based on SEDAR 15A (2015) accepted by the SSC. Results indicate that the mutton snapper stock is not overfished (i.e., $SSB/SSB_{F30\%} > 1$) and is not experiencing overfishing (i.e., $F/F_{30\%SPR} < 1$).

Stock Status	**Definition**	**Value**
Overfished (yes if < 1)	$SSB_{Current}/SSB_{OFL}$	1.13
Overfishing (yes if > 1)	$F_{Current}/F_{30\%SPR}$	0.65
Mortality	**Definition**	**Value**
Natural mortality	M	0.11
MFMT	$F_{30\%SPR}$	0.18
$F_{CURRENT}$	Geometric mean (2011-2013)	0.12
Biomass	**Definition**	**Value (lbs)**
$SSB_{Current}$	SSB_{2013}	5,253,600
SSB_{OFL}	$SSB_{30\%SPR}$ (females)	4,649,200
MSST	$(1-M)*SSB_{OFL}$	4,137,700
MSY proxy	Yield at $F_{30\%SPR}$ (pounds)	912,500

Source: Table 4.8.1 in SEDAR 15A Update 2015. SSBCurrent = current level of spawning stock biomass; SSBOFL = spawning stock biomass equivalent at the overfishing limit; FCurrent = current level of fishing mortality; F30%SPR = fishing mortality level at 30% spawning potential ratio; MFMT = maximum fishing mortality threshold; MSST = minimum stock size threshold.

Although mutton snapper is a single stock in the southeast region, the Gulf and South Atlantic Councils manage mutton snapper independently within their respective jurisdictions (Figure

1.1.1), and the Florida Fish and Wildlife Conservation Commission (FWC) establishes their own size and bag limits in state waters. For the recreational sector, regulations are currently the same in federal waters (Table 1.1.2). As of January 1, 2017, Florida increased the minimum size limit for mutton snapper to 18 inches TL, with a bag limit of 5 mutton snapper within the recreational 10-snapper aggregate bag limit. For the commercial sector, trip limits are restricted to 10 fish per person per day, or per trip, in May and June (whichever is more restrictive) in South Atlantic federal waters. In Florida Atlantic state waters, the commercial bag limit is 5 fish per person per day from April through June, and a 500 lb vessel trip limit from July through March. There is no commercial trip limit in Gulf federal or Florida Gulf waters (Table 1.1.3). The South Atlantic has also selected 18 inches TL, and a year-round recreational bag limit of 5 fish per person per day, as their preferred alternatives in Snapper Grouper Amendment 41, which is anticipated to be implemented in 2017.

The mutton snapper acceptable biological catch (ABC) is apportioned between regions based on a jurisdictional apportionment that was established in the Generic Annual Catch Limit (ACL)/Accountability Measures (AM) Amendment (GMFMC 2011). This amendment established a stock overfishing limit (OFL) at 1.48 million pounds (mp) of landings whole weight (ww)[1], and a stock ABC equal to 1.13 mp (landings). The ABC for the South Atlantic is 82% of the stock ABC, and the Gulf ABC is 18% of stock ABC. This was established using 50% of the mean of the catch history from 1990-2008 plus 50% of the mean of the catch history from 2006-2008 (GMFMC 2011).

Table 1.1.2. Recreational fishing regulations for mutton snapper in Florida state waters and federal waters of the Gulf and South Atlantic. Minimum size limits are in total length (TL); bag limits are per person per day.

Species	Recreational Regulations	Florida State Waters	Federal Waters Gulf of Mexico	Federal Waters South Atlantic
Mutton Snapper	Size Limit	18 inches TL	16 inches TL	
	Bag Limit	5 mutton snapper within 10 snapper aggregate bag limit	10 mutton snapper within 10 snapper aggregate bag limit	

Table 1.1.3. Commercial fishing regulations for mutton snapper in Florida state waters and federal waters of the Gulf and South Atlantic. Minimum size limits are in total length (TL). Florida increased the minimum size limit to 18 inches TL effective January 1, 2017.

Species	Commercial Regulations	Florida State Waters	Federal Waters Gulf of Mexico	Federal Waters South Atlantic
Mutton Snapper	Size Limit	18 inches TL	16 inches TL	
	Trip Limit	*Atlantic*: 500 lbs (July - March); 5 fish/person (April - June) *Gulf*: No trip limit	No Trip Limit	10/person/day or 10/person/trip, whichever is more restrictive (May -

[1] These values do not include estimated discards, whereas the South Atlantic Council reports the OFL = 1.52 mp and ABC = 0.93 mp as the sum of landings and discards (SAFMC 2011).

				June)

Mutton snapper are typically solitary animals; however, from April to August, they form large spawning aggregations timed with the full moon. Spawning peaks from April through early July (SEDAR 15A Update 2015). These aggregations are highly predictable and make mutton snapper highly vulnerable to fishing pressure while spawning. The Gulf Council is considering changes to spawning season closures, bag limits, and size limits. The Gulf Council may want to consider developing compatible regulations with both the South Atlantic Council and Florida to simplify management and increase compliance for anglers harvesting this species in south Florida.

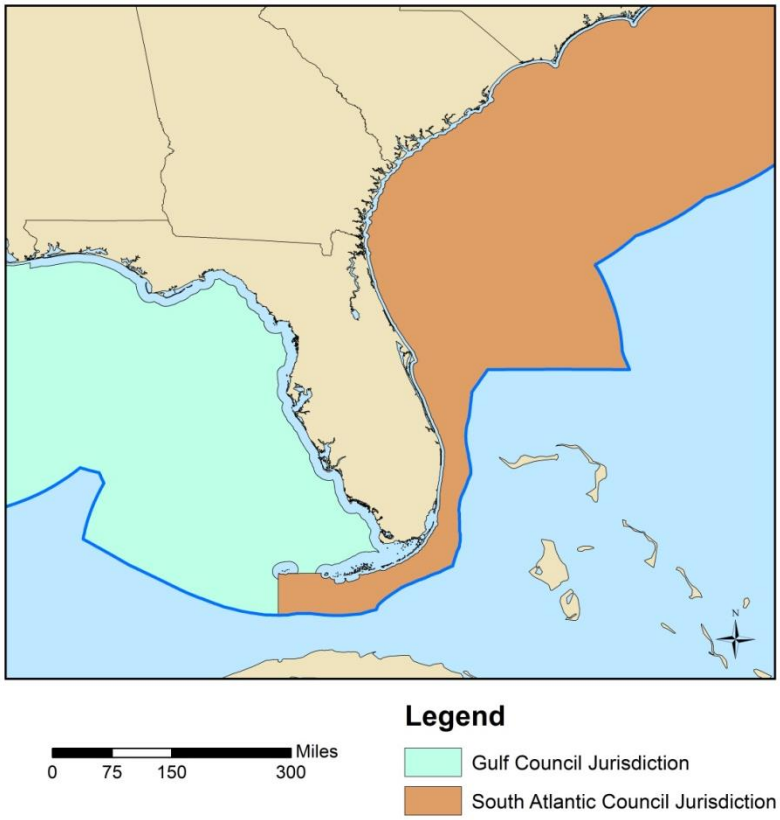

Figure 1.1.1. Jurisdictional boundaries of the Gulf (green) and South Atlantic (brown) Councils.

Landings data

The vast majority of mutton snapper landings occur in waters adjacent to Florida. Within the South Atlantic Council's jurisdiction, mutton snapper landings are predominantly from the recreational sector while harvest in the Gulf Council's jurisdiction is primarily from the commercial sector (Table 1.1.4, Figures 1.1.2 – 1.1.5).

Table 1.1.4. Commercial and recreational landings of mutton snapper by sector and region from 2010 through 2015. Recreational data includes all modes. Gulf recreational landings reported to the Marine Recreational Information Program (MRIP) exclude Monroe County.

Year	South Atlantic			Gulf of Mexico			Stock Total
	Rec	Com	SA Total	Rec	Com	Gulf Total	
2010	477,647	74,737	552,384	1,541	54,242	55,783	608,167
2011	251,446	66,158	317,604	1,391	94,238	95,629	413,233
2012	505,583	77,122	582,705	7,156	88,695	95,851	678,556
2013	660,449	74,229	734,678	5,833	107,814	113,647	848,325
2014	538,122	91,173	629,295	6,669	130,368	137,037	766,332
2015	692,613	92,569	785,182	3,468	131,860	135,328	920,510
Mean	**520,977**	**79,331**	**600,308**	**4,341**	**97,702**	**102,043**	**702,351**

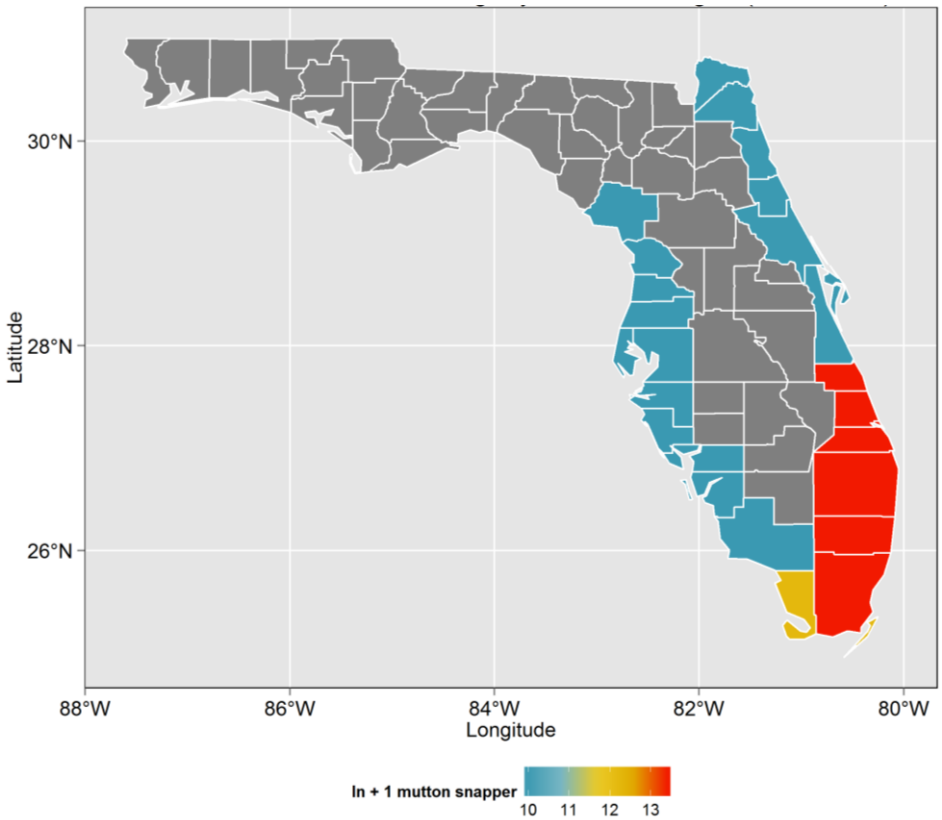

Figure 1.1.2. Mean annual recreational landings of mutton snapper by recreational data collection region. Landings are from 2008-2013, and represent the distribution of landings and effort used in the stock assessment. Data are represented on a log scale, with regions in blue having lower landings than regions in red. Regions in gray have no reported landings of mutton snapper.
Source: Florida FWC.

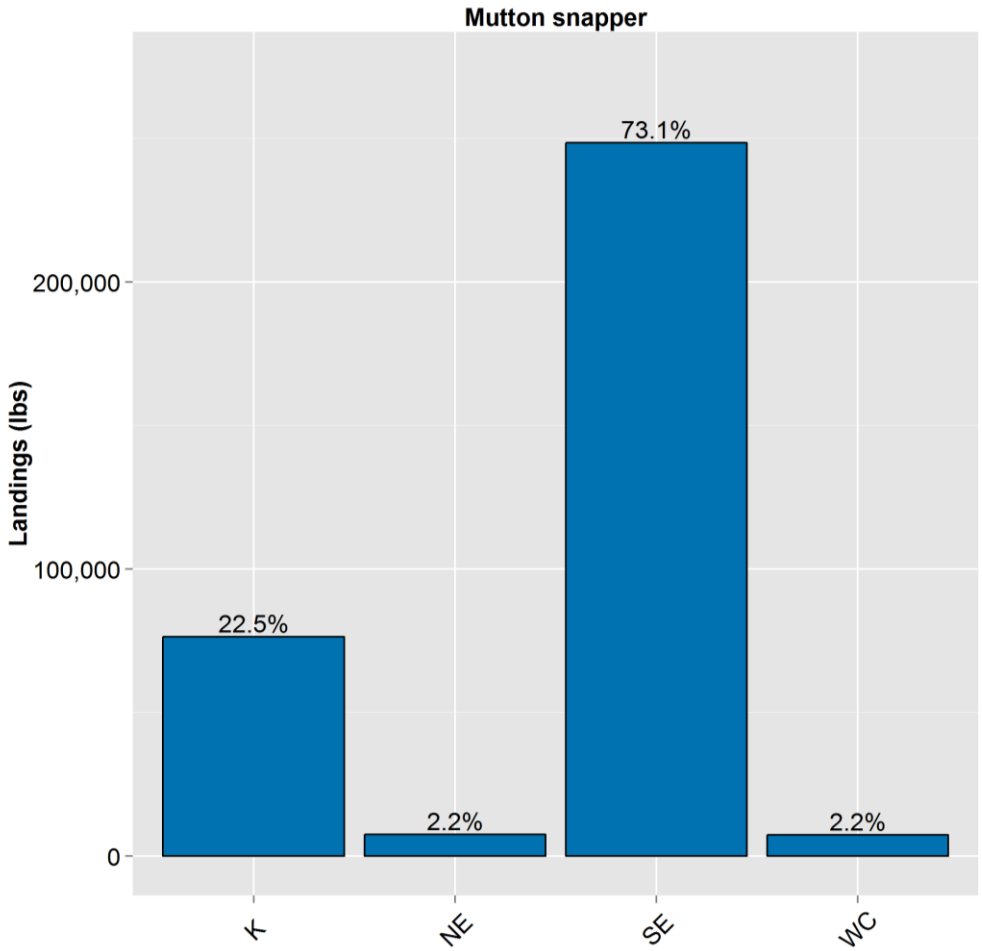

Figure 1.1.3. Recreational landings of mutton snapper in pounds by recreational data collection region. "K" represents the Florida Keys (Monroe County); "NE" represents Nassau to Brevard County; "SE" represents Indian River to Dade County; and "WC" represents Collier to Levy County.
Source: Florida FWC.

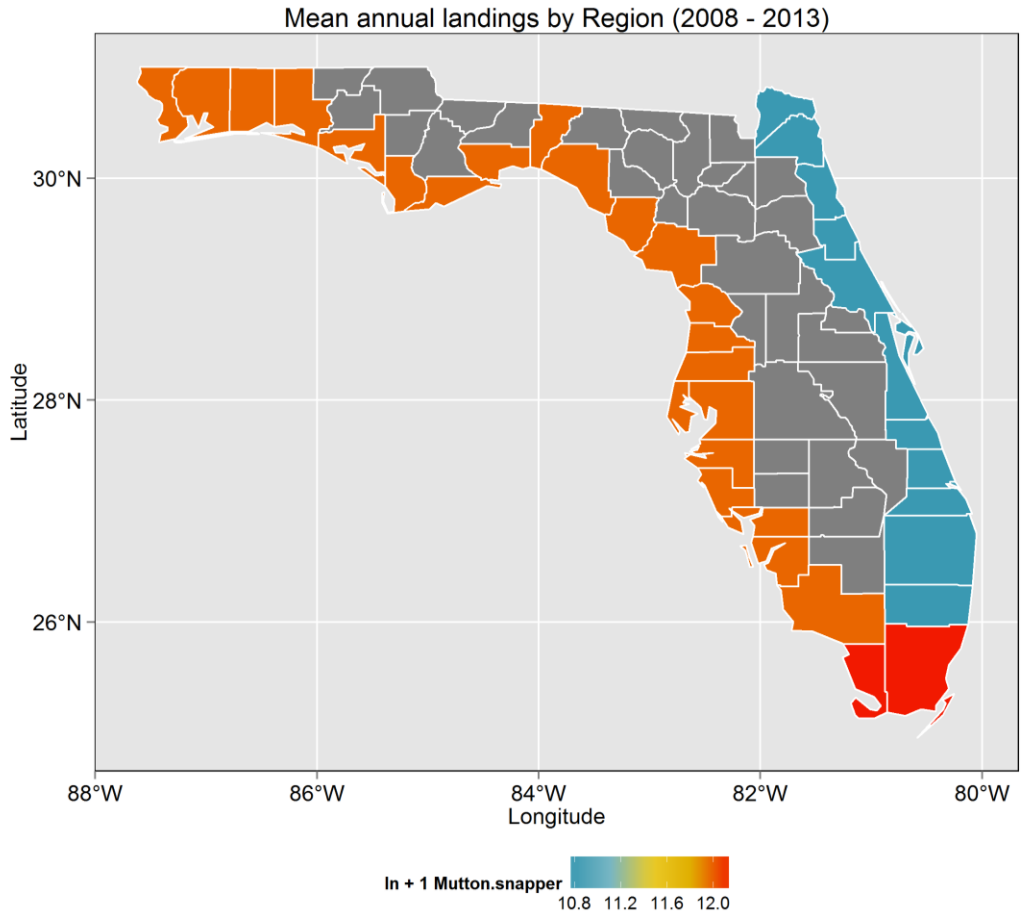

Figure 1.1.4. Mean annual commercial landings of mutton snapper aggregated across counties for confidentiality purposes. Data are represented on a log scale, with regions in blue having lower landings than regions in red. Regions in gray have no reported landings of mutton snapper.
Source: Florida FWC.

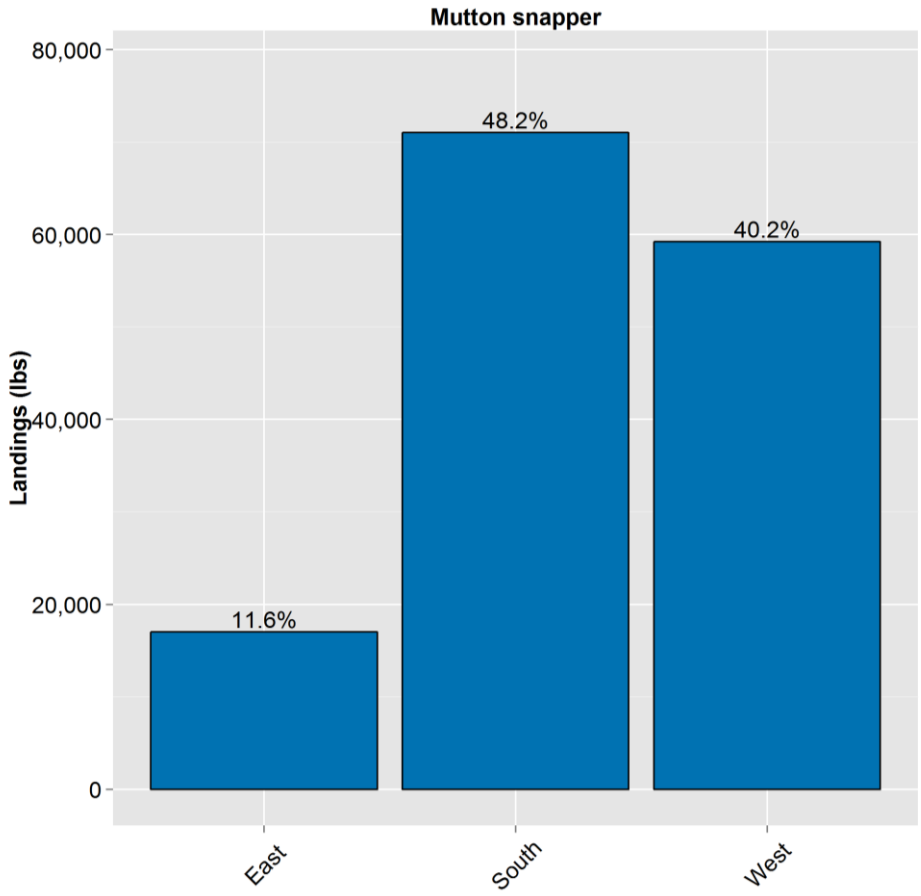

Figure 1.1.5. Commercial landings of mutton snapper in pounds aggregated across counties for confidentiality purposes. "East" represents Nassau to Broward County; South" represents Dade and Monroe County; and "West" represents Collier to Escambia County.
Source: Florida FWC.

Gag Commercial Minimum Size Limit

Currently, the gag commercial minimum size limit is 22 inches TL in Gulf federal waters, and the recreational minimum size limit is 24 inches TL. On the other hand, the recreational and commercial minimum size limits are 24 inches TL in federal waters of the South Atlantic. In Florida state waters, the minimum size limit is 22 inches TL in the Gulf and 24 inches in the Atlantic, including Monroe County. This creates a compliance burden for fishermen in the south Florida area, particularly the Florida Keys, where commercial fishermen can fish in multiple jurisdictions on a single trip. The rationale for the commercial minimum size limit in Gulf waters is that the 22 inch TL minimum size limit reduces dead discards. Discard mortality of gag increases with depth, and is inversely related to the condition of the fish upon release (SEDAR 33 2014).

Many minimum size limit regulations aim to prevent recruitment overfishing (i.e., the take of fish before reproductive maturity). In the case of gag in the Gulf, the current minimum size limit achieves this goal. Therefore, it is for the goal of making the commercial and recreational

minimum size limit for gag consistent that the Council is exploring changing the commercial size limit for gag.

1.2 Purpose and Need

The purpose of this amendment is to modify the allowable harvest and management measures for the Gulf apportionment of mutton snapper as a result of the most recent mutton snapper stock assessment (SEDAR 15A Update, 2015) and to simplify management and increase compliance for anglers harvesting mutton snapper and gag in Florida.

The need for this action is that the Gulf ACL for mutton snapper established in the Generic ACL/AM Amendment exceeds the Gulf apportionment of the stock ABC for 2017 and beyond as recommended by the Scientific and Statistical Committee. This action also addresses a need to simplify management of commercially harvested gag by developing compatible commercial regulations in the Gulf, South Atlantic, and Florida state waters.

1.3 History of Management

Reef Fish Fishery Management Plan (FMP)

Reef Fish FMP and its associated environmental impact statement (EIS), implemented in November 1984 established initial regulations designed to rebuild declining reef fish stocks. It included prohibitions on the use of fish traps, roller trawls, and powerhead equipped spear guns within inshore stressed areas; and directed the National Marine Fisheries Service (NMFS) to develop data reporting requirements in the reef fish fishery.

Mutton Snapper

Amendment 1, including environmental assessment (EA), regulatory impact review (RIR), and regulatory flexibility analyses (RFA), to the Reef Fish Fishery Management Plan, implemented in 1990, was a major revision of the original FMP. It set a 12-inch total length minimum size limit on gray, mutton, and yellowtail snapper. Set a 10-snapper recreational bag limit on snappers in aggregate, excluding red, lane, and vermilion snapper.

Amendment 15, including EA, RIR and IRFA, implemented in January 1998, prohibited harvest of reef fish from traps other than permitted reef fish traps, stone crab traps, or spiny lobster traps.

Amendment 19, including a final SEIS, RIR and IRFA, also known as the Generic Amendment Addressing the Establishment of the Tortugas Marine Reserves, was submitted to NMFS in March 2001, and was implemented on August 19, 2002. This amendment, affecting all FMPs for the Gulf fisheries (as Reef Fish Amendment 19, Coastal Pelagics Amendment 13, Coral Amendment 4, Red Drum Amendment 4, Shrimp Amendment 12, Spiny Lobster Amendment 7, and Stone Crab Amendment 8), establishes two marine reserve areas off the Tortugas area and prohibits fishing for any species and anchoring by fishing vessels inside the two marine reserves.

Generic ACL/AM Amendment, including a final FEIS, RIR and IRFA, implemented in August 2011, established a jurisdictional apportionment of mutton snapper based on the Florida Keys (Monroe County) jurisdictional boundary between the Gulf and South Atlantic Councils. The ABC was based on the following method: South Atlantic = 82% of ABC and Gulf = 18% of ABC (established by using 50% of catch history from 1990-2008 + 50% of catch history from 2006-2008).

Gag

Amendment 1, including EA, RIR, and RFA, to the Reef Fish Fishery Management Plan, implemented in 1990, set objectives to stabilize long-term population levels of all reef fish species by establishing a survival rate of biomass into the stock of spawning age fish to achieve at least 20% spawning stock biomass per recruit by January 1, 2000. It also set a 20 inch TL minimum size limit on gag; set a five-grouper recreational daily bag limit; set an 11.0 mp commercial quota for grouper, with the commercial quota divided into a 9.2 mp shallow-water grouper (black grouper, gag, red grouper, Nassau grouper, yellowfin grouper, yellowmouth grouper, rock hind, red hind, speckled hind, and scamp) quota and a 1.8 mp deep-water grouper (misty grouper, snowy grouper, yellowedge grouper, and warsaw grouper, and scamp once the shallow-water grouper quota was filled) quota; allowed a two-day possession limit for charter vessels and headboats on trips that extend beyond 24 hours; established a longline and buoy gear boundary at the 50-fathom depth contour west of Cape San Blas, Florida, and the 20-fathom depth contour east of Cape San Blas, inshore of which the directed harvest of reef fish with longlines and buoy gear was prohibited, and the retention of reef fish captured incidentally in other longline operations (e.g., sharks) was limited to the recreational daily bag limit; limited trawl vessels to the recreational size and daily bag limits of reef fish; established fish trap permits (up to 100 fish traps per permit holder); and established a commercial reef fish vessel permit.

Amendment 5, including EA, RIR, and RFA implemented in February 1994, established restrictions on the use of fish traps in the Gulf exclusive economic zone (EEZ); implemented a three-year moratorium on the use of fish traps by creating a fish trap endorsement for fishermen with historical landings; created a special management zone (SMZ) with gear restrictions off the Alabama coast; created a framework procedure for establishing future SMZ's; required that all finfish except for oceanic migratory species be landed with head and fins attached; and closed the region of Riley's Hump (near Dry Tortugas, Florida) to all fishing during May and June to protect mutton snapper spawning aggregations.

Regulatory Amendment, including EA, RIR, and RFA implemented in June 2000, increased the commercial size limit for gag and black grouper from 20 to 24" TL; increased the recreational size limit for gag from 20 to 22" TL; prohibited commercial sale of gag, black, and red grouper each year from February 15 to March 15 (during the peak of gag spawning season); and established two marine reserves (Steamboat Lumps and Madison-Swanson) that are closed year-round to fishing for all species under the Council's jurisdiction.

Regulatory Actions Since Gag Stock Was Declared Overfished

Amendment 29 including EA, RIR, and RFA, implemented January 2010, established an individual fishing quota (IFQ) system for the commercial harvest of grouper and tilefish, including gag.

Amendment 30B including a final SEIS, RIR and IRFA, implemented May, 2009, established ACLs and AMs for gag and red grouper; managed shallow-water grouper to achieve optimum yield (OY) and improve the effectiveness of federal management measures; defined the gag minimum stock size threshold (MSST) and OY; set interim allocations of gag and red grouper between recreational and commercial fisheries; made adjustments to the gag and red grouper ACLs to reflect the current status of these stocks; established ACLs and AMs for the commercial and recreational gag harvest, and commercial aggregate shallow-water grouper harvest; adjusted recreational grouper bag limits and seasons; adjusted commercial grouper quotas; replaced the one-month February 15 through March 15 commercial grouper closed season with a four-month seasonal area closure at the Edges, a 390 square nautical mile area in the dominant gag spawning grounds; eliminated the end date for the Madison-Swanson and Steamboat Lumps marine reserves; and required that vessels with federal commercial or charter reef fish permits comply with the more restrictive of state or federal reef fish regulations when fishing in state waters.

Amendment 31 including a final SEIS, RIR and IRFA, implemented May 2010, prohibited the use of bottom longline gear shoreward of a line approximating the 35-fathom contour from June through August; established a longline endorsement; and restricted the total number of hooks onboard each reef fish bottom longline vessel to 1,000, only 750 of which may be rigged for fishing.

An **Interim Rule**, published December 1, 2010 [75 FR 74654]. While management measures for the gag rebuilding plan were being developed through Amendment 32, the **Interim Rule** reduced gag landings consistent with ending overfishing; implemented conservative management measures while a rerun of the update stock assessment was being completed; reduced the commercial quota to 100,000 lbs gutted weight (gw); suspended the use of red grouper multi-use individual fishing quota (IFQ) allocation so it would not be used to harvest gag, and; temporarily halted the recreational harvest of gag until recreational fishing management measures being developed in Amendment 32 could be implemented to allow harvest at the appropriate levels.

An **Interim Rule**, effective from June 1, 2011 through November 27, 2011, and was extended for another 186 days or until Amendment 32 was implemented [76 FR 31874]. The gag 2009 update stock assessment was rerun in December 2010 addressing the problems with discards identified earlier in 2010. This assessment was reviewed in January 2011 by the Council's SSC and presented to the Council at its February 2011 meeting. The assessment indicated that the gag commercial quota implemented in the December 1, 2010 interim rule could be increased and that a longer recreational season could be implemented. In response, the Council requested an interim rule while they continued to work on long-term measures including a gag rebuilding plan in Amendment 32. The interim rule set the commercial gag quota at 430,000 lbs gw (including the 100,000 lbs previously allowed) for the 2011 fishing year, and temporarily suspended the use of red grouper multi-use IFQ allocation so it could not be used to harvest gag. It also set a two-month recreational gag fishing season from September 16 through November 15.

Amendment 32, including a final FEIS, RIR and IRFA implemented March 2012, set the commercial and recreational gag ACLs and ACTs for 2012 through 2015 and beyond; implemented gag commercial quotas for 2012 through 2015 and beyond that included a 14% reduction from the ACL to account for additional dead discards of gag resulting from the reduced harvest; modified grouper IFQ multi-use allocations; reduced the commercial minimum size limit of gag from 24 to 22 inches TL to reduce discards; set the gag recreational season from July 1 through October 31 (the bag limit remained two gag in the four-grouper aggregate bag limit); simplified the commercial shallow-water grouper AMs by using the IFQ program to reduce redundancy; and added an overage adjustment and in-season closure to the gag and red grouper recreational AMs to avoid exceeding the ACL.

Amendment 38, including EA, RIR, and RFA implemented March 1, 2013, revised the post-season recreational AM that reduces the length of the recreational season for all shallow-water grouper in the year following a year in which the ACL for gag or red grouper is exceeded. The modified AM reduces the recreational season of only the species for which the ACL was exceeded.

Generic Management Amendments

Generic Sustainable Fisheries Act Amendment including a final FEIS, RIR and IRFA was partially approved and implemented in November 1999. It set the Maximum Fishing Mortality Threshold (MFMT) for most reef fish stocks at a fishing mortality rate corresponding to 30% spawning potential ratio ($F_{30\% \text{ SPR}}$).

Generic Tortugas Marine Reserves, including a final FEIS, RIR and IRFA was implemented in August 2002, amended all seven FMPs and created two marine reserves where all fishing is prohibited. One 60 square mile reserve was created on a spawning aggregation site for mutton snapper in the Gulf Council's jurisdiction. The other (125 square miles) was created in the jurisdictions of the National Park Service, Florida Keys National Marine Sanctuary, Gulf Council, and State of Florida.

Generic ACL/AM Amendment, including a final FEIS, RIR and IRFA was implemented in August 2011, established a jurisdictional apportionment of mutton snapper based on the Florida Keys (Monroe County) jurisdictional boundary between the Gulf and South Atlantic Councils. The ABC was based on the following method: South Atlantic = 82% of ABC and Gulf = 18% of ABC (established by using 50% of catch history from 1990-2008 + 50% of catch history from 2006-2008).

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1 - Establish Annual Catch Limits for Gulf of Mexico Apportioned Mutton Snapper

Alternative 1: No Action. Maintain the current annual catch limit (ACL) and annual catch target (ACT) established in the Generic ACL/Accountability Measures (AMs) Amendment. The Gulf of Mexico (Gulf) ACL is 18% of the stock acceptable biological catch (ABC) based on the Gulf and South Atlantic apportionment. The ACL/ACT control rule established a 14% buffer between the ACL and the ACT.

OFL = 1.48 mp ww based upon equilibrium yield @ $F_{30\%SPR}$
ABC = 1.13 mp ww based upon equilibrium yield @ $F_{40\%SPR}$
ACL = ABC
Gulf ACL = ACL * 0.18 (0.203 mp ww)
Gulf ACT = Gulf ACL * 0.86 (0.175mp ww)

OFL: overfishing limit; F30%SPR: fishing mortality at 30% spawning potential ratio; mp: million pounds; ww: whole weight

Alternative 2: Accept the OFLs and ABCs recommended by the Gulf and South Atlantic Scientific and Statistical Committees (SSCs) from 2017 through 2020. Apply the Gulf apportionment of the ACL equal to 18% of the stock ABC.

Option 2a: Remove the Gulf ACT as a management target.

Option 2b: Apply the Gulf's ACL/ACT control rule to set the buffer based on landings from 2012 to 2014. This results in a 12% buffer between the ACL and the ACT.

Year	Stock OFL	Stock ABC	Gulf ABC/ACL	Gulf ACT
2017	751,711	717,200	129,096	113,605
2018	793,823	746,800	134,424	118,293
2019	835,318	774,400	139,392	122,665
2020	850,077	798,300	143,694	126,451

Alternative 3: Accept the OFLs and ABCs recommended by the Gulf and South Atlantic SSCs from 2017 through 2020. Apply the Gulf apportionment equal to 18% of the stock ABC. Use the ACL/ACT control on this apportionment and set the Gulf ACL equal to 88% of the apportionment (i.e., 12% buffer using landings from 2012-2014). Remove the Gulf ACT.

Year	Stock OFL	Stock ABC	Gulf ABC	Gulf ACL
2017	751,711	717,200	129,096	113,605
2018	793,823	746,800	134,424	118,293
2019	835,318	774,400	139,392	122,665
2020	850,077	798,300	143,694	126,451

Discussion:

Mutton snapper comprise a single biological stock that encompasses the U.S. Gulf and South Atlantic, with more than 99% of landings occurring in Florida. In 2015, an update to the Southeast Data, Assessment, and Review (SEDAR) stock assessment for mutton snapper in the southeastern U.S. was conducted using data through 2013 (SEDAR 15A Update 2015). The result of the 2015 stock assessment indicated that the stock was not overfished or undergoing overfishing. However, the adult population was determined to be smaller than previously estimated in the 2008 stock assessment (SEDAR 15A 2008). Based on this result, reductions in allowable harvest are necessary to ensure overfishing does not occur. The SEDAR 15A update assessment was reviewed by the Gulf and South Atlantic Fishery Management Councils' (Councils) SSCs, which recommended a yield stream of OFLs and ABCs from 2016 through 2020. This amendment will consider the yield stream from 2017 through 2020.

Alternative 1 (no action) would retain the current harvest levels for mutton snapper including the OFL (1.48 mp ww), ABC (1.13 mp ww), Gulf ACL (0.203 mp ww) and Gulf ACT (0.175 mp ww). However, the current OFL (1.48 mp ww) and ABC (1.13 mp ww) exceed the SSC's OFL and ABC recommendations for 2017 through 2020, and are not consistent with the best scientific information available (represented by the SEDAR 15A Update Assessment).

Both **Alternative 2** and **Alternative 3** would be consistent with the SSCs' recommendation to reduce harvest and would require reductions in allowable landings (see Table 1.1.4 for comparison). **Alternative 2** would set the Gulf ACL equal to the Gulf apportionment of the stock ABC (18%). **Option 2a** would remove the ACT as a management target. The ACT is not currently used for management purposes. **Option 2b** would apply the ACL/ACT control rule to establish the ACT using landings from 2012 – 2014 (see Appendix E), resulting in a 12% buffer between the Gulf ACL and the Gulf ACT, and retain the Gulf ACT as a management target. **Alternative 2** would reduce the ABC by 36% in 2017 and the ACT by 35% (**Option 2b)**, compared to **Alternative 1** (Table 2.1.1).

Table 2.1.1. Comparison of Gulf ACL and ACT with the annual ACLs and ACTs under Alternative 2 for the years 2017 through 2020. ACLs and ACTs are in pounds whole weight.

Year	Gulf ACL	Alt 2 Option 2a: Gulf ACL	ACL % Change	Gulf ACT	Alt 2 Option 2b: Gulf ACT	ACT % Change
2017	203,000	129,096	-36%	175,000	113,605	-35%
2018	203,000	134,424	-34%	175,000	118,293	-32%
2019	203,000	139,392	-31%	175,000	122,665	-30%
2020	203,000	143,694	-29%	175,000	126,451	-28%

Alternative 3 would accept the OFLs and ABCs recommended by the Gulf and South Atlantic SSCs from 2017 through 2020. **Alternative 3** would establish the Gulf ACL equal to 88% of the Stock ABC (i.e., 12% buffer) and would remove the Gulf ACT. **Alternative 3** would reduce the ABC by 44% in 2017 compared to **Alternative 1** and eliminate the ACT as a management target (Table 2.1.2).

Table 2.1.2. A comparison of the current Gulf apportioned ACL in relation to the ACL under Alternative 3. The ACL is set in lbs ww.

Year	Gulf ACL	Alt 3: Gulf ACL	ACL % Change
2017	203,000	113,605	-44%
2018	203,000	118,293	-42%
2019	203,000	122,665	-40%
2020	203,000	126,451	-38%

Alternatives 2 and **3** both result in substantial reductions in ACLs compared to **Alternative 1**. **Option 2b** in **Alternative 2** establishes the ACL at harvest levels above the ACT and prevents triggering accountability measures (AMs) due to minor, inter-annual variations in harvest. **Alternative 3** would not establish an ACT and the ACL for **Alternative 3** is set equal to the ACT in **Option 2b** of **Alternative 2**. **Alternative 3**, however, does not use an ACT; therefore, there is no mechanism to account for minor inter-annual variation in harvest without triggering AMs.

Landings of mutton snapper in the Gulf have increased annually since 2010 (Table 1.1.4). Both **Alternatives 2** and **3** would result in allowable harvest levels which are below the most recent year's landings (2015: 135,328 lbs ww) by 6,232 lbs ww (**Alternative 2, Option 2a**), and 21,723 lbs ww (**Alternative 2, Option 2a** and **Alternative 3**), in 2017. Should harvest levels remain similar to 2015, these alternatives could result in an in-season closure on the harvest of mutton snapper in the Gulf.

2.2 Action 2 - Modify the Gulf Mutton Snapper Recreational Bag Limit

Alternative 1: No Action. Mutton snapper remain part of the aggregate 10-snapper recreational bag limit in the Gulf.

Alternative 2: Retain mutton snapper within the aggregate 10-snapper recreational bag limit in the Gulf, but specify a bag limit for mutton snapper within the aggregate bag limit year round.

Option 2a: 3 fish/person/day

Option 2b: 5 fish/person/day

Discussion:

There is concern by the public regarding fishing effort on mutton snapper spawning aggregations during the April – June peak spawning season in the Florida Keys. Mutton snapper form spawning aggregations that increase their vulnerability to fishing during the spawning season. Catch rates may show a condition where catch rates (an indicator of stock size) remain stable despite a declining stock size until the stock collapses. A reduction in the bag limit could reduce the risk associated with fishing during the spawning season. Currently, mutton snapper is part of the aggregate 10-snapper recreational bag limit in the Gulf (Table 2.2.1) and current regulations for mutton snapper in the Gulf and South Atlantic are shown in Tables 1.1.2 and 1.1.3. Landings of mutton snapper in the Gulf are predominantly commercial (Table 1.1.4). Effective January 1, 2017, Florida decreased the mutton snapper recreational bag limit to 5 fish per person per day (year round) within the 10-snapper aggregate in Florida state waters. The South Atlantic Council has selected the same 5-fish per person per day (year round) aggregate bag limit as the preferred alternative in Snapper Grouper Amendment 41.

Table 2.2.1. Species composition of the aggregate 10 snapper recreational bag limit in the Gulf.

Gulf of Mexico
Gray snapper
Mutton snapper
Yellowtail snapper
Cubera snapper
Queen snapper
Blackfin snapper
Silk snapper
Wenchman

Alternative 1 would retain mutton snapper in the aggregate 10-snapper recreational bag limit, but would not facilitate a management strategy to lower recreational harvest that is necessary if the recreational catch level is reduced in Action 1. If the recreational bag limit is not reduced, the probability of an in-season closure for mutton snapper may be higher. Also, **Alternative 1** would not result in congruent regulations among the Gulf Council and its bordering jurisdictions, the South Atlantic and Florida, both of which are reducing the year-round recreational bag limit for mutton snapper to five fish per person per day (**Alternative 2**, **Option 2b**).

Alternative 2 provides for some measure of reduction in recreational landings and effort, but this reduction depends largely on the option selected in the alternative. However, since recreational landings of mutton snapper in the Gulf account for only approximately 4% of the total landings for the Gulf (Table 1.1.4), the effect of **Alternative 2** on reducing the overall harvest of mutton snapper may be minimal. Further, the degree to which recreational landings of mutton snapper would be reduced, and by association the degree to which recreational landings of other species within the Gulf aggregate 10-snapper recreational bag limit may be affected, is unknown because of the aforementioned low recreational harvest levels of mutton snapper.

2.3 Action 3 - Modify the Mutton Snapper Minimum Size Limit in the Gulf

Alternative 1: No Action. The minimum size limit for both commercial and recreational mutton snapper in the Gulf is 16 inches TL.

Alternative 2: Increase the minimum size limit for commercial and recreational mutton snapper in the Gulf to 18 inches TL.

Alternative 3: Increase the minimum size limit for commercial and recreational mutton snapper in the Gulf to 20 inches TL.

Discussion:

Alternative 1 would maintain the current 16 inch TL minimum size limit. Other alternatives consider larger size limits that increase the age (Figure 2.3.1) and likelihood of individuals reaching sexual maturity before entering the fishery. Increasing the size limit may also reduce the proportion of retained catch and slow the harvest rate (at least initially) for the recreational sector. In contrast, most mutton snapper landed by the commercial sector (accounting for more than 95% of all Gulf landings; see Table 1.1.4) are larger than the limits proposed in **Alternative 2** or **3** (greater than 95%; see Figure 2 in Appendix C). Action 3 may contribute to achieving the harvest reductions necessary in the South Atlantic, but may have little effect in the Gulf, given that Gulf landings are dominated by the commercial sector. Both the South Atlantic Council and Florida are increasing the minimum size limit of mutton snapper to 18 inches TL for both fishing sectors. For this reason, the recreational and commercial sectors are not considered separately in this action.

Alternatives 2 and **3** increase the minimum size limit relative to **Alternative 1** with the objectives of adopting regulations consistent with neighboring jurisdictions and reducing the rate of retained catch. **Alternative 2** is consistent with the actions being taken by the South Atlantic Council and Florida and would simplify the harvest regulations for both anglers and law enforcement by reducing the burden of regulatory compliance. Mutton snapper primarily occur in south Florida and anglers routinely fish in waters managed by the Gulf Council, South Atlantic Council, and/or Florida in a single trip. Achieving consistent regulations would likely increase compliance, and aid enforcement efforts in the region.

According to the SEDAR 15 stock assessment, the length at which 50% of females achieved sexual maturity (L_{50}) was 353 mm maximum TL (tail pinched, TL_{max}), or ~14 inches TL_{max}, and 2.07 years of age. These estimates were lower than those from studies in adjacent Cuban (Claro 1981) and Puerto Rican (Figuerola and Torres 2001) waters. The Cuban estimate showed the L_{50} to be 520 mm fork length (FL; ca. 574 mm TL_{max}, or 22.6 inches TL_{max}) and 5-6 years of age. Similarly, the Puerto Rican estimate, using histological criteria, reported a L_{50} of 414 mm FL (ca. 459 mm TL_{max}, 16.3 inches TL_{max}) and 3 years of age.

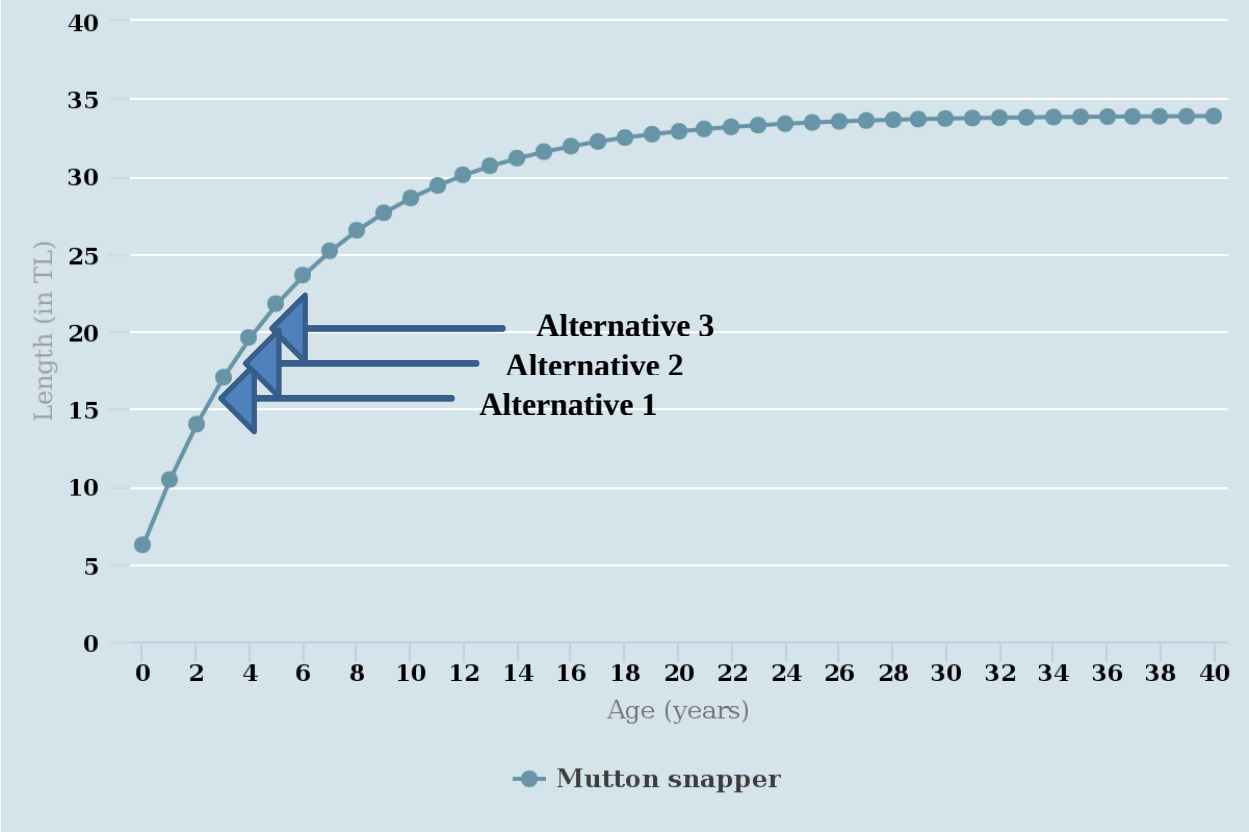

Figure 2.3.1. Age and growth relationship for mutton snapper based on data from the SEDAR 15A Update stock assessment (2015). Mutton snapper are approximately 2.6 years old at the current 16 inch TL minimum size limit. Individuals are approximately 3.4 years old at 18 inches TL and 4.2 years old at 20 inches TL. A sample size of 13,052 individuals was used to calculate the above von Bertalanffy growth curve. Approximately 50% of individuals are mature (both sexes) by 20 inches TL.

The smaller length and age at sexual maturity from fish sampled in US waters may be indicative of growth overfishing (SEDAR 15A Update 2015), whereby fish are harvested at an average size or age which is smaller than the size or age which produces the maximum yield per recruit, or the number of offspring produced by a sexually mature individual. If indeed growth overfishing is occurring in US waters, then increasing the size limit may help to correct this condition. Recreational landings of mutton snapper in the Gulf are very low (Table 1.1.4), and as a result the effect of a change in the size limit on recreational landings and effort cannot be quantified. For the commercial sector, an increase in the minimum size limit to 18 inches TL would result in a reduction in landings of approximately 0.2% (**Alternative 2**; Figure 2 in Appendix C), while an increase in the minimum size limit to 20 inches TL would result in a reduction in landings of approximately 1% (**Alternative 3**).

2.4 Action 4 - Modify the Commercial Gag Minimum Size Limit in the Gulf

Alternative 1: No Action. The commercial minimum size limit for gag in the Gulf is 22 inches TL.

Alternative 2: Increase the commercial minimum size limit for gag in the Gulf to 24 inches TL.

Discussion:

The range of alternatives in this action are based on retaining inconsistent size limits (**Alternative 1**) or adopting a minimum size limit to be consistent with the Gulf's recreational sector and the South Atlantic and Florida's recreational and commercial minimum size limit (**Alternative 2**). Therefore, increasing the minimum size limit to 24 inches TL (**Alternative 2**) is considered the only reasonable modification to the size limit to address the purpose and need. These alternatives also encompass the range of estimated sizes where 50% of female gag attain maturity. The SEDAR 33 (2014) stock assessment estimated that 50% of females are mature at 22 inches TL, but earlier assessments estimated the size at 24 inches TL. It is relevant to note that the most recent stock assessment of Gulf gag determined that the stock is not overfished and is not undergoing overfishing (SEDAR 33 Update 2017).

Yield-per-recruit (YPR) and spawning potential ratio (SPR) analysis results were provided from the SEDAR 33 assessment model for both the 22-and 24-inch TL minimum size limits (Table 2.5.1). This analysis assumes equilibrium conditions and recruitment are constant, and was run for current stock conditions (e.g., recent estimate of fishing mortality rate). The analysis incorporated discard mortality of released gag and focused only on the recreational sector. The results showed that increasing the size limit from 22 to 24 inches TL will give a very slight reduction in YPR; however, this results in a substantial increase in SPR. Therefore, raising the size limit has the potential to slightly reduce landings, but will likely impact the stock positively by increasing the abundance of the spawning stock.

Table 2.5.1. YPR and Spawning biomass per recruit (SBPR) (in kilograms; kg) analysis results from the SEDAR 33 stock assessment model for 22 and 24 inches TL. Recruits are considered to be age-0 fish.

Size Limit (inches TL)	YPR	SBPR
22	0.405	0.508
24	0.383	0.947

Alternative 1 (no action) is inconsistent with the Gulf recreational minimum size limit which increased to 24 inches TL in 2016 (GMFMC 2016), and the South Atlantic recreational and commercial minimum size limits, which were set to 24 inches TL in 1999 (SAFMC 1999). The 22 inch TL recreational minimum size limit was previously implemented in the Gulf for gag and black grouper in 2000 (GMFMC 1999a). At that time, the commercial minimum size limit for gag and black grouper was set at 24 inches TL, which was estimated to be the size at which 50%

of female gag reach reproductive maturity (Schirripa and Goodyear 1994). The Council proposed a further increase in the recreational minimum size limit by one inch per year until it reached 24 inches TL. However, that proposal was disapproved by the Secretary of Commerce on the basis that setting both the commercial and recreational minimum size limits at 24 inches TL would disproportionately impact the recreational sector, which catches smaller fish on average than the commercial sector. In 2012, Amendment 32 (GMFMC 2011b) reduced the commercial minimum size limit for gag to 22 inches TL to reduce discard mortality. A more recent analysis has estimated the size at which 50% of the female gag reach reproductive maturity to be 22 inches TL (SEDAR 33 2014a). Therefore, **Alternative 1** would keep the gag commercial size limit at the size at which 50% of females reach reproductive maturity, but it would be inconsistent with the Gulf recreational and both the South Atlantic and Florida's commercial and recreational 24 inch TL minimum size limit.

Based on the von Bertalanffy growth equation used in SEDAR 33[2], gag take approximately seven months to grow from 22 inches to 24 inches TL (Figure 2.5.1). Given the rapid growth rate during this period and the release mortality rate (< 30 m: 12-16% recreational; > 30 m: 27% commercial) any increase in dead discards from increasing the size limit is expected to be minor. Further, an analysis of the effect of increasing the minimum size limit of gag on commercial fishermen (Appendix D) shows that approximately 94.5% of all gag landed commercially in the Gulf from 2013 – 2015 were at least 24 inches TL (Figure 1 in Appendix D).

[2] $l_t = L_\infty * (1 - e^{-k(t-t0)})$ where L_∞ (mm FL) = 1277.95, k = 0.1342, and t_0 = -0.6687

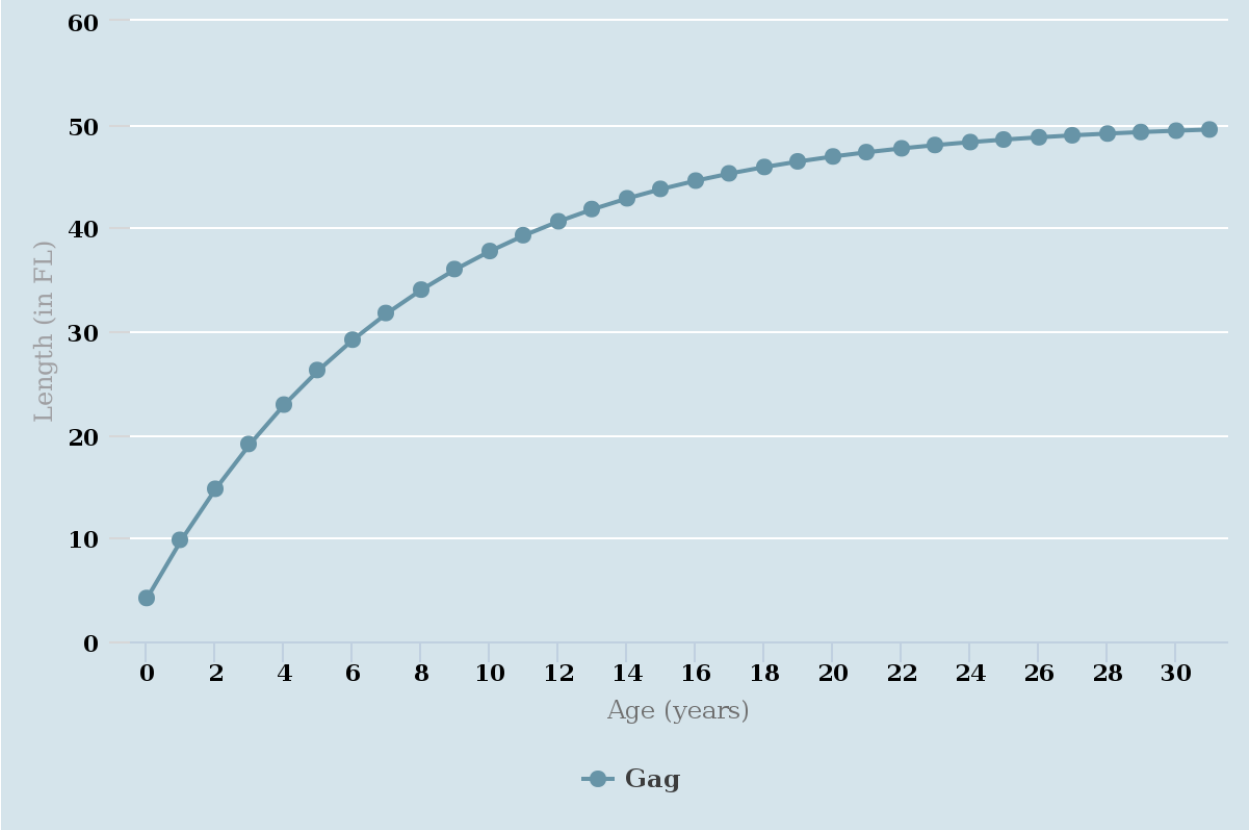

Figure 2.5.1. Age and growth relationship for female gag based on data from SEDAR 33 (2014). Gag are approximately 3.8 years old at the current 22 inch TL commercial minimum size limit, and 4.3 years old at 24 inches TL.

CHAPTER 3. AFFECTED ENVIRONMENT

The affected environment as it pertains to the mutton snapper and gag components of the Gulf of Mexico (Gulf) reef fish fishery has been described in detail in the Generic Essential Fish Habitat Amendment (GMFMC 2004a) and the Generic Annual Catch Limit/Accountability Measures Amendment (GMFMC 2011a). This information is incorporated by reference and is summarized below.

3.1 Description of the Physical Environment

The Gulf has a total area of approximately 600,000 square miles (1.5 million km^2), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.1.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). Gulf water temperatures range from 54º F to 84º F (12º C to 29º C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73 º F through 83º F (23-28º C) including bays and bayous (Figure 3.1.1) between 1982 and 2009, according to satellite-derived measurements (NODC 2012: http://accession.nodc.noaa.gov/0072888). In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

There are several marine reserves, habitat areas of particular concern, and restricted fishing gear areas in the Gulf. These are detailed in GMFMC (2005). The Bureau of Ocean Energy Management lists historic shipwrecks that occur in the Gulf. Most of these sites are in state or deep (>1,000 feet or 328 meters) waters. There is one site located in federal waters in less than 100 feet (30 meters) that could be affected by reef fish fishing. This is the *U.S.S. Hatteras* located approximately 20 miles (12 kilometers) off Galveston, Texas.

There are environmental sites of special interest that are discussed in the Generic EFH Amendment (GMFMC 2004a) that are relevant to reef fish management. These include the longline/buoy area closure, the Edges Marine Reserve, Tortugas North and South Marine Reserves, individual reef areas and bank habitat areas of particular concern (HAPCs) of the northwestern Gulf the Florida Middle Grounds HAPC, the Pulley Ridge HAPC, and Alabama Special Management Zone. These areas are managed with gear restrictions to protect habitat and specific reef fish species. These restrictions are detailed in the Generic EFH Amendment (GMFMC 2004a).

The *Deepwater Horizon* MC252 oil spill in 2010 affected at least one-third of the Gulf area from western Louisiana east to the Florida Panhandle and south to the Campeche Bank in Mexico. The impacts of the *Deepwater Horizon* MC252 oil spill on the physical environment are expected to be significant and may be long-term. Oil was dispersed on the surface, and because of the heavy use of dispersants (both at the surface and at the wellhead), oil was also documented as being suspended within the water column, some even deeper than the location of the broken well head. Floating and suspended oil washed ashore in several areas of the Gulf as did non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are persistent

in the environment and can be transported hundreds of miles. A discussion of the additional impacts to the physical, biological, economic, social, and administrative environments affected by the oil spill is contained in the January 2011 Regulatory Amendment (GMFMC 2011c) and is incorporated here by reference. For more information on physical impacts of the *Deepwater Horizon* MC252 oil spill, see http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm.

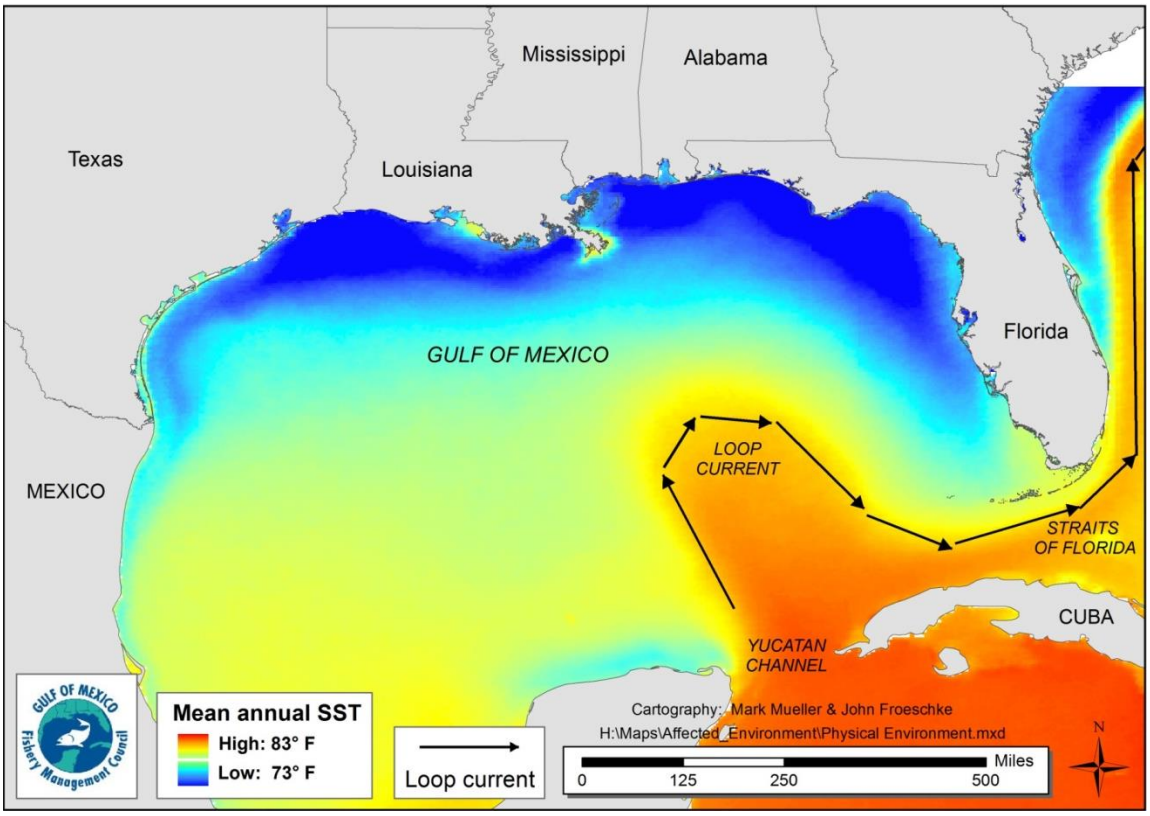

Figure 3.1.1. Physical environment of the Gulf including major feature names and mean annual sea surface temperature as derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://accession.nodc.noaa.gov/0072888)

3.2 Description of the Biological/Ecological Environment

The biological environment of the Gulf is described in detail in the final environmental impact statement (EIS) for the Generic EFH Amendment (GMFMC 2004a), the Generic Annual Catch Limit/Accountability Measure (ACL/AM) Amendment (GMFMC 2011b), and Amendment 40 (GMFMC 2014b), and are incorporated herein by reference.

Definition of Overfishing

In January 2012, the Generic ACL/AM Amendment (GMFMC 2011b) became effective. One of the provisions in this amendment was to redefine overfishing. In years when there is a stock assessment, overfishing is defined as the fishing mortality rate exceeding the maximum fishing mortality threshold. In years when there is no stock assessment, overfishing is defined as the catch exceeding the overfishing limit (OFL). Note that, because the overfishing threshold is now

re-evaluated each year instead of only in years when there is a stock assessment, this status for reef fish species could change on an annual basis.

3.2.1 Mutton Snapper

Mutton Snapper Life History and Biology

Mutton snapper are distributed within the Western Atlantic from Brazil north to Massachusetts; however, the majority of biological information on this species comes from waters adjacent to the state of Florida, the Bahamas, and Cuba (Burton 2002; Barbieri and Colvocoresses 2003; Claro and Lindeman 2003; Burton et al. 2005). The strong Caribbean, Loop, and Gulf Stream currents maintain a homogenous population at the genetic level (Shulzitski, et al. 2005T). The unit stock of mutton snapper is defined as the total number of individuals that use waters within the jurisdiction of the South Atlantic and Gulf Councils.

Larval mutton snapper settle onto seagrass beds < 10 m deep (Lindeman et al. 2000), thereafter transitioning to mangroves or shallow hardbottom habitat, and then to more complex offshore reef habitat (e.g., Dahlgren and Eggleston 2000; Nagelkerken et al. 2000; Serafy et al. 2003; Eggleston et al. 2004). Little is documented regarding the seasonal migrations of mutton snapper along coastlines. Fishermen on the Atlantic coast of Florida note a spike in catch rates during the fall (November) and winter (February) that may be related to the latitudinal movement of fishes into the region (B. Hartig, B. Taylor pers. com). Perhaps the most significant movement patterns of mutton snapper occur during the summer, when normally solitary individuals aggregate over spawning grounds (Domeier and Colin 1997). In Florida, Lindeman et al. (2000) reported three locations identified by fishermen in the lower Keys that may serve as spawning aggregations for mutton snapper.

Age
Fish are only considered age-0 until the following January when they become age-1 fish. The proportion of fish above age 17 in the data set of Burton (2002) is quite small, and a maximum age of 17 years was also observed among two fishery independent data sets from the State of Florida. Despite differences in sampling gear and location, the age-structure of mutton snapper in Florida is remarkably similar among data sets. In total, 90% of the fish examined in SEDAR 15A (2008) were less than eight years of age, or 20% of their maximum life span. Differences in size at age by sex were negligible.

Growth
Mutton snapper have a planktonic larval duration of approximately 30 days (Lindeman et al. 2001; Paris et al. 2005). The von Bertalanffy growth curve used in the SEDAR 15A Update (2015) was $L_t = 861(1-e^{(-0.165(t+1.23))})$, where L_t is the average length at age, t.

Reproduction
Over 4,500 aged and sexed fish in analyses for the SEDAR 15A Update (2015) indicated that the probability of fish being female at any age was 50%. The spawning season can be inferred from indices relating gonad weight to body weight (gonadosomatic index, or GSI). Plots of GSI during each month showed elevated values during April-June. This trend closely matches newly

available data from the "South Florida" (Fort Pierce South) dataset of Burton (2002) that show elevated values during March-July. Direct examination of the gonads indicate that the reproductive season for mutton snapper spans March-July with a peak in activity during April-June. Fifty percent of females achieved sexual maturity at 353 mm TL_{max} and 2.07 years of age. If the data from Caribbean populations, exhibiting larger size and age at 50% maturity, is indicative of fishes inhabiting Florida waters in the past, then current estimates of size-at-maturity are comparatively small and may indicate growth overfishing in the south Florida population of mutton snapper. Aggregations of mutton snapper that had been heavily exploited were observed and described as "milling a few meters off the bottom, yet exhibiting no clear behaviors related to spawning- suggesting these behaviors occur at night" (Domeier and Colin 1997). Johannes et al. (1999) explained that fishes in spawning condition may exhibit "spawning stupor" or a general ignorance to observation by divers. Despite numerous attempts, spawning behaviors and courtship have yet to be documented for mutton snapper.

Natural Mortality

With a maximum observed age of 40 years, the best estimate of natural mortality (M) comes from the equation: $M = 0.899\ t_{max}^{-0.916}$. For a t_{max} of 40 years, the average M = 0.17 per year.

Discards

Discard mortality is influenced by hook type and placement, handling time, and depth of capture (relating to barotrauma caused by the super-inflation of the swim bladder upon ascent). Of these factors, depth of capture is best represented in available data. Recreational fisheries account for most of the mortality on mutton snapper (Gulf and Atlantic headboat fishing mortality in 2013 was 0.02 per year and MRFSS/MRIP was 0.15 per year) while the commercial fisheries accounted for about 0.01 per year. The fishing mortality rates for discards show that few fish older than four years are released alive. A discard mortality rate of 15% was used for the SEDAR 15A Update (2015).

Status of the Mutton Snapper Stock

Mutton snapper in the southeastern US are considered to be a single stock from their northernmost boundaries in the Atlantic and Gulf of Mexico south through the Florida Keys (Faunce et al. 2007; Carson et al. 2011). An update assessment of the southeastern US mutton snapper stock (SEDAR 15A Update 2015) indicated that the stock was not overfished and is not undergoing overfishing; however, the spawning stock biomass of mutton snapper was considerably smaller than previously estimated in SEDAR 15A (2008). The ratio of current fishing mortality (described as the geometric mean of the fishing mortality from the most recent three years [2011 – 2013]) over the maximum fishing mortality threshold was 0.65, meaning that mutton snapper are not undergoing overfishing. The ratio of current level of spawning stock biomass (described as the current [2013] amount of sexually mature females) over the minimum spawning stock threshold was 1.13, meaning that mutton snapper are not overfished.

3.2.2 Gag

Gag Life History and Biology

Habitat Use
Seagrass meadows (Coleman et al. 1996), oyster beds (Adamski et al. 2012), and mangroves (Casey et al. 2007) are important habitats for juvenile gag. Pre-reproductive females reside on reefs for an overall average of 9.8 months (Lindberg et al 2006) as they transition to the offshore spawning stock. As mature adults, gag prefer relatively steep drop-offs and rocky ridges as spawning sites (Coleman et al. 2011). Gag are protogynous hermaphrodites, beginning life as females and transitioning to males at older ages. Hermaphroditism in gag is modeled as the proportion of individuals transitioning sex at a given age. Males clearly exhibit strong site fidelity, remaining on one or at most two spawning sites for extended periods of time. Females tend to move more frequently among spawning sites, stopping only briefly before moving on. Most females left spawning sites after the spawning season; however, some unknown proportion are thought to remain in such areas.

Age and Natural Mortality
The natural mortality rate (*M*) is assumed constant over time, but decreasing with age. The form of *M* as a function of age was based on Lorenzen (1996). The base $M = 0.134$ y^{-1}. Maximum age remains at 31 years from a fish sampled in 2005. In more recent years, gag estimated to be as old as 29 years (2009) and 28 years (2012) have been observed (Lombardi et al. 2013-SEDAR33-DW22).

Growth
A modified von Bertalanffy growth model accounts for the influence of minimum size limits. In this model fit, the lengths used were fork lengths (FL) in mm in comparison to total length (TL). The results (L_∞, k, t_0) were very similar to the previous model and differences (e.g. change in L_∞ from 1300 mm TL to 1272 mm FL) may be attributed to the use of fork- rather than total length (Lombardi et al. 2013). The von Bertalanffy growth parameters; L_{inf}, asymptotic length, and *k*, growth rate were estimated within the assessment model: L_{inf} (mm fork length) = 1277.95; *k* ($year^{-1}$) = 0.1342; t_0 (year) = -0.6687.

Reproduction
There is slight evidence for a decrease in size at maturity over time: 1991-1996, A_{50} (age at which 50% of gag are sexually mature) = 3.5 years, L_{50} (length at which 50% of gag are sexually mature) = 538 mm FL: 1997-2012, A_{50} = 3.3 years, L_{50} = 502 mm FL). This decrease could be due in part to differences in recording lengths in TL versus FL, or changing life history characteristics induced by size selective mortality that has occurred in other intensively fished species (Hamilton et al. 2007). However, there is little evidence for a change in age at maturity within the Gulf (occurring about 3-4 years based on samples from the late 1970s: Hood and Schlieder 1992).

An analysis of gag sampled for histology and pigment pattern (copperbelly) showed that the presence/absence of ventral pigmentation is a good indicator of secondary sex, or when gag transition from female to male. Gag not noted to have ventral pigmentation were 98% females, and of gag noted to have copperbelly pigmentation 86% were males. These results are in agreement with past

studies examining pigment pattern in gag. For sex transitions from female to male, the L_{50} and A_{50} are 1022 mm FL and 10.7 years.

Studies examining the sex ratio of male and female gag have shown that many more females are present in the stock than males: Burns and Robbins (2006) returned 225 gag captured of the central west coast of Florida, with the percentage of males determined to be 1.8%; Ward and Brooks (2010) sampled 114 gag from the eastern Gulf of Mexico, with the percentage male and transitional estimated to be 2.6%; Koenig and Coleman (2011) found the proportion of males inside Madison Swanson Reserve to be 12% compared to 1% outside the reserve. Thus, these three studies generally agree that in recent years the proportion of male gag outside of marine reserves is below 3% across the greater WFS.

Discards and Discard Mortality
On average, 87% of recreational discards are from the private recreational fleet. Discards from the charterboat and headboat fleets make up 10% and 3% of the total discards on average, respectively. The number of discards has generally increased over time for each recreational fleet, peaking in 2008 for the private recreational fleet and then declining. The number of discards peaked in 1998 for the charterboat fleet, exhibited considerable variability until 2010 and then declined. The pattern in the number of discards from the headboat fleet was similar to the charterboat fleet, except it peaked in 2011 and then declined substantially in 2012.

Commercial discards prior to the implementation of the IFQ system were dominated by out-of-season handline vessels. After the IFQ system was implemented in 2010, discards in the commercial sector have been predominantly from vessels which do not have sufficient gag quota to retain gag landed on a commercial trip. Vessels with available gag quota typically land legal-size fish, and do not exhibit high discard rates (see Appendix D).

For both the recreational and the commercial vertical line (hand-line and electric/hydraulic reels) fisheries, the stock assessment uses a depth-mortality function from Sauls (2013) that assumes 90% survivorship for gag released in good condition.

Status of the Gag Stock

The management unit for Gulf gag extends from the United States–Mexico border in the west through the northern Gulf waters and west of the Dry Tortugas and the Florida Keys. Currently, the Council manages gag as one unit. The NMFS SEFSC completed an update assessment of gag in 2017 (SEDAR 33 Update 2017), and determined that the stock is not overfished and is not undergoing overfishing. The ratio of current fishing mortality (described as the geometric mean of the fishing mortality from the most recent three years [2013 – 2015]) over the maximum fishing mortality threshold was 0.416, meaning that gag are not undergoing overfishing. The ratio of the current level of spawning stock biomass (described as the current [2015] amount of sexually mature females) over the minimum spawning stock threshold was 1.56, meaning that gag are not overfished.

3.2.3 General Information on Reef Fish Species

The following is summarized from the January 2011 Regulatory Amendment (GMFMC 2011a). The National Ocean Service of NOAA (NOS) collaborated with the NMFS and the Gulf of

Mexico Fishery Management Council (Council) to develop distributions of reef fish (and other species) in the Gulf of Mexico (SEA 1998). The NOS obtained fishery-independent data sets for the Gulf of Mexico, including the Southeast Area Monitoring and Assessment Program (SEAMAP), and state trawl surveys. Data from the Estuarine Living Marine Resources (ELMR) Program contain information on the relative abundance of specific species for a series of estuaries, by five life stages and month for five seasonal salinity zones. The NOS staff analyzed the data to determine relative abundance of the mapped species by estuary, salinity zone, and month. For some species not in the ELMR database, distribution was classified as only observed or not observed for adult, juvenile, and spawning stages.

Habitat types and life history stages can be found in more detail in GMFMC (2004). In general, reef fish are widely distributed in the Gulf of Mexico, occupying both pelagic and benthic habitats during their life cycle. In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Exceptions to these generalizations include the gray triggerfish that lay their eggs in depressions in the sandy bottom, and gray snapper whose larvae are found around submerged aquatic vegetation. Juvenile and adult reef fish are typically demersal, and are usually associated with bottom topographies on the continental shelf (<100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. Some juvenile snappers (e.g. mutton, gray, red, dog, lane, and yellowtail snappers) and groupers (e.g. goliath, red, gag, and yellowfin groupers) have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems (GMFMC 1981). More detail on hard bottom substrate and coral can be found in the Fishery Management Plan (FMP) for Corals and Coral Reefs (GMFMC and SAFMC 1982).

Status of Reef Fish Stocks

The FMP for the Reef Fish Resources for the Gulf of Mexico currently encompasses 31 species (Table 3.2.1). Eleven other species were removed from the FMP in 2012 by the Council in their Generic ACL/AM Amendment (GMFMC 2011b). Stock assessments and stock assessment reviews can be found on the Council (www.gulfcouncil.org) and SEDAR (www.sefsc.noaa.gov/sedar) websites and have been conducted for 13 species:

- Red Snapper (SEDAR 7 2005; SEDAR 7 Update 2009; SEDAR 31 2013; SEDAR 31 Update 2015)
- Vermilion Snapper (Porch and Cass-Calay 2001; SEDAR 9 2006c; SEDAR 9 Update 2011a; SEDAR 45 2016)
- Yellowtail Snapper (Muller et al. 2003; SEDAR 3 2003; O'Hop et al. 2012)
- Mutton Snapper (SEDAR 15A 2008; SEDAR 15A Update 2015)
- Gray Triggerfish (Valle et al. 2001; SEDAR 9 2006a; SEDAR 9 Update 2011b, SEDAR 43 2015)
- Greater Amberjack (Turner et al. 2000; SEDAR 9 2006b; SEDAR 9 Update 2010; SEDAR 33 2014a)
- Hogfish (Ault et al. 2003; SEDAR 6 2004b; Cooper et al. 2013; SEDAR 37 2014)
- Red Grouper (NMFS 2002; SEDAR 12 2007; SEDAR 12 Update 2009, SEDAR 42 2015)

- Gag (Turner et al. 2001; SEDAR 10 2006; SEDAR 10 Update 2009; SEDAR 33 2014b; SEDAR 33 Update 2017)
- Black Grouper (SEDAR 19 2010)
- Yellowedge Grouper (Cass-Calay and Bahnick 2002; SEDAR 22 2011b)
- Tilefish (Golden) (SEDAR 22 2011a)
- Atlantic Goliath Grouper (Porch et al. 2003; SEDAR 6 2004a; SEDAR 23 2011)

The NMFS Office of Sustainable Fisheries updates its Status of U.S. Fisheries Report to Congress on a quarterly basis utilizing the most current stock assessment information. The most recent update can be found at: (http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm). The status of both assessed and unassessed stocks is shown in Table 3.2.3.1.

Table 3.2.3.1. Species of the reef fish FMP grouped by family.

Common Name	Scientific Name	Stock Status
Family Balistidae – Triggerfishes		
gray triggerfish	*Balistes capriscus*	Overfished, no overfishing
Family Carangidae – Jacks		
greater amberjack	*Seriola dumerili*	Overfished, no overfishing
lesser amberjack	*Seriola fasciata*	Unknown
almaco jack	*Seriola rivoliana*	Unknown
banded rudderfish	*Seriola zonata*	Unknown
Family Labridae - Wrasses		
* hogfish	*Lachnolaimus maximus*	Not Overfished, no overfishing
Family Malacanthidae - Tilefishes		
tilefish (golden)	*Lopholatilus chamaeleonticeps*	Not overfished, no overfishing
blueline tilefish	*Caulolatilus microps*	Unknown
goldface tilefish	*Caulolatilus chrysops*	Unknown
Family Serranidae - Groupers		
gag	*Mycteroperca microlepis*	Not overfished, no overfishing
red grouper	*Epinephelus morio*	Not overfished, no overfishing
scamp	*Mycteroperca phenax*	Unknown
black grouper	*Mycteroperca bonaci*	Not overfished, no overfishing
yellowedge grouper	*Hyporthodus flavolimbatus***	Not overfished, no overfishing
snowy grouper	*Hyporthodus niveatus***	Unknown
speckled hind	*Epinephelus drummondhayi*	Unknown
yellowmouth grouper	*Mycteroperca interstitialis*	Unknown
yellowfin grouper	*Mycteroperca venenosa*	Unknown
warsaw grouper	*Hyporthodus nigritus***	Unknown
***Atlantic goliath grouper	*Epinephelus itajara*	Unknown
Family Lutjanidae - Snappers		
queen snapper	*Etelis oculatus*	Unknown
mutton snapper	*Lutjanus analis*	Not overfished, no overfishing
blackfin snapper	*Lutjanus buccanella*	Unknown
red snapper	*Lutjanus campechanus*	Overfished, no overfishing
cubera snapper	*Lutjanus cyanopterus*	Unknown
gray snapper	*Lutjanus griseus*	Unknown
lane snapper	*Lutjanus synagris*	Unknown
silk snapper	*Lutjanus vivanus*	Unknown
yellowtail snapper	*Ocyurus chrysurus*	Not overfished, no overfishing
vermilion snapper	*Rhomboplites aurorubens*	Not overfished, no overfishing
wenchman	*Pristipomoides aquilonaris*	Unknown

Notes: * In 2013 the genus for yellowedge grouper, snowy grouper, and warsaw grouper was changed by the American Fisheries Society from *Epinephelus* to *Hyporthodus* (Page et al. 2013).
**Atlantic goliath grouper is a protected grouper and benchmarks do not reflect appropriate stock dynamics. In 2013 the common name was changed from goliath grouper to Atlantic goliath grouper by the American Fisheries Society to differentiate from the Pacific goliath grouper, a newly named species (Page et al. 2013).

Description of the Fishery

The reef fish fishery of the Gulf is divided into two broad categories, recreational fishing and commercial fishing. Recreational fishing includes fishing from charter vessels and headboats (collectively referred to as for-hire vessels) as well as from private vessels and from shore. No federal permit is needed for private vessels to fish for reef fish in the exclusive economic zone (EEZ), but persons fishing onboard private vessels do need a state recreational saltwater fishing license to land their catch. For-hire vessels fishing for reef fish and other federally managed species are required to have a federal reef fish charter/headboat permit, and as a condition of the permit, must agree to abide by federal fishing regulations whether in federal or state waters. Reef fish caught under recreational bag limits are not allowed to be sold. A commercial reef fish permit is required in order to harvest commercial quantities and sell reef fish. In addition, commercial harvest of red snapper, shallow-water grouper, deep-water grouper, and tilefish is managed under an individual fishing quota (IFQ) system, which requires that vessels have individual allocations of the quotas for those stocks to harvest and sell the catch. Both charter/headboat and commercial reef fish permits are under a moratorium, but the permits are transferable. IFQ shares and allocations are also transferable.

A detailed description of the fishing gears and methods used in the reef fish fishery is provided in Amendment 1 to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) (GMFMC 1989). The gears described included handline and bandit fishing, fish traps, longlines, buoy fishing, and shrimp bycatch of red snapper. Spearfishing is also used as a method of taking grouper by both the commercial and recreational sectors, but to a lesser extent than hook and line methods. In 1999, the NMFS published a list of authorized fisheries and fishing gear used in those fisheries [FR 64 67511]. For the Gulf reef fish fishery, the following gears were listed as authorized:

Commercial: Longline, handline, bandit gear, rod and reel, buoy gear, pot, trap, spear, powerhead, cast net, trawl (reef fish caught in a trawl are limited to recreational bag limits and cannot be sold). In February 2007, the use of fish traps (including pots) was phased out in the Gulf EEZ.

Recreational: Spear, powerhead, bandit gear, handline, rod and reel, cast net.

3.2.4 Protected Species

The Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) provide special protections to some species that occur in the Gulf. A very brief summary of these two laws and more information is available on NMFS Office of Protected Resources website (http://www.nmfs.noaa.gov/pr/laws/). All 22 marine mammals in the Gulf are protected under the MMPA. Two marine mammals (sperm whales and manatees) are also protected under the ESA. Other species protected under the ESA include sea turtle species (Kemp's ridley, loggerhead (Northwest Atlantic Ocean distinct population segment distinct population segment (DPS)), green (South Atlantic and North Atlantic DPSs), leatherback, and hawksbill), three fish species (Gulf sturgeon, smalltooth sawfish, and Nassau grouper), and five coral species (elkhorn, staghorn, lobed star, mountainous star, pillar, and boulder star). Critical habitat designated under

the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean DPS of loggerhead sea turtles also occur in the Gulf, though only loggerhead critical habitat occurs in federal waters.

The most recent biological opinion (opinion) on the Reef Fish FMP was completed on September 30, 2011. The opinion determined the continued authorization of the Gulf reef fish fishery managed under the Reef Fish FMP was not likely to affect ESA-listed marine mammals or corals, and was not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback), or smalltooth sawfish. An incidental take statement was provided. Since issuing the opinion, in memoranda dated September 16, 2014, and October 7, 2014, the National Marine Fisheries Service (NMFS) concluded that the activities associated with the Reef Fish FMP will not adversely affect critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle DPS or four species of corals (*Mycetophyllia ferox*, *Orbicella annularis*, *O. faveolata*, and *O. franksi*).

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered, effective May 6, 2016. Two of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, occur in the Gulf and are listed as threatened. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA. NMFS has reinitiated consultation on the Reef Fish FMP to address the listing of this new species and determined that allowing the fishing under Reef Fish FMP to continue during the re-initiation period is not likely to jeopardize the continued existence of the Nassau grouper.

NMFS classifies reef fish bottom longline/hook-and-line gear in the MMPA 2016 List of Fisheries as a Category III fishery (81 FR 20550). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Dolphins are the only species documented as interacting with these fisheries. Bottlenose dolphins are a common predator around reef fish vessels. They prey upon on the bait, catch, and/or released discards of fish from the reef fish fishery.

3.2.4.1 Marine Mammals

The 22 species of marine mammals in the Gulf include one sirenian species (a manatee), which is under US Fish and Wildlife Service's (USFWS) jurisdiction, and 21 cetacean species (dolphins and whales), all under NMFS' jurisdiction. Manatees primarily inhabit rivers, bays, canals, estuaries, and coastal waters rich in seagrass and other vegetation off Florida, but can occasionally be found in seagrass habitats as far west as Texas. Although most of the cetacean species reside in the oceanic habitat (greater than or equal to 200 m), the Atlantic spotted dolphin is found in waters over the continental shelf (20-200 m), and the common bottlenose dolphin (hereafter referred to as bottlenose dolphin) is found throughout the Gulf, including within bays, sounds, and estuaries; coastal waters over the continental shelf; and in deeper oceanic waters.

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 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 List of Fisheries and the classification process can be found at: http://www.nmfs.noaa.gov/pr/interactions/fisheries/lof.html.

NMFS classifies reef fish bottom longline/hook-and-line gear in the MMPA 2016 List of Fisheries as a Category III fishery (81 FR 20550). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Dolphins are the only species documented as interacting with these fisheries. Bottlenose dolphins are a common predator around reef fish vessels. They prey upon the bait, catch, and/or released discards of fish from the reef fish fishery.

3.2.4.2 Turtles

Green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles are all highly migratory and travel widely throughout the Gulf. Several volumes exist that cover the biology and ecology of these species (i.e., Lutz and Musick (eds.) 1997; Lutz et al. (eds.) 2003, Wynekan et al. (eds.) 2013).

All five species of sea turtles are adversely affected by the Gulf reef fish fishery. Incidental captures are infrequent, but occur in all commercial and recreational hook-and-line and longline components of the reef fish fishery. Observer data indicate that the bottom longline component of the fishery interacts solely with loggerhead sea turtles. Captured loggerhead sea turtles can be released alive or can be found dead upon retrieval of bottom longline gear as a result of forced submergence. Sea turtles caught during other reef fish fishing with other gears are believed to all be released alive due to shorter gear soak. All sea turtles released alive may later succumb to injuries sustained at the time of capture or from exacerbated trauma from fishing hooks or lines that were ingested, entangled, or otherwise still attached when they were released. Sea turtle release gear and handling protocols are required in the commercial and for-hire reef fish fisheries to minimize post-release mortality. NMFS has conducted specific analyses ("Section 7 consultations") evaluating potential effects from the Gulf reef fish fishery on sea turtles (as well as on other ESA-listed species and critical habitat) as required by the ESA. On September 30, 2011, the Southeast Regional Office (SERO) completed a biological opinion (Opinion), which concluded that the continued authorization of the Gulf reef fish fishery is not likely to jeopardize the continued existence of any sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) (NMFS 2011). An incidental take statement was issued specifying the amount and extent of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes.

3.2.4.3 Protected Fish

<u>Nassau Grouper</u>

The Nassau grouper's confirmed distribution currently includes Bermuda and Florida (USA), throughout the Bahamas and Caribbean Sea" (Heemstra and Randall 1993). The Nassau grouper

has been documented in the Gulf at Arrecife Alacranes (north of Progreso) to the west off the Yucatan Peninsula, Mexico (Hildebrand et al. 1964). Nassau grouper is generally replaced ecologically in the eastern Gulf by red grouper (*E. morio*) in areas north of Key West or the Tortugas (Smith 1971). They are considered a rare or transient species off Texas in the northwestern Gulf (Gunter and Knapp 1951 in Hoese and Moore 1998).

The Nassau grouper is primarily a shallow-water, insular fish species that has long been valued as a major fishery resource throughout the wider Caribbean, South Florida, Bermuda, and the Bahamas (Carter et al. 1994). As larvae, Nassau grouper are planktonic. After an average of 35-40 days and at an average size of 32 millimeters total length (TL), larvae recruit from an oceanic environment into demersal habitats (Colin 1992, Eggleston 1995). Juvenile Nassau grouper (12-15 centimeters TL) are relatively solitary and remain in specific areas (associated with macroalgae, and both natural and artificial reef structure) for months (Bardach 1958). As juveniles grow, they move progressively to deeper areas and offshore reefs (Tucker et al. 1993, Colin et al. 1997). Smaller juveniles occur in shallower inshore waters (3.7-16.5 meters [m]) and larger juveniles are more common near deeper (18.3-54.9 m) offshore banks (Bardach et al. 1958; Cervigón 1966; Silva Lee 1974; Radakov et al. 1975; Thompson and Munro 1978). Adult Nassau grouper also tend to be relatively sedentary and are commonly associated with high-relief coral reefs or rocky substrate in clear waters to depths of 130 m. Generally, adults are most common at depths less than 100 m (Hill and Sadovy de Mitcheson 2013) except when at spawning aggregations where they are known to descend to depths of 255 m (Starr et al. 2007). Nassau grouper form spawning aggregations at predictable locations around the winter full moons, or between full and new moons (Smith 1971; Colin 1992; Tucker et al. 1993; Aguilar-Perera 1994; Carter et al. 1994; Tucker and Woodward 1994).

The most serious threats to the status of Nassau grouper today are fishing at spawning aggregations and inadequate law enforcement protecting spawning aggregations in many foreign nations. These threats are currently affecting the status of Nassau grouper, putting it at a heightened risk of extinction.

Smalltooth Sawfish

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. Smalltooth sawfish primarily occur in the Gulf off peninsular Florida and are most common off Southwest Florida and the Florida Keys. 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.). Smalltooth sawfish feed primarily on fish, with mullet, jacks, and ladyfish believed to be their primary food resources (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).

Smalltooth sawfish are also adversely affected by the Gulf reef fish fishery, but are interacted with to a much lesser extent than sea turtles. Although the long, toothed rostrum of the smalltooth sawfish causes this species to be particularly vulnerable to entanglement in fishing gear, incidental captures in the commercial and recreational hook-and-line components of the reef fish fishery are rare events.

Only eight smalltooth sawfish are anticipated to be incidentally caught every three years in the entire reef fish fishery, and none are expected to result in mortality (NMFS 2011). In the September 30, 2011, Opinion, NMFS concluded that the continued authorization of the Gulf reef fish fishery is not likely to jeopardize the continued existence of smalltooth sawfish (NMFS 2011). An incidental take statement was issued specifying the amount and extent of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes. Fishermen in this fishery are required to follow smalltooth sawfish safe handling guidelines.

3.2.4.4 Northern Gulf of Mexico Hypoxic Zone

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands by rivers to the Gulf, increasing nutrient inputs from the Mississippi River, and a seasonal layering of waters in the Gulf (see http://www.gulfhypoxia.net/). The layering of the water is temperature and salinity dependent and prevents the mixing of higher oxygen content surface water with oxygen-poor bottom water. For 2014, the extent of the hypoxic area was estimated to be 5,052 square miles and is similar the running average for over the past five years of 5,543 square miles Gulf (see http://www.gulfhypoxia.net/).

The hypoxic conditions in the northern Gulf directly impact less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009). However, more mobile macroinvertebrates and demersal fishes (e.g., red snapper) are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012). For red snapper, Courtney et al. (2013) have conjectured that the hypoxic zone could have an indirect positive effect on red snapper populations in the western Gulf. They theorize that increased nutrient loading may be working in 'synergy' with abundant red snapper artificial habitats (oil platforms). Nutrient loading likely increases forage species biomass and productivity providing ample prey for red snapper residing on the oil rigs, thus increasing red snapper productivity. Grouper and tilefish are less common in the northern Gulf, so the northern Gulf hypoxic zone influences these stock less.

3.2.4.5 Climate Change

Climate change projections show increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation (Intergovernmental Panel on Climate Change (IPCC) http://www.ipcc.ch/). These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation

in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The NOAA Climate Change Web Portal[3] indicates the average sea surface temperature in the Gulf will increase by 1.2-1.4ºC for 2006-2055 compared to the average over the years 1956-2005. For reef fishes, Burton (2008) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. It is unclear if reef fish distribution in the Gulf has been affected. For some reef fish species such as the smooth puffer, there has been a distributional trend to the north in the Gulf. For other species such as red snapper and the dwarf sand perch, there has been a distributional trend towards deeper waters. For other reef fish species such as the dwarf goatfish, there has been a distributional trend both to the north and to deeper waters. These changes in distributions have been hypothesized as a response to environmental factors such as increases in temperature.

The distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the occurrence and intensity of toxic algae blooms. Hollowed et al. (2013) provided a review of projected effects of climate change on the marine fisheries and dependent communities. Integrating the potential effects of climate change into the fisheries assessment is currently difficult due to the time scale differences (Hollowed et al. 2013). The fisheries stock assessments rarely project through a time span that would include detectable climate change effects.

Greenhouse gases

The IPCC (http://www.ipcc.ch/) has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2014) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.3.2 with respect to total emissions and from fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (1.43% and 0.59%, respectively).

[3] http://www.esrl.noaa.gov/psd/ipcc/ocn/

Table 3.3.2. Total Gulf greenhouse gas emissions estimates (tons per year) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*.

Emission source	CO_2	Greenhouse CH_4	Gas N_2O	Total CO_{2e}**
Oil platform	11,882,029	271,355	167	17,632,106
Non-platform	22,703,695	2,029	2,698	23,582,684
Total	34,585,724	273,384	2,865	41,214,790
Commercial fishing	585,204	2	17	590,516
Percent commercial fishing	1.69	>0.01	0.59	1.43

*Compiled from Tables 7.9 and 7.10 in Wilson et al. (2014).

**The CO_2 equivalent (CO_2e) emission estimates represent the number of tons of CO_2 emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH_4 and N_2O). Conversion factors to CO_{2e} are 21 for CH_4 and 310 for N_2O.

3.2.4.6 *Deepwater Horizon* MC252 Oil Spill

General Impacts on Fishery Resources

The presence of PAHs in marine environments can have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of development (Whitehead et al. 2012). When exposed to realistic yet toxic levels of PAHs (1–15 µg/L), greater amberjack (*Seriola dumerili*) larvae develop cardiac abnormalities and physiological defects (Incardona et al. 2014). The future reproductive success of long-lived species, including red drum (*Sciaenops ocellatus*) and many reef fish species, may be negatively affected by episodic events resulting in high-mortality years or low recruitment. These episodic events could leave gaps in the age structure of the population, thereby affecting future reproductive output (Mendelssohn et al. 2012). Other studies have described the vulnerabilities of various marine finfish species, with morphological and/or life history characteristics similar to species found in the Gulf, to oil spills and dispersants (Hose et al. 1996; Carls et al. 1999; Heintz et al. 1999; Short 2003).
An increase in histopathological lesions were found in red snapper (*Lutjanus campechanus*) in the area affected by the oil, but Murawski et al. (2014) found that the incidence of lesions had declined between 2011 and 2012. The occurrence of such lesions in marine fish is not uncommon (Sindermann 1979; Haensly et al. 1982; Solangi and Overstreet 1982; Khan and Kiceniuk 1984, 1988; Kiceniuk and Khan 1987; Khan 1990). Red snapper diet was also affected after the spill. A decrease in zooplankton consumed, especially by adults (>400 mm TL) over natural and artificial substrates may have contributed to an increase in the consumption of fish and invertebrate prey- more so at artificial reefs than natural reefs (Tarnecki and Patterson 2015).

The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. Marine fish species typically concentrate PAHs in the digestive tract, making stomach bile an appropriate testing medium. A study by Synder et al. (2015) assessed bile samples from golden tilefish (*Lopholatilus chamaeleonticeps*), king snake eel (*Ophichthus rex*), and red snapper for PAH accumulation over time, and reported concentrations were highest in golden tilefish during the same time period when compared to king snake eel and red snapper. These results suggest that the more highly associated an organism is with the sediment in an oil spill area, the higher the likelihood of toxic PAH accumulation. Twenty-first

century dispersant applications are thought to be less harmful than their predecessors. However, the combination of oil and dispersants has proven to be more toxic to marine fishes than either dispersants or crude oil alone. Marine fish which are more active (e.g., a pelagic species versus a demersal species) appear to be more susceptible to negative effects from interactions with weathered oil/dispersant emulsions. These effects can include mobility impairment and inhibited respiration (Swedmark et al. 1973). Another study found that while Corexit 9500A® and oil are similar in their toxicity, when Corexit 9500A® and oil were mixed in lab tests, toxicity to microscopic rotifers increased up to 52-fold (Rico-Martínez et al. 2013). These studies suggest that the toxicity of the oil and dispersant combined may be greater than anticipated.

As reported by NOAA's Office of Response and Restoration (NOAA 2010), oil from the *Deepwater Horizon* MC252 spill is relatively high in alkanes, which can readily be used by microorganisms as a food source (Figure 3.3.2). As a result, oil from this spill is generally likely to biodegrade more readily than crude oil. The *Deepwater Horizon* MC252 oil is also relatively much lower in polycyclic aromatic hydrocarbons (PAHs), which are highly toxic chemicals that tend to persist in the environment for long periods of time, especially if the spilled oil penetrates into the substrate on beaches or shorelines. Like all crude oils, MC252 oil contains volatile organic compounds (VOCs) such as benzene, toluene, and xylene. Some VOCs are acutely toxic but because they evaporate readily, they are generally a concern only when oil is fresh.[4]

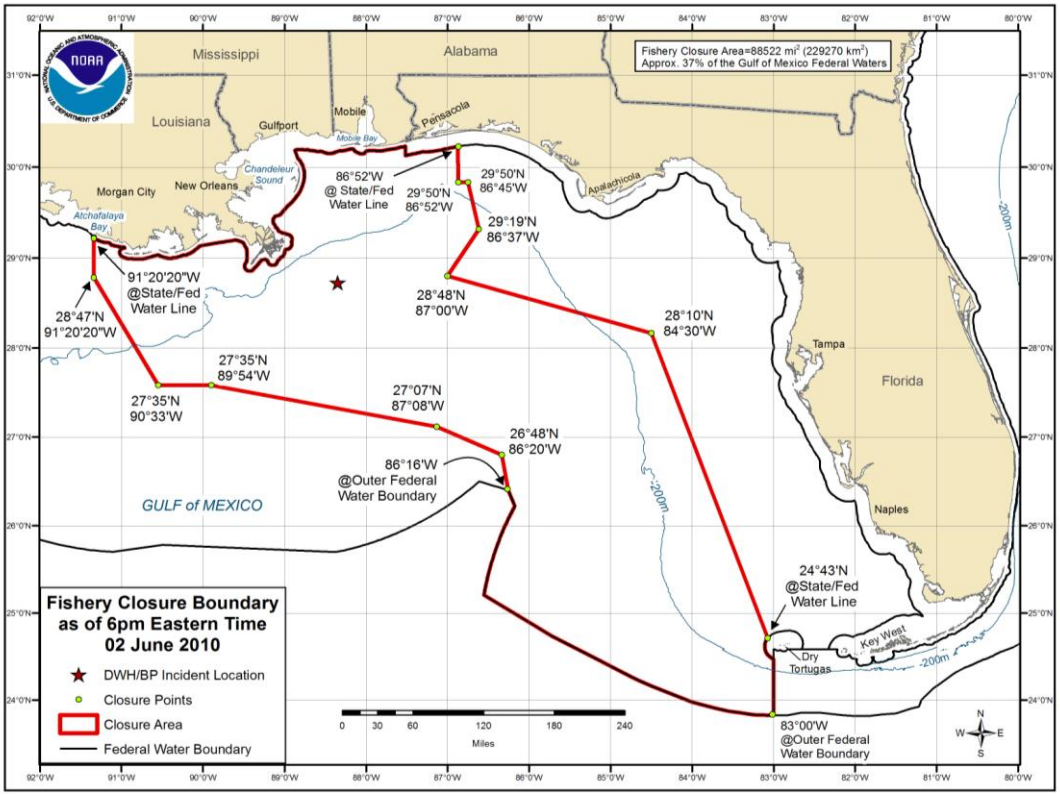

Figure 3.3.2. Fishery closure at the height of the *Deepwater Horizon* MC252 oil spill.

[4] Source: http://sero.nmfs.noaa.gov/deepwater_horizon/documents/pdfs/fact_sheets/oil_characteristics.pdf

In addition to the crude oil, over a million gallons of the dispersant, Corexit 9500A®, was applied to the ocean surface and an additional hundreds of thousands of gallons of dispersant was pumped to the mile-deep well head (National Commission 2010). No large-scale applications of dispersants in deep water had been conducted until the *Deepwater Horizon* MC252 oil spill. Thus, no data exist on the environmental fate of dispersants in deep water. However, a study found that, while Corexit 9500A® and oil are similar in their toxicity, when Corexit 9500A® and oil were mixed in lab tests, toxicity to microscopic rotifers increased up to 52-fold (Rico-Martínez et al. 2013). This suggests that the toxicity of the oil and dispersant combined may be greater than anticipated.

Deepwater Coral Communities

Deepwater corals are particularly vulnerable to episodic mortality events such as oil spills, since corals are immobile. Severe health declines have been observed in three deepwater corals in response to dispersant alone (2.3–3.4 fold) and the oil–dispersant mixtures (1.1–4.4 fold) compared to oil-only treatments (DeLeo et al. 2015). Increased dispersant concentrations appeared to exacerbate these results. As hundreds of thousands of gallons of dispersant were applied near the wellhead during the *Deepwater Horizon* MC252 oil spill, the possibility exists that deepwater corals may have been negatively impacted by the oil spill and subsequent spill remediation activities.

Several studies have documented declines in coral health or coral death in the presence of oil from the *Deepwater Horizon* MC252 oil spill (White et al. 2012; Hsing et al. 2013; Fisher et al. 2014). Sites as far as 11 km southwest of the spill were documented to have greater than 45% of the coral colonies affected by oil (White et al. 2012; Hsing et al. 2013), and, though less affected, a site 22 km in 1900 m of water had coral damage caused by oil (Fisher et al. 2014). Coral colonies from several areas around the wellhead had damage to colonies that seemed to be representative of microdroplets as all colonies were not affected, and colonies that were affected had patchy distributions of damaged areas (Fisher et al. 2014). Because locations of deep-sea corals are still being discovered, it is likely that the extent of damage to deep-sea communities will remain undefined.

Outstanding Effects

As a result of the *Deepwater Horizon* MC252 oil spill, a consultation pursuant to ESA Section 7(a)(2) was reinitiated. As discussed above, on September 30, 2011, the Protected Resources Division released an Opinion, which after analyzing best available data, the current status of the species, environmental baseline (including the impacts of the recent *Deepwater Horizon* MC252 oil spill in the northern Gulf), effects of the proposed action, and cumulative effects, concluded that the continued operation of the Gulf reef fish fishery is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, nor the continued existence of smalltooth sawfish (NMFS 2011).

3.2.5 Bycatch

As summarized in the Bycatch Practicability Analysis (BPA) (Appendix F), the actions in this framework are not expected to result in significant changes in bycatch of mutton snapper or gag grouper. In addition, the Gulf Council, the National Marine Fisheries Service (NMFS), and the Southeast Fisheries Science Center (SEFSC) have implemented and plan to implement numerous management measures and reporting requirements that have improved, or are likely to improve monitoring efforts of discards and discard mortality. Therefore, no additional action is needed to minimize bycatch or bycatch mortality within the reef fish fishery. See Appendix F for detailed descriptions of bycatch when fishing for mutton snapper.

3.2.6 Other Species Affected

The BPA (Appendix F) has further information regarding other species affected by this amendment. For details on the life histories and ecology of co-occurring species, the reader is referred to Generic Essential Fish Habitat Amendment (GMFMC 2004a).

3.3 Description of the Economic Environment

3.3.1 Commercial Sector

Vessel Activity

Tables 3.3.1.1 and 3.3.1.2 contain information on vessel performance for commercial vessels that harvested mutton snapper in the Gulf in 2010-2015 and Tables 3.3.1.3 and 3.3.1.4 provide similar information for vessels that landed gag. The tables contain vessel counts from the NMFS Southeast Fisheries Science Center (SEFSC) logbook (logbook) data (vessel count, trips, and landings). Dockside values were generated using landings information from logbook data and price information from the NMFS SEFSC Accumulated Landings System (ALS) data. The data in Tables 3.3.1.1-3.3.1.4 cover all vessels that harvested mutton snapper or gag anywhere in the Gulf, regardless of trip length or species target intent.

Landings shown in Tables 3.3.1.1-3.3.1.4 are based on logbook information for landings and NMFS Accumulated Landings System (ALS) for prices (SEFSC-SSRG Economic Panel Data). Thus, these landings would not exactly match with mutton snapper landings shown in Table 1.1.4, which are based on SEFSC ACL databases and gag landings based on IFQ database. In addition, the landings are presented in gutted weight rather than whole weight. Landings for all species in the SEFSC-SSRG Economic Panel Data are expressed in gutted weight to provide one unit for all species, because data summarizations as done in Tables 3.3.1.1-3.3.1.4 involve a multitude of species. Federally permitted vessels required to submit logbooks generally report their harvest of most species regardless of whether the fish were caught in state or federal waters.

On average, 119 vessels per year landed mutton snapper in the Gulf (Table 3.3.1.1). These vessels, combined, averaged 425 trips per year in the Gulf on which mutton snapper was landed and 1,581other trips (Table 3.3.1.1). The average annual total dockside revenue (2015 dollars)

was approximately $0.21 million from mutton snapper, approximately $4.29 million from other species co-harvested with mutton snapper (on the same trips), and approximately $11.95 million from other trips by these vessels on trips in the Gulf on which no mutton snapper were harvested or occurred in the South Atlantic (Table 3.3.1.2). Total average annual revenue from all species harvested by vessels harvesting mutton snapper in the Gulf was approximately $16.46 million, or approximately $138,052 per vessel (Table 3.3.1.2).

Table 3.3.1.1. Summary of vessel counts, trips, and logbook landings (pounds gutted weight (lbs gw)) for vessels landing at least one pound of mutton snapper, 2010-2015.

Year	Number of Vessels	Number of Gulf Trips that Caught Mutton Snapper	Mutton Snapper Landings (lbs gw)	"Other Species" Landings Jointly Caught with Mutton Snapper (lbs gw)	Number of Other Trips*	Landings on Other Trips (lbs gw)
2010	114	384	46,174	756,632	1,329	2,305,664
2011	118	468	68,646	1,333,882	1,597	3,462,986
2012	120	433	73,093	1,195,915	1,763	3,524,583
2013	108	371	82,838	1,134,357	1,464	3,273,018
2014	131	451	106,139	1,355,266	1,815	4,398,231
2015	121	445	93,465	1,418,411	1,515	3,638,484
Average	119	425	78,393	1,199,077	1,581	3,433,828

Source: NMFS SEFSC Logbook data.
*Includes Gulf trips on which mutton snapper were not harvested as well as trips in the South Atlantic regardless of what species were harvested, including mutton snapper.

Table 3.3.1.2. Summary of vessel counts and revenue (2015 dollars) for vessels landing at least one pound of mutton snapper, 2010-2015.

Year	Number of Vessels	Dockside Revenue from Gulf Mutton Snapper	Dockside Revenue from "Other Species" Jointly Caught with Mutton Snapper	Dockside Revenue on Other Trips	Total Dockside Revenue	Average Total Dockside Revenue per Vessel
2010	114	$112,644	$2,504,655	$7,257,554	$9,874,854	$86,622
2011	118	$180,754	$4,429,934	$11,422,435	$16,033,123	$135,874
2012	120	$197,818	$3,999,500	$11,647,523	$15,844,841	$132,040
2013	108	$232,021	$4,161,161	$11,583,030	$15,976,211	$147,928
2014	131	$300,231	$5,105,352	$16,042,188	$21,447,771	$163,723
2015	121	$283,438	$5,552,246	$13,781,634	$19,617,318	$162,127
Average	119	$217,818	$4,292,141	$11,955,727	$16,465,686	$138,052

Source: NMFS SEFSC Logbook and ALS data.

An average of 373 vessels per year landed gag in the Gulf (Table 3.3.1.3). These vessels, combined, averaged 2,914 trips per year in the Gulf on which gag was landed and 2,393 trips taken either in the Gulf on which gag were not harvested or trips taken in the South Atlantic (Table 3.3.1.3). The average annual total dockside revenue (2015 dollars) for these 373 vessels was approximately $2.33 million from gag, approximately $25.27 million from other species co-harvested with gag (on the same trips in the Gulf), and approximately $16.99 million from the other trips taken by these vessels (Table 3.3.1.4). The total average annual revenue from all species harvested by these 373 vessels was approximately $44.60 million, or approximately $120,533 per vessel (Table 3.3.1.4).

Table 3.3.1.3. Summary of vessel counts, trips, and logbook landings (pounds gutted weight (lbs gw)) or vessels landing at least one pound of gag, 2010-2015.

Year	Number of Vessels	Number of Gulf Trips that Caught Gag	Gag Landings (lbs gw)	"Other Species" Landings Jointly Caught with Gag (lbs gw)	Number of Other Trips*	Landings on Other Trips (lbs gw)
2010	413	3,061	477,804	5,722,149	2,034	3,721,799
2011	360	2,509	310,315	6,586,467	2,507	5,588,081
2012	377	3,039	508,726	7,782,071	2,529	5,204,895
2013	361	2,945	555,287	7,512,398	2,250	4,765,449
2014	373	3,221	544,185	8,509,753	2,460	5,263,099
2015	354	2,708	486,909	7,056,538	2,580	4,849,135
Average	373	2,914	480,538	7,194,896	2,393	4,898,743

Source: NMFS SEFSC Logbook data.
*Includes Gulf trips on which gag were not harvested as well as trips in the South Atlantic regardless of what species were harvested, including gag.

Table 3.3.1.4. Summary of vessel counts and revenue (2015 dollars) for vessels landing at least one pound of gag, 2010-2015.

Year	Number of Vessels	Dockside Revenue from Gulf Gag	Dockside Revenue from "Other Species" Jointly Caught with Gag	Dockside Revenue on Other Trips	Total Dockside Revenue	Average Total Dockside Revenue per Vessel
2010	413	$2,210,905	$18,351,186	$11,167,414	$31,729,504	$76,827
2011	360	$1,520,629	$21,531,215	$17,182,734	$40,234,578	$111,763
2012	377	$2,499,970	$25,907,052	$16,987,194	$45,394,216	$120,409
2013	361	$2,790,123	$27,068,897	$17,807,526	$47,666,546	$132,040
2014	373	$2,716,188	$31,205,797	$19,800,116	$53,722,100	$144,027
2015	354	$2,287,196	$27,595,417	$19,020,727	$48,903,340	$138,145
Average	373	$2,337,502	$25,276,594	$16,994,285	$44,608,381	$120,535

Source: NMFS SEFSC Logbook and ALS data.

Share, Allocation, and Ex-vessel Prices

The dockside or ex-vessel price is the price the vessel receives at the first sale of harvest. Over the period 2010-2015, the average annual ex-vessel price per lb for mutton snapper harvested in the Gulf was $2.78 (2015 dollars), and ranged from $2.44 in 2010 to $3.03 in 2015. For gag, the average price per lb was $4.86 and ranged from $4.63 in 2010 to $5.02 in 2013. In the Gulf, gag is one of the species managed under the grouper/tilefish IFQ system. This IFQ system collects and maintains information about activities in the system, including participating vessels, landings, share prices, allocation prices, and ex-vessel prices. Based on the IFQ reporting system, average gag landings from 2010 through 2015 was 527,210 pounds, average ex-vessel price was $4.94 per pound, average share transfer price was $23.91 per pound, and average allocation transfer price was $1.99 per pound (NMFS 2016). Averages were calculated as simple averages across years.

Commercial Sector Business Activity

Estimates of the business activity (economic impacts) in the U.S. associated with the Gulf mutton snapper and gag commercial harvests were derived using the model developed for and applied in NMFS (2015) and are provided in Table 3.3.1.5 (vessels harvesting and landing mutton snapper) and Table 3.3.1.6 (vessels harvesting gag). Business activity for the commercial sector is characterized in the form of full-time equivalent (FTE) jobs, output (sales) impacts (gross business sales), income impacts (wages, salaries, and self-employed income), and value added impacts (difference between the sales price of a good and the cost of the goods and services needed to produce it). Income impacts should not be added to output (sales) impacts because this would result in double counting. The estimates of economic activity include the direct effects (effects in the sector where an expenditure is actually made), indirect effects (effects in sectors providing goods and services to directly affected sectors), and induced effects (effects induced by the personal consumption expenditures of employees in the direct and indirectly affected sectors).

Table 3.3.1.5. Average annual business activity (thousand 2015 dollars) associated with the harvests of vessels that harvested mutton snapper in the Gulf, 2010-2015.

Species	Average Annual Dockside Revenue	Jobs	Output (Sales) Impacts	Income Impacts	Value Added Impacts
Mutton Snapper	$218	10	$878	$241	$364
All species*	$16,466	733	$66,352	$18,198	$27,515

*Includes dockside revenues and economic activity associated with the average annual harvest of all species, including mutton snapper, harvested by vessels that harvested mutton snapper in the Gulf.
Source: Revenue data from NMFS SEFSC Logbook and ALS data, economic impact results calculated by NMFS SERO using the model developed for NMFS (2015).

Table 3.3.1.6. Average annual business activity (thousand 2015 dollars) associated with the harvests of vessels that harvested gag in the Gulf, 2010-2015.

Species	Average Annual Dockside Revenue	Jobs	Output (Sales) Impacts	Income Impacts	Value Added Impacts
Gag	$2,338	317	$23,181	$8,513	$12,027
All species*	$44,608	6,047	$442,373	$162,455	$229,530

*Includes dockside revenues and economic activity associated with the average annual harvest of all species, including gag, harvested by vessels that harvested gag in the Gulf.
Source: Revenue data from NMFS SEFSC Logbook and ALS data, economic impact results calculated by NMFS SERO using the model developed for NMFS (2015).

In addition to the business activities generated by commercial vessel landings of mutton snapper or gag, business activities associated with commercial vessel landings of all other species landed by commercial vessels are also presented in the tables above. Vessels that harvested mutton snapper or gag also harvested other species on trips where mutton snapper or gag were harvested, and some took other trips in the Gulf on which no mutton snapper or gag were harvested, as well as trips in the South Atlantic. All revenues from all species harvested on all of these trips contributed towards making these vessels economically viable and contribute to the economic activity associated with these vessels.

Dealers

Commercial vessels landing mutton snapper can only sell their catch to seafood dealers with valid Gulf and South Atlantic Dealer (GSAD) permit. On March 3, 2017, there were 412 dealers with a valid GSAD permit. There are no income or sales requirements to acquire a GSAD permit. As a result, the total number of dealers can vary over the course of the year and from year to year. A dealer with a valid GSAD permit is authorized to receive an IFQ species, including gag, only if he/she has an active Gulf IFQ dealer account. As of March 3, 2017, there were 217 active dealer accounts. In 2015, 114 dealers received IFQ species, including gag.

Imports

Information on the imports of all snapper and grouper species, either fresh or frozen, are available at: http://www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataProduct.html. Information on the imports of individual snapper or grouper species is not available. In 2012, imports of all snapper and grouper species (fresh and frozen) were approximately 44.51 million pounds valued at approximately $128.20 million (2012 dollars). More recent data are not currently available. These amounts are contrasted with the domestic harvest of all snapper and grouper in the U.S. in 2012 of approximately 19.60 mp valued at approximately $60.53 million (2012 dollars; data available at: http://www.st.nmfs.noaa.gov/commercial-fisheries/publications/index). Although the levels of domestic production and imports are not totally comparable for several reasons, including considerations of different product form such as fresh versus frozen, and possible product mislabeling, the difference in the magnitude of imports

relative to the amount of domestic harvest is indicative of the dominance of imports in the domestic market. Final comparable data for more recent years are not currently available.

3.3.2 Recreational Sector

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 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). Estimates of the number of mutton snapper target trips and catch trips for the shore, charter, and private/rental boat modes in the Gulf for 2010-2015 are provided in Table 3.3.2.1. Only Florida recorded target and catch trips for mutton snapper. Over the period examined, mutton snapper were most commonly targeted by private/rental anglers and mutton snapper target effort averaged approximately 25,000 trips per year across all modes (Table 3.3.2.1). As shown in Table 3.3.2.1, considerably more trips caught mutton snapper, approximately 66,000 trips from all modes, than targeted mutton snapper, but the private/rental mode remains the dominant mode.

Target and catch trips for gag are presented in Table 3.3.2.2 as averages for 2010-2015, because states other than Florida recorded only few trips in some years and no trips in other years. Averages are calculated only for positive trip records. As in the case with mutton snapper, the private/rental mode was the dominant fishing mode both for gag target and catch trips, and in addition, more catch trips are recorded than target trips.

Table 3.3.2.1. Number of mutton snapper recreational target and catch trips, by mode, Florida, 2010-2015*.

	Shore Mode	Charter Mode	Private/Rental Mode	All Modes
Target Trips				
2010	nr	3,171	8,704	11,875
2011	7,407	982	nr	8,389
2012	nr	2,395	4,576	6,971
2013	nr	831	23,080	23,911
2014	19,582	677	16,853	37,112
2015	5,444	2,300	9,132	16,876
Average	10,811	1,726	12,469	25,006
Catch Trips				
2010	2,267	11,091	20,941	34,299
2011	2,175	11,275	5,019	18,469
2012	314	18,658	41,676	60,648
2013	9,936	15,814	63,204	88,954
2014	51,167	12,646	47,609	111,422
2015	33,257	26,524	26,536	86,317
Average	16,519	16,001	34,164	66,685

*Florida was the only Gulf state with recorded target and catch effort for mutton snapper. "nr" = none recorded. Averages based on positive entries; "nr" entries are not assumed equivalent to "0" trips. Source: MRIP database, NMFS, SERO.

Table 3.3.2.2. Average number of gag recreational target and catch trips, by mode, by state, 2010-2015*.

	Shore Mode	Charter Mode	Private/Rental Mode	All Modes
Target Trips				
Florida	20,925	17,153	258,688	296,765
Alabama	nr	301	742	1,043
Mississippi	nr	nr	517	517
Louisiana	nr	nr	nr	nr
Catch Trips				
Florida	55,152	86,243	378,129	519,523
Alabama	601	1,134	3,520	5,255
Mississippi	nr	nr	1,060	1,060
Louisiana	nr	486	5,723	6,209

* "nr" = none recorded. Averages based on positive entries; "nr" entries are not assumed equivalent to "0" trips. Source: MRIP database, NMFS, SERO.

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 number of standardized 12-hour fishing days that account for the different half-, three-quarter-, and full-day fishing trips by headboats. The stationary "fishing for demersal (bottom-dwelling) species" nature of headboat fishing, as opposed to trolling, suggests that most, if not all, headboat trips and, hence, angler days, are demersal or reef fish trips by intent. Estimates of headboat effort (angler days) are provided in Table 3.3.2.3. Headboat data is collected by the NMFS Southeast Region Headboat Survey (SRHS).

Table 3.3.2.3. Headboat angler days and percent distribution, by state, 2011-2015.

	Angler Days				**Percent Distribution**			
	FLW	**NWFL-AL***	**MS-LA****	**TX**	**FLW**	**FL-AL**	**MS-LA**	**TX**
2011	79,722	77,303	3,657	47,284	38.3%	37.2%	1.8%	22.7%
2012	84,205	77,770	3,680	51,776	38.7%	35.8%	1.7%	23.8%
2013	94,752	80,048	3,406	55,749	40.5%	34.2%	1.5%	23.8%
2014	102,841	88,524	3,257	51,231	41.8%	36.0%	1.3%	20.8%
2015	107,910	86,473	3,587	55,135	42.6%	34.2%	1.4%	21.8%
Average	93,886	82,024	3,517	52,235	40.5%	35.4%	1.5%	22.5%

Source: NMFS Southeast Region Headboat Survey (SRHS).
*Beginning in 2013, HBS data was reported separately for NW Florida and Alabama, but has been combined here for consistency with previous years.
**Headboats from Mississippi and Louisiana are combined for confidentiality purposes.

Permits

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

A federal charter/headboat (for-hire) vessel permit is required for fishing in federal waters for Gulf reef fish (RF). On March 3, 2017, there were 1,179 vessels with a valid (non-expired) or renewable Gulf for-hire RF permit (including historical captain permits). A renewable permit is an expired limited access permit that may not be actively fished, but is renewable for up to one year after expiration. The Gulf RF for-hire permits are limited access permits. Most for-hire vessels possess more than one for-hire permit.

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, if a vessel meets certain selection criteria used by the SRHS and is selected to report by the Science Research Director of the Southeast Fisheries Science Center, it is determined to operate primarily as a headboat and is

required to submit harvest and effort information to the SRHS. As of February 2017, 73 Gulf headboats were registered in the SRHS (K. Fitzpatrick, NMFS SEFSC, pers. comm.).

Information on Gulf charter vessel and headboat operating characteristics is included in Savolainen et al. (2012) and is incorporated herein by reference. The average charter vessel operation took 46 full-day (9 hours) and 55 half-day (5 hours) trips per year, carried 4.8 and 4.6 passengers per trip type, respectively, targeted reef fish and pelagic species on 64% and 19% of all trips, respectively, and took 68% of all trips in the EEZ. The average headboat operation took 83 full-day (10 hours) and 37 half-day (6 hours) trips per year, carried 13.1 and 14.6 passengers per trip type, respectively, targeted reef fish and pelagic species on 84% and 6% of all trips, respectively, and took 81% of all trips in the EEZ.

There are no specific federal permitting requirements for recreational anglers to fish for or harvest reef fish. 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. For the for-hire sector, customers are authorized to fish under the charter or headboat vessel license and are not required to hold their own fishing licenses. As a result, it is not possible to identify with available data how many individual anglers would be expected to be affected by this amendment.

Economic Value

Economic value can be measured in the form of consumer surplus (CS) per additional fish kept on a trip for anglers (the amount of money that an angler would be willing to pay for a fish in excess of the cost to harvest the fish). The CS value per fish for mutton snapper or gag is unknown but some proxies, such as the CS for red snapper and the CS for grouper, may be used. The estimated value of the CS per fish for a second red snapper kept on a trip is approximately $79, and that for grouper is approximately $101 (Carter and Liese 2012; values updated to 2015 dollars).

Economic value for for-hire vessels 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 vessels in the Gulf, the estimated NOR value is $155 (2015 dollars) per charter angler trip (Liese and Carter 2011). The estimated NOR value per headboat angler trip is $54 (2015 dollars) (C. Liese, NMFS SEFSC, pers. comm.).

Business Activity

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 mutton snapper and gag 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 (2015). Estimates of the average expenditures by recreational anglers are also provided in NMFS (2015) 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), income impacts, and value-added impacts (difference between the value of goods and the cost of materials or supplies). Estimates of the average mutton snapper and gag target effort (2010-2015) and associated business activity (2015 dollars) are provided in Table 3.3.2.4. Because mutton snapper directed effort during this time period was only recorded in Florida (see Table 3.3.2.1), estimates of business activity for the other Gulf States are not provided. To the extent, however, that gag has also been targeted in other states, target trips and associated economic activities for the entire Gulf are presented in Table 3.3.2.4.

The average annual target effort for mutton snapper over the period 2010-2015 supported an estimated 22 jobs, and generated approximately $2.3 million in output (sales) impacts, $1.4 million in value added impacts, and $0.9 million in income impacts. The corresponding numbers for gag are 293 jobs, $41.1 million in output impacts, $23.2 million in value added impacts, and $14.3 million in income impacts.

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 3.3.2.4. Summary of mutton snapper and gag target trips (2010-2015 average) and associated business activity (thousand 2015 dollars). Output, value added, and income impacts are not additive.

	Impacts	
	Mutton Snapper, FL	**Gag, Gulf**
	Shore Mode	**Shore Mode**
Target Trips	10,811	20,925
Output Impact	$491	$1,773
Value Added Impact	$307	$986
Income Impact	$186	$584
Jobs	5	13
	Private/Rental Mode	**Private/Rental Mode**
Target Trips	12,469	259,947
Output Impact	$630	$23,550
Value Added Impact	$399	$13,070
Income Impact	$241	$7,561
Jobs	6	157
	Charter Mode	**Charter Mode**
Target Trips	1,726	17,454
Output Impact	$1,184	$15,804
Value Added Impact	$720	$9,183
Income Impact	$501	$6,211
Jobs	11	123
	All Modes	**All Modes**
Target Trips	25,006	298,326
Output Impact	2,305	41,127
Value Added Impact	1,425	23,239
Income Impact	929	14,356
Jobs	22	293

Source: Effort data from the MRIP, economic impact results calculated by NMFS SERO using the model developed for NMFS (2015).

3.4 Description of the Social Environment

This amendment affects commercial and recreational management of mutton snapper and the commercial management of gag in the Gulf. This section provides the background for the proposed actions which will be evaluated in Chapter 4. Commercial and recreational mutton snapper landings and commercial gag landings by state are included to provide information on the geographic distribution of fishing involvement. Descriptions of the top communities involved in commercial fishing for mutton snapper and gag in the Gulf are included along with the top Florida recreational fishing communities based on recreational engagement. Community level data are presented in order to meet the requirements of National Standard 8 of the

Magnuson-Stevens Act, which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented. Additional information on the Gulf recreational and commercial mutton snapper fishery and the commercial gag fishery is provided in the Economic Environment in Section 3.3.

3.4.1 Landings by State

Mutton Snapper

As described in Section 1.1, the vast majority of mutton snapper landings are from waters adjacent to Florida and are primarily from the commercial sector in the Gulf. All commercial mutton snapper in the Gulf is landed in Florida (SEFSC Commercial ACL Dataset, 2010-2015). The majority of Gulf recreational mutton snapper is harvested in Florida and Alabama (average of 96.8% from 2010-2015), followed by Texas, and Louisiana and Mississippi (SEFSC MRIP ACL Dataset). Recreational landings for Florida and Alabama and Louisiana and Mississippi are aggregated together because of the manner in which headboat landings are reported; however the majority, if not all, of the landings attributed to the combined category of Florida and Alabama are landed in Florida. Recreational landings for Texas and Louisiana and Mississippi are not reported because of confidentiality issues. Recreational landings reported to MRIP exclude Monroe County.

Gag

The majority of Gulf commercial gag landings are from waters adjacent to Florida (average of approximately 98.9% from 2010-2016), followed by Louisiana and Texas, and Alabama and Mississippi (Table 3.4.1.1).

Table 3.4.1.1. Percentage of total commercial gag landings by state for 2010-2016. The state represents the state of the dealer facility and not necessarily the landing location.

Year	FL	AL/MS	LA/TX
2010	98.45%	0.37%	1.19%
2011	99.16%	0.11%	0.73%
2012	99.07%	0.09%	0.84%
2013	98.55%	0.12%	1.34%
2014	99.02%	0.18%	0.80%
2015	98.91%	0.11%	0.98%
2016	99.14%	0.14%	0.73%

Source: IFQ database accessed 2/23/17.
Notes: LA/TX and AL/MS are aggregated for confidentiality reasons.

3.4.2 Fishing Communities

The descriptions of Gulf communities include information about the top communities based on a "regional quotient" (RQ) of commercial landings and value for mutton snapper or gag. The RQ

is the proportion of landings and value out of the total landings and value of that species for that region, and is a relative measure. These communities would be most likely to experience the effects of the proposed actions that could change the mutton snapper and gag fisheries and impact participants, associated businesses, and communities within the region. If a community is identified as a mutton snapper or gag community based on the RQ, this does not necessarily mean that the community would experience significant impacts due to changes in the fishery if a different species or number of species were also important to the local community and economy. Additional detailed information about communities with the highest RQs, can be found for Gulf communities on the Southeast Regional Office's Community Snapshots website at http://sero.nmfs.noaa.gov/sustainable_fisheries/social/community_snapshot/.

In addition to examining the RQs to understand how communities are engaged and reliant on fishing, indices were created using secondary data from permit and landings information for the commercial sector (Jepson and Colburn 2013, Jacob et al. 2013). Fishing engagement is primarily the absolute numbers of permits, landings, and value for all species. For commercial fishing, the analysis used the number of vessels designated commercial by homeport and owner address, value of landings, and total number of commercial permits for each community for all species. Fishing reliance includes the same variables as fishing engagement divided by population to give an indication of the per capita influence of this activity.

Using a principal component and single solution factor analysis, each community receives a factor score for each index to compare to other communities. Factor scores of both engagement and reliance were plotted for the communities with the highest RQs. Two thresholds of one and one-half standard deviation above the mean are plotted to help determine a threshold for significance. The factor scores are standardized; therefore, a score above a value of 1 is also above one standard deviation. A score above one-half standard deviation is considered engaged or reliant with anything above one standard deviation to be very engaged or reliant.

The reliance index uses factor scores that are normalized. The factor score is similar to a z-score in that the mean is always zero, positive scores are above the mean, and negative scores are below the mean. Comparisons between scores are relative; however, like a z-score, the factor score puts the community on a point in the distribution. Objectively, that community will have a score related to the percent of communities with similar attributes. For example, a score of 2.0 means the community is two standard deviations above the mean and is among the 2.27% most vulnerable places in the study (normal distribution curve). Reliance score comparisons between communities are relative; however, if the community scores greater than two standard deviations above the mean, this indicates that the community is dependent on fishing. Examining the component variables on the reliance index and how they are weighted by factor score provides a measurement of commercial reliance. The reliance index provides a way to gauge change over time in these communities and also provides a comparison of one community with another.

Landings for the recreational sector are not available by species at the community level; therefore, it is not possible with available information to identify communities as dependent on recreational fishing for mutton snapper. However, Figure 1.1.2 shows the mean recreational landings by recreational data collection region for mutton snapper in Florida. Because limited data are available concerning how recreational fishing communities are engaged and reliant on

specific species, indices were created using secondary data from permit and infrastructure information for the southeast recreational fishing sector at the community level (Jepson and Colburn 2013, Jacob et al. 2013). Recreational fishing engagement is represented by the number of recreational permits and vessels designated as "recreational" by homeport and owners address. Fishing reliance includes the same variables as fishing engagement, divided by population. Factor scores of both engagement and reliance were plotted. Florida communities including Gulf and Florida Keys communities were included in the analysis because the majority of recreational mutton snapper fishing occurs off the southwestern coast of Florida and in the Florida Keys. Communities were analyzed in ranked order by recreational fishing engagement. The top 20 recreational communities were compared to recreational data collection regions with recreational landings of mutton snapper in Figure 1.1.2. Top communities located in recreational data collection regions with recreational landings of mutton snapper are presented.

A suite of indices were created to examine the social vulnerability of coastal communities. 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 five, disruptions such as higher separation rates, higher crime rates, and unemployment are all signs of populations experiencing vulnerabilities. For those communities that exceed the threshold, it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change.

Mutton Snapper

Commercial Fishing Communities

All Gulf communities with commercial landings of mutton snapper are located in Florida (SERO Community ALS, 2014). About 37% of mutton snapper is landed in the top two communities (St. Petersburg and Madeira Beach), representing about 35% of the Gulf-wide ex-vessel value for the species (Figure 3.4.2.1). Additionally, two other greater Tampa Bay area communities (Tarpon Springs and Cortez) are included in the top communities and these two communities represent about 11% of landings and 11% of value. Several Florida Keys communities (Key West, Key Largo, and Islamorada) are included in the top communities and collectively represent about 19% of landings and 23% of value.

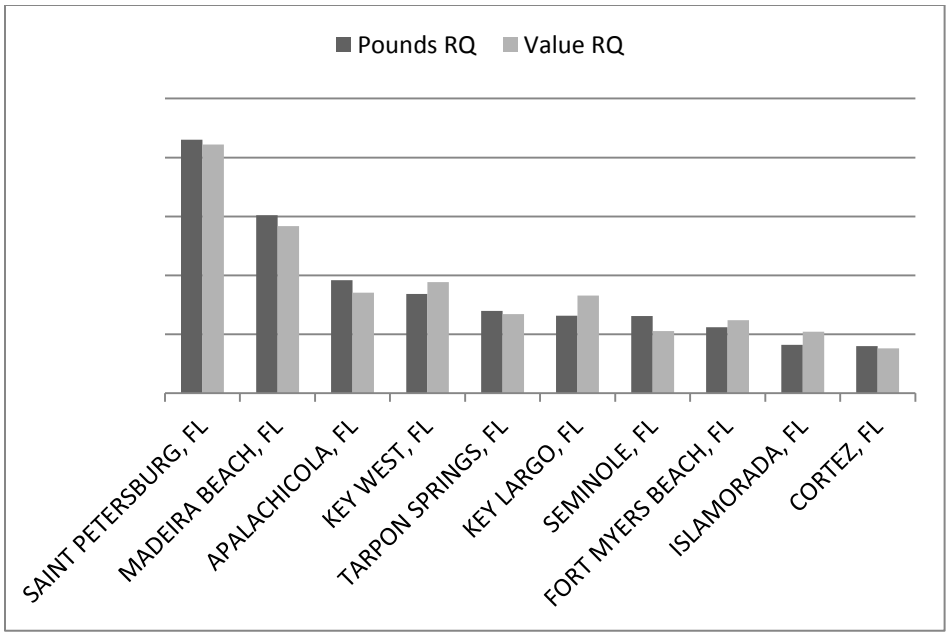

Figure 3.4.2.1. Top ten Gulf communities ranked by pounds and value RQ of mutton snapper, 2014. The actual RQ values (y-axis) are omitted from the figure to maintain confidentiality.
Source: SERO, Community ALS 2014.

The details of how these indices are generated are explained at the beginning of the Fishing Communities section. The primary communities that demonstrate high levels of commercial engagement and reliance include Madeira Beach, Apalachicola, Key West, Fort Myers Beach, and Cortez, Florida (Figure 3.4.2.2).

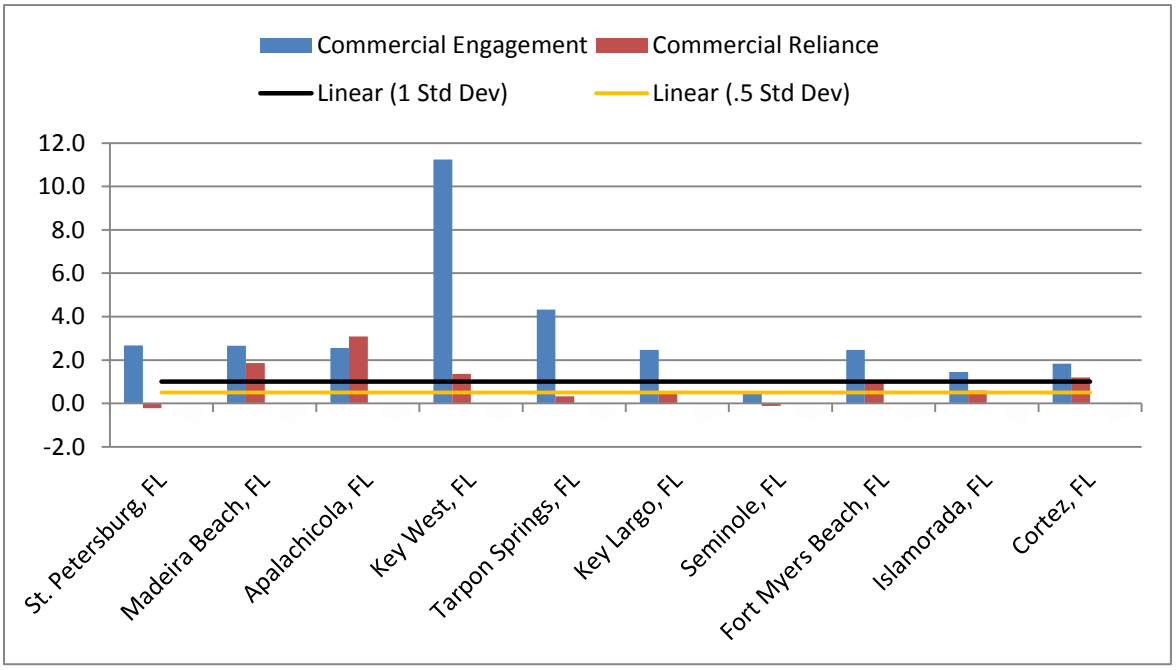

Figure 3.4.2.2. Top ten Gulf mutton snapper communities' commercial engagement and reliance.
Source: SERO, Social indicators database (2012).

Recreational Fishing Communities

Gulf recreational landings of mutton snapper are low (range of 1,391 to 7,156 lbs for years 2010-2015, Table 1.1.4) and the majority of recreational mutton snapper are harvested off the southwestern coast of Florida and in the Florida Keys. Figure 3.4.2.3 identifies the Florida communities that are the most engaged and reliant on recreational fishing and are located in recreational data collection regions with recreational landings of mutton snapper. Two thresholds of one and one-half standard deviation above the mean were plotted to help determine a threshold for significance. Communities are presented in ranked order by fishing engagement and all 13 included communities demonstrate high levels of recreational engagement, although this is not specific to fishing for mutton snapper. Five communities (Key West, Marathon, Islamorada, Fort Myers Beach, and Big Pine Key) demonstrate high levels of recreational reliance, although not specific to mutton snapper.

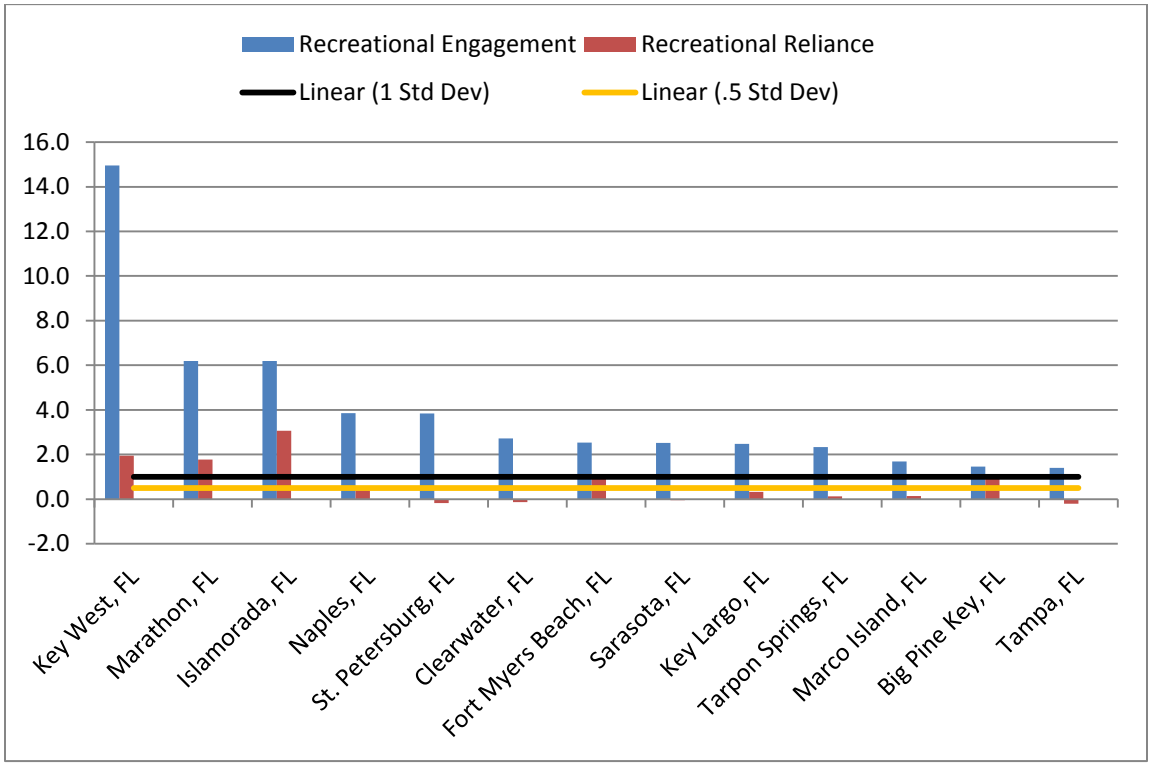

Figure 3.4.2.3. Recreational fishing communities' engagement and reliance.
Source: SERO, Social indicators database (2012).

Gag

Commercial Fishing Communities

All of the top gag communities are located in Florida (Figure 3.4.2.4). About 31% of gag is landed in the top community of Madeira Beach, representing about 31% of Gulf-wide ex-vessel value for the species. Two Florida Panhandle communities (Apalachicola and Panama City) are ranked second and third and collectively represent about 32% of landings and 31% of value.

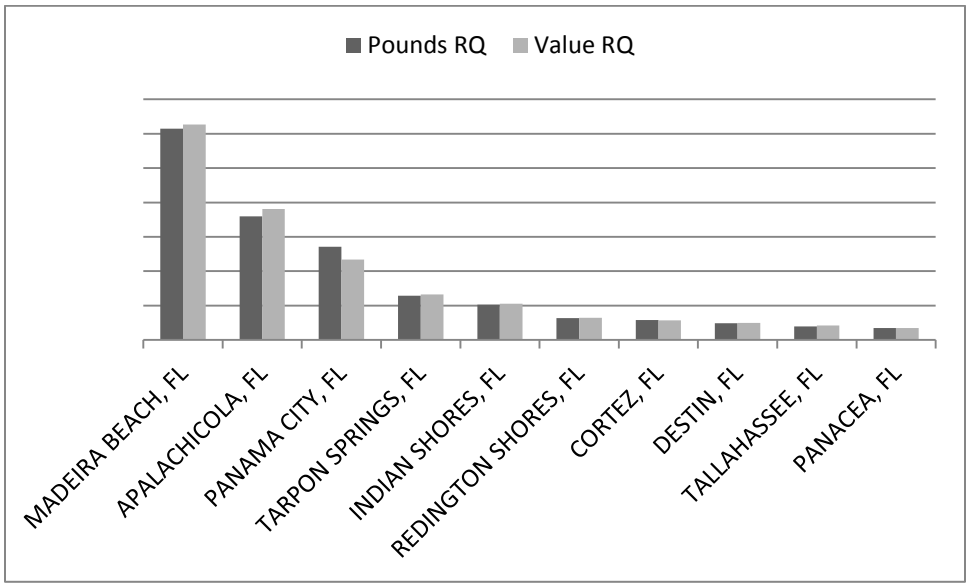

Figure 3.4.2.4. Top ten Gulf communities ranked by pounds and value RQ of gag, 2016. The actual RQ values (y-axis) are omitted from the figure to maintain confidentiality.
Source: IFQ database accessed 2/24/17.

The details of how these indices are generated are explained at the beginning of the Fishing Communities section. The primary communities that demonstrate high levels of commercial engagement and reliance include Madeira Beach, Apalachicola, and Cortez, Florida (Figure 3.4.2.5).

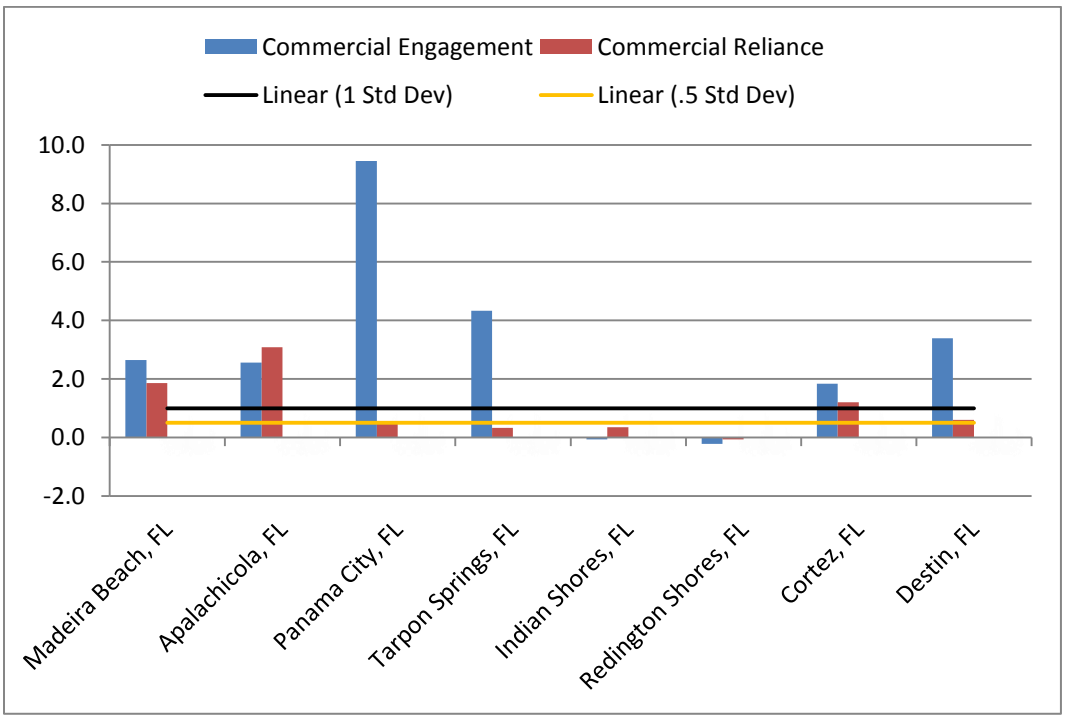

Figure 3.4.2.5. Top ten Gulf gag communities' commercial engagement and reliance.
Source: SERO, Social indicators database (2012).

Social Vulnerability

Figure 3.4.2.6 provides the social vulnerability of the top commercial and recreational communities. One community exceeds the threshold of one standard deviation above the mean for any of the indices (Apalachicola, Florida). One community exceeds the threshold of one half standard deviation above the mean for three of the indices (Tampa, Florida). These communities would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

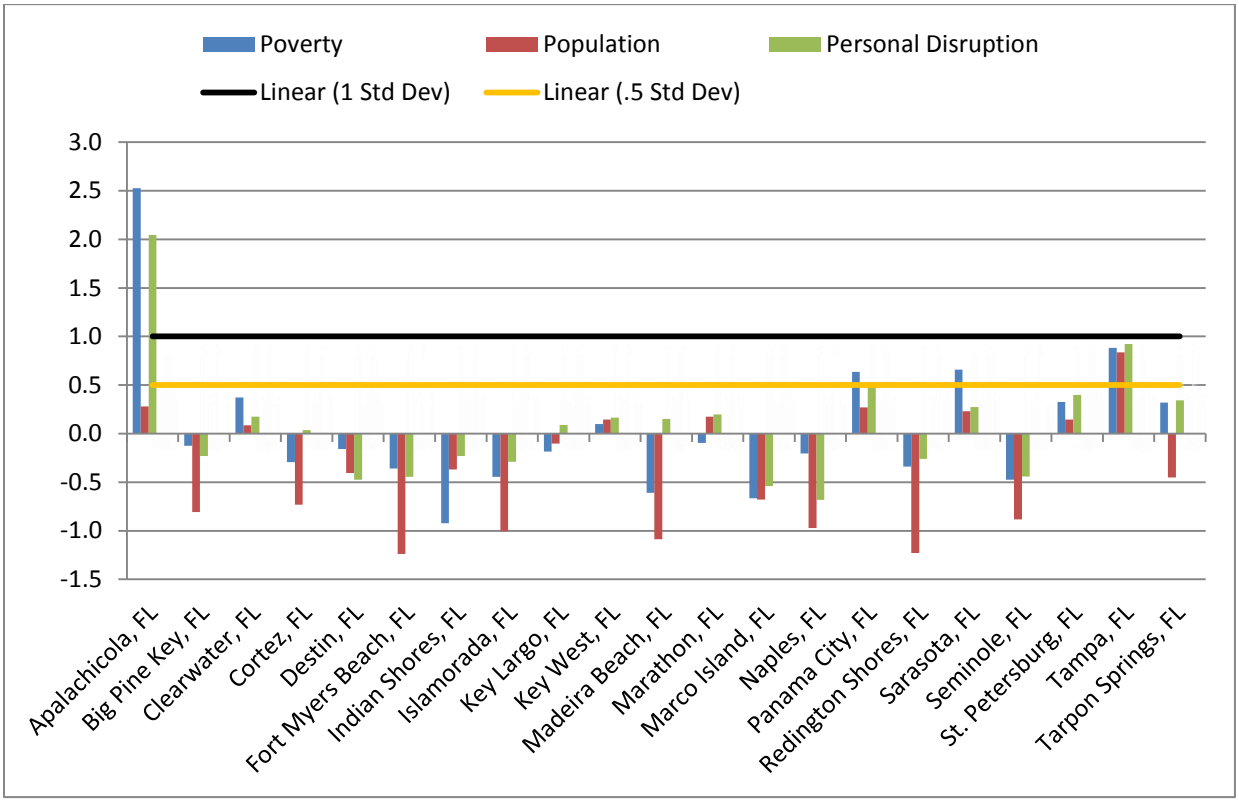

Figure 3.4.2.6. Social vulnerability indices for top commercial and recreational fishing communities.
Source: SERO, Social indicators database (2012).

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).

Information on race, ethnicity, and income status for groups at the different participation levels in commercial and recreational fishing for reef fish (fishermen, captains, crew, dealers, and employees of commercial and recreational fishing businesses, etc.) is not available, because these types of data are not collected by NMFS or other agencies. However, as addressed in the social effects analysis for each action (Chapter 4), the effects are generally expected to be minimal, but positive overall. Further, the actions in this amendment would not affect commercial or recreational fishing participants differently based on race, ethnicity, or income status. Thus, disproportionate impacts to EJ populations are not expected to result from any of the actions in this amendment. Nevertheless, the lack of impacts on EJ populations cannot be assumed. Finally, there are no known claims for customary usage or subsistence consumption of any of the species managed under the IFQ programs by any population including tribes or indigenous groups.

3.5 Description of the Administrative Environment

3.5.1 Federal Fishery Management

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

Responsibility for federal fishery management is shared by the 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 promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix A. In most cases, the Secretary has delegated this authority to NMFS.

The Council is responsible for fishery resources in federal waters of the Gulf. These waters extend to 200 nautical miles offshore from the nine-mile seaward boundary of the states of Florida and Texas, and the three-mile seaward boundary of the states of Alabama, Mississippi, and Louisiana. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline of 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

The Council consists of seventeen voting members: 11 public members appointed by the Secretary; one each from the fishery agencies of Texas, Louisiana, Mississippi, Alabama, and Florida; and one from NMFS. The public is also involved in the fishery management process through participation on advisory panels and through Council meetings that, with few

exceptions for discussing personnel matters, are open to the public. The regulatory process is also in accordance with the Administrative Procedures Act, in the form of "notice and comment" rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

Regulations contained within FMPs are enforced through actions of the National Oceanic and Atmospheric Administration's Office of Law Enforcement, the United States Coast Guard, and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. These activities are being coordinated by the Council's Law Enforcement Advisory Panel and the Gulf States Marine Fisheries Commission's Law Enforcement Committee, which have developed joint enforcement agreements and cooperative enforcement programs (www.gsmfc.org).

The mutton snapper stock in the Gulf is classified as not overfished and not undergoing overfishing (SEDAR 15A Update 2015). Likewise, the gag stock in the Gulf is also classified as not overfished and not undergoing overfishing (SEDAR 33 Update 2017). Adjustments to management measures are needed periodically to prevent ACLs from being exceeded. These management measures are needed to maintain the stocks above the minimum stock size threshold and to prevent overfishing, and are implemented through regulatory amendments.

3.5.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf States exercises legislative and regulatory authority over their respective state's natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided in Amendment 22 (GMFMC 2004b).

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1 - Establish Annual Catch Limits for Gulf of Mexico Apportioned Mutton Snapper

Alternative 1: No Action. Maintain the current annual catch limit (ACL) and annual catch target (ACT) established in the Generic ACL/Accountability Measures (AMs) Amendment. The Gulf of Mexico (Gulf) ACL is 18% of the stock acceptable biological catch (ABC) based on the Gulf and South Atlantic apportionment. The ACL/ACT control rule established a 14% buffer between the ACL and the ACT.

OFL = 1.48 mp ww based upon equilibrium yield @ $F_{30\%SPR}$
ABC = 1.13 mp ww based upon equilibrium yield @ $F_{40\%SPR}$
ACL = ABC
Gulf ACL = ACL * 0.18 (0.203 mp ww)
Gulf ACT = Gulf ACL * 0.86 (0.175mp ww)

Alternative 2: Accept the OFLs and ABCs recommended by the Gulf and South Atlantic SSCs from 2017 through 2020. Establish the Gulf apportionment of the ACL equal to 18% of the stock ABC.

Option 2a: Remove Gulf ACT as a management target. **(Gulf Reef Fish AP Recommended)**

Option 2b: Apply the Gulf's ACL/ACT control rule buffer based on landings from 2012 to 2014. The results in a 12% buffer between the Gulf ACL and the Gulf ACT.

Year	Stock OFL	Stock ABC	Gulf ABC/ACL	Gulf ACT
2017	751,711	717,200	129,096	113,605
2018	793,823	746,800	134,424	118,293
2019	835,318	774,400	139,392	122,665
2020	850,077	798,300	143,694	126,451

Alternative 3: Accept the OFLs and ABCs recommended by the Gulf and South Atlantic SSCs from 2017 through 2020. Apply the Gulf apportionment equal to 18% of the stock ABC. Use the ACL/ACT control to this apportionment and set the Gulf ACL equal to 88% of the apportionment (i.e., 12% buffer using landings from 2012-2014). Do not establish a Gulf ACT.

Year	Stock OFL	Stock ABC	Gulf's ABC	Gulf ACL
2017	751,711	717,200	129,096	113,605
2018	793,823	746,800	134,424	118,293
2019	835,318	774,400	139,392	122,665
2020	850,077	798,300	143,694	126,451

4.1.1 Direct and Indirect Effects on the Physical Environment

Fishery management actions affecting the physical environment mostly relate to the interactions of fishing with bottom habitat, most commonly through gear impacts to or interactions with bottom habitat. For commercial harvest, the primary gears used to harvest mutton snapper are hook-and-line and, to a much lesser extent, spearfishing. For recreational harvest, mutton snapper are taken primarily by hook-and-line and spearfishing. Recreational harvest of mutton snapper is from both private and charter vessels, with a small amount of shore-based fishing (SEDAR 15A 2008).

Fishing gear can damage or disturb bottom structures and occasionally incidentally harvest such habitat. The degree to which a habitat is affected by fishing gear depends largely on the vulnerability of the affected habitat to disturbance, and on the rate at which the habitat can recover from disturbance (Barnette 2001). For example, the complex structure and vertical growth pattern of coral reef species makes reef habitat more vulnerable to adverse impacts from fishing gear and slower to recover from such impacts than is sand and mud bottom habitat (Barnette 2001).

Vertical Line Fishing
Concentrations of many managed reef fish species are higher on hard-bottom areas than on sand or mud bottoms, thus vertical line gear fishing generally occurs over hard-bottom areas (GMFMC 2004a). Vertical lines include multi-hook bandit gear, handlines, and rod-and-reels. Vertical-line gear has the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001). Bandit gear uses a weighted line that is lowered just above the bottom, with the gear in only brief direct contact with the bottom (Siebenaler and Brady 1952). Barnette (2001) suggested that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights. Commercial or recreational fishing with rod-and-reel and handlines also puts gear on the bottom. The weight is either lifted off the bottom like fishing with bandit gear, or left on the bottom. Fishing line can become entangled on coral and hard bottom outcroppings, with resultant algal growth fouling or killing underlying coral (Barnette 2001). Researchers observed lost fishing line on bottom habitat in the Madison-Swanson Reserve which often appeared fairly old and covered with growth (A. David, pers. comm.), indicating that bottom fishing impacted the physical environment prior to fishing being prohibited in the area (GMFMC 2003).

Anchor damage is also associated with vertical-line fishing effort, particularly by the recreational sector where fishermen may repeatedly visit well-marked fishing locations. Bohnsack (Hamilton 2000) showed that popular fishing areas are routinely targeted and revisited, particularly with the advent of global positioning technology. The cumulative effects of repeated anchoring could damage hard bottom areas where fishing for mutton snapper occurs.

Spearfishing
Spearfishing is a relatively minor component of harvest for reef fish. A study by Gomez (1987) concluded that spearfishing on reef habitat may result in occasional coral breakage, but damage is likely negligible. Also, some impacts from divers touching coral with hands or from resuspension of sediment by fins is possible (Barnette 2001). Such impacts should be negligible

to non-existent for well-trained and experienced spearfishers who stay in the water column and avoid contact with the bottom.

Modifying the mutton snapper ACL or ACT does not directly affect the physical environment. However, specifying these values may indirectly affect the physical environment by defining the future level of fishing effort needed to harvest either value. Hook-and-line and spearfishing gear typically have minimal adverse physical environmental effects. Generally, alternatives allowing greater levels of fishing effort would have greater affects, as more gear would ostensibly be used for longer periods of time compared to those alternatives which allow less fishing effort. However, these effects are expected to be minimal because no significant change in overall fishing effort is expected. The reef fish fishery is a multispecies fishery, with continual effort shifting amongst reef fish species as seasons open and close.

The South Atlantic Fishery Management Council's (South Atlantic Council) Scientific and Statistical Committee (SSC) recommended that the OFL be set equal to the equilibrium maximum sustainable yield proxy, which is the yield at the fishing mortality (F) level which achieves a 30% spawning potential ratio ($F_{30\%SPR}$), or 1.52 million pounds (mp) whole weight (ww), including estimated dead discards. The South Atlantic Council's SSC also recommended that the ABC be set equal to the equilibrium optimum yield, which is the yield at $F_{40\%SPR}$ = 1.16 mp ww, including estimated dead discards. The Gulf Council's SSC recommendation of OFL and ABC is consistent with the South Atlantic SSC, but OFL and ABC are established in landed weight excluding dead discards. Yield streams are calculated assuming the entirety of the recommended harvest will be caught annually. If recent landings are largely different, the assessment may need to be updated with recent landings to produce an updated yield stream. Further, the accountability measures for the Gulf are based on the ACL, while the projected fishing season length is based on the ACT.

Alternative 1 would maintain the current ACL and ACT established in the Generic ACL/AM Amendment (2011). The Gulf ACL is 18% of the stock ABC based on the Gulf and South Atlantic apportionment, which used means from 50% of landings from 1990-2008 and 50% of landings from 2006-2008. The ACL/ACT control rule established a 14% buffer between the ACL and the ACT. The SEDAR 15A Update assessment (2015) indicated that the mutton snapper stock was healthy (see section 3.2.1); however, the available spawning stock biomass was estimated to be smaller than in the previous stock assessment (SEDAR 15A 2008). In maintaining the current ACL and ACT, **Alternative 1** would disregard the best scientific information available, and would permit more fishing effort than is recommended by the most recent stock assessment (SEDAR 15A Update 2015).

Alternative 2 would accept the OFLs and ABCs recommended by the Gulf and South Atlantic SSCs from 2017 through 2020, and would establish the Gulf apportionment of the ACL equal to 18% of the stock ABC (the historical apportionment). Options to remove (**Option 2a**) or apply (**Option 2b**) the Gulf Council's ACL/ACT control rule buffer (12%, using years 2012 – 2014) are also presented. Functionally, **Alternative 2** reduces the allowable harvest and, therefore, allowable fishing effort, when compared with **Alternative 1**. This reduction results in positive indirect effects to the physical environment through the comparative reduction of fishing effort to the greatest degree under **Option 2b**, followed by **Option 2a**; however, the small difference in allowable landings between these options makes the difference in their effects negligible.

Comparably to **Alternative 2**, **Alternative 3** would also accept the SSC-recommended OFLs and ABCs, and would apply the historical Gulf apportionment equal to 18% of the stock ABC. Further, **Alternative 3** would apply the ACL/ACT control to this apportionment and set the Gulf ACL equal to 88% of the apportionment (i.e., 12% buffer using landings from 2012-2014). No ACT would be established in the Gulf. In practice, **Alternative 3** is functionally similar to **Option 2b** of **Alternative 2**. The primary difference is that AMs are activated when the ACL is met, and if an ACT is used as a management tool, then the fishing season will be set using the ACT. This means that the fishing season would close sooner (and fishing effort would be less) under **Alternative 3**. Even though the estimated fishing season under **Option 2b** of **Alternative 2** would be shorter than under **Alternative 3**, fishing effort would still not cease until the ACL was met or projected to be met.

4.1.2 Direct and Indirect Effects on the Biological/Ecological Environment

The SEDAR 15A Update assessment (2015) indicated that the mutton snapper stock was healthy (see section 3.2.1); however, the available spawning stock biomass was estimated to be smaller than in the previous stock assessment (SEDAR 15A 2008). This observed reduction in spawning biomass resulted in OFL and ABC yield streams which are lower than that which was previously estimated. In maintaining the current ACL and ACT established in the Generic ACL/AM Amendment, **Alternative 1** would disregard the best scientific information available, and would continue to allow harvest of mutton snapper above what is recommended by the stock assessment and the Councils' SSCs. **Alternative 1** could therefore result in negative direct effects to the biological/ecological environment through excessive harvest, further jeopardizing the size of the mutton snapper spawning stock.

Alternatives 2 and **3** both recommend some manner of decrease in allowable harvest of mutton snapper compared to **Alternative 1**, based on the recommendations of the Councils' SSCs. Both alternatives accept the OFLs and ABCs recommended by the SSCs from 2017-2020, and use the historical Gulf apportionment of the ACL equal to 18% of the stock ABC. **Alternative 2 Option 2b** and **Alternative 3** set target harvest levels which are essentially identical in terms of determining the forecast length of a year's fishing season. The primary difference is that AMs are activated when the ACL is met for **Alternative 3**, and if an ACT is used as a management tool (**Alternative 2 Option 2b**), then the fishing season will be set using the ACT. However, negative biological/ecological effects on the stock are not anticipated so long as the harvest during a particular fishing year does not exceed the ABC for that year.

Relationships among marine species are complex and often poorly understood, making the accurate quantification of ecological effects difficult. The most recent mutton snapper stock assessment (SEDAR 15A Update 2015) indicated the southeastern U.S. mutton snapper stock is not overfished and is not experiencing overfishing (see section 3.2.1). It is possible that forage and competitor species could experience changes in abundance in response to changes in mutton snapper abundance. Although birds, dolphins, and other predators may feed on mutton snapper discards, there is no evidence that any of these species rely on mutton snapper discards for food. Changes in the prosecution of the reef fish fishery are not expected from this action, so no additional effects to protected resources (see Section 3.2.4) are anticipated. Additionally, because

of the multispecies nature of this fishery (as discussed in Section 3.2) and that the primary gear used to harvest mutton snapper is hook-and-line and spearfishing (as discussed in Section 4.1.1), this action should have minimal impacts in terms of bycatch.

4.1.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain the current mutton snapper ACL and ACT. Therefore, **Alternative 1** would not affect mutton snapper harvests in the Gulf and would not be expected to result in economic effects.

Between 2017 and 2020, **Alternative 2** would apportion 18% of the mutton snapper stock ABC to the Gulf, thereby decreasing the Gulf mutton snapper ACL (**Option 2a**). **Option 2b** would establish a Gulf ACT and set a 12% buffer between the ACL and ACT. For **Alternative 2**, ACL (or ACT) changes relative to the current ACL (or ACT) are provided in Table 4.1.3.1.

Between 2017 and 2020, **Alternative 3** would not set and ACT for Gulf mutton snapper but would establish a Gulf ACL equal to the ACT considered in **Alternative 2** (**Option 2b**). For **Alternative 3**, ACL changes relative to the current ACL are provided in Table 4.1.3.2.

Table 4.1.3.1. Mutton snapper stock ACL and ACT for Alternatives 1 and 2 and ACL and ACT changes relative to Alternative 1.

Year	Alt 1 ACL	Alt 2a (ACL)	ACL Change	Alt 1 ACT	Alt 2b (ACT)	ACT Change
2017	203,000	129,096	-73,904	175,000	113,605	-61,395
2018	203,000	134,424	-68,576	175,000	118,293	-56,707
2019	203,000	139,392	-63,608	175,000	122,665	-52,335
2020	203,000	143,694	-59,306	175,000	126,451	-48,549

Table 4.1.3.2. Mutton snapper stock ACL for Alternatives 1 and 3 and ACL changes relative to Alternative 1.

Year	Gulf ACL	Alt 3 ACL	ACL Change
2017	203,000	113,605	-89,395
2018	203,000	118,293	-84,707
2019	203,000	122,665	-80,335
2020	203,000	126,451	-76,549

Between 2010 and 2015, commercial landings accounted for 95.75% of the Gulf mutton snapper landings (Table 1.1.4); recreational anglers harvested the remaining 4.25%. While it is noted that there are no sector ACL and ACT in the Gulf, commercial and recreational effects discussed in this section are based on these percentages. Changes in stock ACL or ACT expected to result

from **Alternatives 2-3** are proportionally assigned to the commercial and recreational sectors based on these percentages. Decreases in commercial ex-vessel value expected to result from **Alternatives 2** and **3** (Table 4.1.3.3) are estimated based on a 2011-2015 average ex-vessel price per pound of $2.53 (NOAA website https://www.st.nmfs.noaa.gov accessed on 3/9/2017).

Table 4.1.3.3. Alternatives 2 and 3 mutton snapper ACL (or ACT) changes in pounds and ex-vessel values (attributed to the commercial sector) relative to Alternative 1.

Year	Alternative 2a		Alternative 2b		Alternative 3	
	lbs	Value ($)	lbs	Value ($)	lbs	Value ($)
2017	-72,241	-$182,770	-60,014	-$151,834	-87,384	-$221,081
2018	-67,033	-$169,594	-55,431	-$140,241	-82,801	-$209,487
2019	-62,177	-$157,307	-51,157	-$129,428	-78,527	-$198,674
2020	-57,972	-$146,668	-47,457	-$120,065	-74,827	-$189,311

For the recreational sector, economic effects expected to result from **Alternatives 2-3** are based on the changes in consumer surplus (CS) associated with the expected changes in ACL (or ACT) attributed to the recreational sector and expressed in number of fish. Because the average weight of Gulf mutton snapper in the recreational sector is not known, the conversion of pounds to number of fish is based on the average weight in the commercial sector. In the most recent assessment (SEDAR 15), the average weight of mutton snapper is estimated at 3.5 pounds. In addition, since the CS per mutton snapper is not known, the proxy value used in this analysis is the CS value for an additional "snapper" (not specific to the species) kept on a trip, i.e. $12.38 (Haab et al. 2012; values updated to 2015 dollars). For the recreational sector, Table 4.1.3.4 provides changes in ACL (or ACT) expressed in pounds. Changes in ACL or ACT attributed to the recreational sector (expressed in number of fish) and associated changes in CS are provided in Table 4.1.3.5.

Table 4.1.3.4. Alternatives 2 and 3 mutton snapper ACL (or ACT) changes attributed to the recreational sector relative to Alternative 1 (No Action).

Year	Alternative 2a	Alternative 2b	Alternative 3
2017	-1,663	-1,381	-2,011
2018	-1,543	-1,276	-1,906
2019	-1,431	-1,178	-1,808
2020	-1,334	-1,092	-1,722

Table 4.1.3.5. Alternatives 2 and 3 mutton snapper ACL (or ACT) changes in number of fish and in CS (attributed to the recreational sector) relative to Alternative 1.

Year	Alternative 2a		Alternative 2b		Alternative 3	
	Number of fish	Value ($)	Number of fish	Value ($)	Number of fish	Value ($)
2017	-475	-$5,882	-395	-$4,886	-575	-$7,115
2018	-441	-$5,458	-365	-$4,513	-545	-$6,741
2019	-409	-$5,062	-336	-$4,165	-516	-$6,394
2020	-381	-$4,720	-312	-$3,864	-492	-$6,092

The estimated changes in commercial ex-vessel value and in recreational consumer surplus are provided as upper bounds for economic effects expected to result from **Alternatives 2-3.** It is likely that recreational anglers as well as commercial fishermen will modify their behavior to mitigate potential losses. Recreational anglers would for example be expected to adjust their species mix within the 10-fish aggregate snapper bag limit. Similarly, commercial fishermen could increase their harvest of other reef fish species, particularly non-IFQ reef fish, e.g., vermillion snapper.

4.1.4 Direct and Indirect Effects on the Social Environment

Although an ACT is established, the ACT is not used for management purposes. Also, there is no post-season accountability measure (AM) for mutton snapper. In the event the ACL is estimated to be reached, an in-season AM would be triggered, prohibiting the further harvest of mutton snapper for the duration of the year. From 2010 through 2015, the combined commercial and recreational landings of mutton snapper have not reached the Gulf ACT or Gulf ACL (Table 1.1.4). During these years, combined Gulf landings were highest in 2014, reaching 78% of the ACT (0.175 mp), or 68% of the ACL (.203 mp). Thus, there has never been an in-season closure for mutton snapper.

The recent stock assessment (SEDAR 15A Update 2015) shows that the adult mutton snapper population is smaller than previously estimated. Therefore, the ACL needs to be reduced to prevent overfishing or the stock from becoming overfished. The Council's SSC has recommended new ABCs for 2017-2020, which represent the best available science. The new ABCs are lower than the current ABC (and the current ABC is equal to the ACL). Direct effects would not result from modifying the ACL. Rather, negative indirect effects would result if the lowered ACLs result in an in-season closure being triggered, or if more restrictive management measures are implemented to constrain harvest to below the new ACL.

Additional effects are not usually expected from **Alternative 1**, but preserving the current ACL could allow overfishing to occur or the stock to become overfished. Should this occur, negative effects would result from a determination of overfishing or overfished status, as a rebuilding plan would be required. More stringent management measures would be needed to rebuild a stock than measures used to manage a stock that is neither overfished nor undergoing overfishing.

Alternatives 2 and **3** would reduce the catch limits from current levels (**Alternative 1**), resulting in some negative indirect effects in the short-term should the lower catch limits result in an in-season closure to harvest. Because the ACT is not currently used for management, the catch limits under **Alternative 2**'s **Option 2a** and **2b** are essentially the same. Although **Option 2b** sets values for the ACT, it is only when the ACL is met that the in-season AM is triggered, closing the harvest of mutton snapper for the remainder of the year. Thus, the social effects are the same between the options under **Alternative 2**. The catch limits under **Alternative 3** are lower than **Alternative 2**, thus greater negative effects would be expected from **Alternative 3**, as it would be more likely to reach the lower catch limits under **Alternative 3**, triggering an in-season closure.

For both **Alternatives 2** and **3**, the lowest catch levels would be set for 2017, with the limits increasing thereafter through 2020. Thus, negative indirect effects would be expected to be greatest in 2017, and should decrease somewhat in subsequent years. These indirect effects would relate to the triggering of an in-season closure as a result of reaching the ACL and any corresponding restrictions adopted to constrain harvest. Total Gulf landings averaged 136,183 lbs for 2014 and 2015 (Table 1.1.4). Assuming that catch remains the same as during these years, an in-season closure would be expected to occur during each year under the increasing annual ACLs of **Alternative 3**, although the in-season closure would likely occur later in each subsequent year. For **Alternative 2**, the ACLs for 2017and 2018 are lower than the average total Gulf landings for 2014-2015, while the ACLs for 2019 and 2020 are higher. Thus, assuming that catch remains the same as during 2014-2015, in-season closures under **Alternative 2** would likely occur only during 2017 and 2018, but these closures would occur later in the year than if **Alternative 3** is selected. Nevertheless, assuming that catch levels would remain the same as those in 2014-2015 is not likely, as the total Gulf landings of mutton snapper have increased overall since 2010 (Table 1.1.4). Thus, it is likely that in-season closures will occur earlier in the year than if catch levels remain constant from past years.

4.1.5 Direct and Indirect Effects on the Administrative Environment

Establishing ACLs and ACTs is a one-time event and is not anticipated to have substantial direct or indirect administrative effects regardless of the alternatives (**Alternatives 1 – 3**). All alternatives maintain constant ACLs and/or ACTs through 2020, or until the next stock assessment. Once these ACLs and ACTs are implemented, the type of regulations needed to manage the reef fish fishery would remain unchanged regardless of the choice of harvest levels. Sector specific catches and effort must be monitored and if the sector specific landings are projected to reach the ACL the fishery will be closed. Further, the NMFS' Office of Law Enforcement, in cooperation with state agencies, would continue to monitor both recreational and commercial landings. The Southeast Regional Office (SERO) monitors both the recreational and commercial landings in cooperation with the Southeast Fisheries Science Center (SEFSC) and Gulf states to determine if landings are meeting or exceeding the specified ACTs. Some administrative burden is anticipated with respect to outreach as it relates to notifying stakeholders of the changes to harvest levels.

4.2 Action 2 - Modify the Gulf Mutton Snapper Recreational Bag Limit

Alternative 1: No Action. Mutton snapper remain part of the aggregate 10-snapper recreational bag limit in the Gulf.

Alternative 2: Retain mutton snapper within the aggregate 10-snapper recreational bag limit in the Gulf, but specify a bag limit for mutton snapper within the aggregate bag limit year round.

Option 2a: 3 fish/person/day

Option 2b: 5 fish/person/day

4.2.1 Direct and Indirect Effects on the Physical Environment

The number of mutton snapper landed by recreational anglers in the Gulf is low, accounting for less than 5% of all mutton snapper landings in the Gulf (on average) from 2010 – 2015 (Table 1.1.4). **Alternative 1** would retain mutton snapper as part of the aggregate 10-snapper recreational bag limit in the Gulf, and is expected to result in no discernible change to the present physical environment. The current level of recreational fishing effort would be expected to remain unchanged, resulting in status-quo effects with respect to angler interactions with the physical environment (anchoring, gear fouling, etc). **Alternative 2** would retain mutton snapper as part of the aggregate 10-snapper recreational bag limit in the Gulf, but specify a year-round bag limit for mutton snapper within the aggregate bag limit of either three (**Option 2a**) or five (**Option 2b**) fish per person per day. A reduction in the daily bag limit for mutton snapper may result in less directed effort by Gulf recreational anglers on mutton snapper, since effort to catch mutton snapper would presumably cease once the lower bag limit was met. However, due to the low mean recreational landings of mutton snapper in the Gulf (Table 1.1.4), any reduction in effects to the physical environment is likely indiscernible between **Alternatives 1** and **2**.

4.2.2 Direct and Indirect Effects on the Biological/Ecological Environment

Alternative 1 would retain mutton snapper as part of the aggregate 10-snapper recreational bag limit in the Gulf, and would not result in any change to the current biological/ecological environment. However, since the most recent stock assessment on mutton snapper (SE$DAR 15A Update 2015) determined that the spawning stock biomass of mutton snapper was smaller than previously estimated in SEDAR 15A (2008), maintaining a larger bag limit may cause additional strain on the remaining spawning stock biomass and result in negative biological effects to the stock.

Alternative 2 would retain mutton snapper within the aggregate 10-snapper recreational bag limit in the Gulf, but would also specify a year-round bag limit for mutton snapper within the aggregate bag limit. Reducing the mutton snapper daily bag limit to three (**Option 2a**) or five (**Option 2b**) fish per person per day within the greater aggregate 10-snapper recreational bag limit would be expected to result in positive biological effects for mutton snapper. With a reduced bag limit, fewer fish would be harvested per angler and more fish would likely be left in

the water to reproduce later. However, due to the generally small amount of mutton snapper landed annually in the Gulf (Table 1.1.4), it is unlikely that **Alternative 2** will result in discernibly positive biological/ecological effects when compared to **Alternative 1**.

4.2.3 Direct and Indirect Effects on the Economic Environment

Under **Alternative 1** (no action), mutton snapper would remain part of the aggregate 10-snapper recreational bag limit in the Gulf. **Alternative 1** would not alter recreational mutton snapper harvests. Therefore, economic effects would not be expected to result from **Alternative 1**.

Alternative 2 would maintain mutton snapper within the 10-snapper recreational bag limit but would establish specific mutton snapper bag limits within the aggregate recreational limit. **Options a** and **b** would set the daily possession limit per person to 3 fish and 5 fish, respectively. **Options a** and **b** would reduce mutton snapper landings by requiring recreational anglers who typically harvest more mutton snapper than the set limit to adjust their fishing behavior and reduce their mutton snapper harvests. It is also likely that some of these anglers would substitute mutton snapper for other snappers to make up for decreases in mutton snapper harvests. The reductions in mutton snapper harvests and potential additional harvests of other snappers that could result from **Options a** and **b** are unknown. The net economic effects expected to result from the establishment of a specific mutton snapper bag limit within the recreational snapper aggregate bag limit would be determined by the difference between the losses due to decreases in mutton snapper harvests and gains from additional harvests of other snappers within the aggregate. Although unquantifiable at this time, these economic effects are expected to be minimal based on the limited recreational mutton snapper harvests in the Gulf.

4.2.4 Direct and Indirect Effects on the Social Environment

Data on the number of mutton snapper landed by recreational anglers per trip are not available, but recreational landings of mutton snapper in the Gulf are very low (approximately 4% of all Gulf landings). The majority of recreational landings in the Gulf occur in south Florida, with recreational landings being much higher in the South Atlantic Council's jurisdiction. For example, Gulf landings reached a high of 7,156 lbs in 2012, while South Atlantic landings were 505,583 lbs that same year (Table 1.1.4).

Additional effects would not be expected from retaining **Alternative 1**, and mutton snapper would remain within the 10-snapper recreational bag limit in which all 10 fish could, potentially, be mutton snapper. However, the State of Florida's recreational bag limit is 5 mutton snapper per person within the 10-snapper aggregate bag limit, and the South Atlantic Council is expected to adopt a recreational bag limit consistent with Florida sometime in 2017. Thus, retaining the current bag limit (**Alternative 1**) would leave the recreational bag limit in the Gulf inconsistent with adjoining jurisdictions. Thus, the negative effects of having inconsistent regulations across adjoining jurisdictions would continue, as fishermen must learn, remember, and comply with different rules depending on where they are fishing.

Alternative 2 would reduce the number of mutton snapper that may be retained within the 10-snapper aggregate bag limit. In general, decreasing a bag limit would be expected to result in

negative effects if fishermen are prohibited from retaining the same amount of fish as before the reduction. As discussed above, the number of mutton snapper landed per trip in the Gulf is unknown, but total landings are very low. Thus, any negative effects from reducing the bag limit for mutton snapper would be expected to be minimal, and would do little to reduce overall landings to remain below the ACLs selected in Action 1.

Option 2b would be expected to result in fewer negative effects in terms of a bag limit reduction, and the greatest benefits in terms of consistent regulations across adjoining jurisdictions, compared with **Option 2a**. Given the low recreational landings of mutton snapper in the Gulf and its status as neither overfished nor undergoing overfishing, adopting a more stringent bag limit that adjoining jurisdictions would result in the greatest negative effects to the social environment, through negative perceptions of management from unnecessary and inconsistent restrictions on fishing activity.

4.2.5 Direct and Indirect Effects on the Administrative Environment

One of the stated purposes for modifying the recreational bag limit for Gulf mutton snapper is to establish congruent regulations between the Gulf and South Atlantic Councils, and with Florida. **Alternative 2**, **Option 2b** most closely aligns with similar actions taken by the South Atlantic Council and Florida, and thereby would ultimately reduce the burden of regulatory compliance on stakeholders. The burden on law enforcement personnel would also be reduced under **Alternative 2**, **Option 2b**, since the same laws would apply to multiple adjacent jurisdictions. Generally, however, the types of regulations needed to manage the reef fish fishery would remain unchanged regardless of the choice of bag limits. The NMFS's Office for Law Enforcement, in cooperation with state agencies, would continue to monitor regulatory compliance with existing regulations and NMFS would continue to monitor recreational landings to determine if landings are meeting or exceeding specified ACTs and ACLs. Some administrative burden is anticipated with respect to outreach as it relates to notifying stakeholders of the changes to recreational bag limits.

4.3 Action 3 - Modify the Mutton Snapper Minimum Size Limit in the Gulf

Alternative 1: No Action. The minimum size limit for both commercial and recreational mutton snapper in the Gulf is 16 inches TL.

Alternative 2: Increase the minimum size limit for commercial and recreational mutton snapper in the Gulf to 18 inches TL.

Alternative 3: Increase the minimum size limit for commercial and recreational mutton snapper in the Gulf to 20 inches TL.

4.3.1 Direct and Indirect Effects on the Physical Environment

The alternatives under this action would not significantly modify the way in which the reef fish fishery is prosecuted in terms of gear types used. **Alternative 3** would be expected to provide a longer fishing season and therefore more physical impacts to the physical environment that **Alternative 1** and **2**. Any impacts would be expected to be minimal as **Alternative 2** and **Alternative 3** are projected to reduce commercial landings by less than 1% each. Since recreational landings of mutton snapper in the Gulf account for only approximately 4% of the total landings for the Gulf (Table 1.1.4), the effect of **Alternative 2** and **Alternative 3** on reducing the overall harvest of mutton snapper are likely to be minimal. Therefore, there are no additional impacts on Endangered Species Act-listed species or designated critical habitats anticipated as a result of this action (see Chapter 3.2.5 for a detailed description of ESA-listed species and critical habitat in the action area). Furthermore, no additional impacts on Essential Fish Habitat (EFH) or HAPCs are expected to result from any of the alternatives considered for this action (see **Section 3.1.3)** for detailed descriptions of EFH in the Gulf of Mexico.

4.3.2 Direct and Indirect Effects on the Biological/Ecological Environment

Sadovy de Mitchesen and Colin (2011) report that male mutton snapper reach sexual maturity at 16 inches FL and females at 18 inches FL. Therefore, **Alternative 1 (No Action)** would not be as biologically beneficial as the alternatives considered under this action because it allows harvest of some reproductively immature individuals. **Alternatives 2** and **3** would be expected to provide biological benefits to the mutton snapper population by allowing more individuals to reach reproductive activity before being harvested. Of these, **Alternative 3** would be more biologically beneficial than **Alternative 2** as it would presumably encompass all the reproductively active individuals in the population. Hence, biological benefits would be greatest under **Alternative 3.**

4.3.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain the 16-inch TL minimum size limit for both commercial and recreational mutton snapper in the Gulf. **Alternative 1** would not affect

recreational or commercial mutton snapper harvests. Therefore, economic effects would not be expected to result from **Alternative 1**. Remaining alternatives consider increases to the mutton snapper recreational and commercial size limits.

Alternatives 2 and **3** would increase the recreational and commercial minimum size limits to 18 inches TL and 20 inches TL, respectively. For either the recreational or the commercial sector, other things equal, an increase in the minimum size limit would be expected to reduce harvests. For the recreational sector, the lack of information relative to the size distribution of harvests precludes from estimating the expected harvest reductions and associated adverse economic effects.

Relative to the no action alternative (minimum size limit of 16 inches TL), the estimated reductions in commercial mutton snapper landings expected to result from increases in the minimum size limit are provided in Table 1 in Appendix C. **Alternatives 2** (minimum size limit of 18 inches TL) and **3** (minimum size limit of 20 inches TL) are estimated to decrease commercial landings by 0.2% and 1.0%, respectively. Based on 2010-2015 mean commercial mutton snapper landings of 97,702 lbs (Table 1.1.4), **Alternatives 2** and **3** would be expected to decrease commercial landings by 195 lbs and 977 lbs, respectively. Using a 2011-2015 average ex-vessel price per pound of $2.53 (NOAA website https://www.st.nmfs.noaa.gov accessed on 3/9/2017), decreases in ex-vessel value expected to result from **Alternatives 2** and **3** are estimated at $495.3 and $2,471.8, respectively.

4.3.4 Direct and Indirect Effects on the Social Environment

In general, increasing a minimum size limit would be expected to reduce the rate of landings. Thus, some negative direct effects would be expected from increasing the minimum size limit, as fishermen are unable to retain fish that are smaller than the new minimum size limit. On the other hand, if increasing the minimum size limit slows harvest enough to avoid an in-season closure, then some positive effects would result. Increasing a minimum size limit may also result in some negative social effects on the perception of management, if fishermen are required to throw back a fish that will not survive its return to the water; such practice is seen as wasteful.

Additional effects would not be expected from retaining the current minimum size limit of 16 inches TL (**Alternative 1**). Increasing the minimum size limit to 18 inches TL (**Alternative 2**) would make the minimum size limit consistent with changes being made by the South Atlantic Council and State of Florida, where the majority of mutton landings are made. Having consistent regulations is simpler for recreational fishermen in particular, thus some broad social benefits would be expected. Nevertheless, recreational landings of mutton snapper in the Gulf are very low compared to the South Atlantic, reaching a high of 7,156 lbs in 2012 and only 3,468 lbs in 2015 (Table 1.1.4). In contrast with the commercial sector, information is not available on the size distribution of mutton snapper landings by the recreational sector, and the potential reduction in recreational landings from increasing the minimum size limit remains unknown. Thus for the recreational sector, increasing the size limit is not likely to have much of an effect on constraining landings to remain below the selected ACLs in Action 1. Increasing the size limit to 20 inches TL (**Alternative 3**) would allow even fewer fish to be retained, and this would make the minimum size limit both larger and inconsistent with the South Atlantic Council and

State of Florida regulations. Thus, **Alternative 3** would result in the greatest negative effects for the recreational sector among the alternatives.

Because most mutton snapper landed by the commercial sector are larger than the proposed minimum size limit increases in Action 3 (Appendix C), increasing the minimum size limit is not expected to result in a substantial reduction in landings; approximately 0.2% under **Alternative 2**, and 1% from increasing the minimum size limit to 20 inches TL (**Alternative 3**). Thus, increasing the minimum size limit may not realize reductions necessary to slow harvest, but would require fishermen to learn and comply with a new, larger minimum size limit. Thus, these alternatives would result in greater negative effects compared to **Alternative 1**. As with the recreational sector, **Alternative 2** would make the minimum size limit consistent with both the South Atlantic Council and State of Florida, resulting in some broad social benefits from simplifying regulations across adjoining jurisdictions. **Alternative 3** would be expected to result in the greatest negative effects among the alternatives, as it may not be sufficient to slow commercial harvest enough to prolong the fishing season, and would not reconcile an inconsistent minimum size limit with adjoining jurisdictions.

4.3.5 Direct and Indirect Effects on the Administrative Environment

Beneficial administrative effects would be expected from **Alternative 2**, when compared with **Alternative 1 (No Action)**, and **Alternative 3** because it would be consistent with the South Atlantic Council and Florida which have selected the minimum size limit to be 18 inches in their waters. Alternatives that specify a consistent minimum size limit in state and federal waters 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. Because there is a minimum size limit already in place for mutton snapper in the Gulf of Mexico under **Alternative 1**, changing the minimum size limit under **Alternatives 2** and **3** would not be unusually burdensome.

4.4 Action 4 - Modify the Commercial Gag Minimum Size Limit in the Gulf

Alternative 1: No Action. The commercial minimum size limit for gag in the Gulf is 22 inches TL.

Alternative 2: Increase the commercial minimum size limit for gag in the Gulf to 24 inches TL.

4.4.1 Direct and Indirect Effects on the Physical Environment

With respect to **Action 4**, fishery management actions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat, either through gear impacts to bottom habitat or through the incidental harvest of bottom habitat as described in Chapter 3.1.1 and Section 4.1.1.

Indirectly, size influences the management measures needed, including closed seasons and seasonally closed areas. These actions affect the amount of time that fishing gear can interact with the physical environment. Fishing line can get entangled on bottom structures and lead to local fouling of areas in some situations. In this respect, **Alternative 1**, the no action alternative, will have less indirect impact to the physical environment than **Alternative 2.** These impacts would be from the expected increase in the amount of time to harvest the recreational gag quota, and conversely, increase gear interactions with the physical environment. These impacts are expected to be minor.

Alternative 1 (no action), would maintain the current 22 inch TL size limit and is not expected to affect commercial fishing for gag and would therefore not be expected to result in effects to the physical environment. The size limit increase to 24 inches TL in **Alternative 2** may have indirect effects on the physical environment by allowing a longer season, however, it is not expected to alter the overall execution of the reef fish fishery and therefore is not be expected to have any significant effects on the physical environment.

4.4.2 Direct and Indirect Effects on the Biological/Ecological Environment

Alternative 1, the no action alternative, is expected to have the greatest negative impact on the gag stock. It will allow the recreational fishery to operate year-round, except for a fixed February-March shallow-water grouper closed season. **Alternative 2** increases the commercial minimum size limit from 22 inches to 24 inches and would be expected to provide greater benefits to the gag stock as more mature individuals would reach sexual maturity. At 22-24 inches TL it is estimated that 50% of the female population would be sexually mature and capable of spawning (SEDAR 10 2006, SEDAR 33 2014a). **Alternative 2** would be expected to provide more gag the opportunity to spawn than **Alternative 1**, and provide a greater positive effect to the population.

The Council and its Reef Fish Advisory Panel have stated concerns about bycatch mortality of gag if the minimum size limit is increased. There were also concerns about whether or not the minimum size limit would sufficiently slow the rate of harvest and increase gag bycatch. To address these concerns, the decision model (Appendix B) was completed in the 2016 Framework Amendment for Gag and Black Grouper Size limits and Gag Recreational Season (GMFMC 2016) used to evaluate how the rate of harvest and dead discards would change with increases to the minimum size limit. However, **Alternative 2** is not expected to alter the overall execution of the fishery and therefore is not expected to have any significant effects on the biological environment.

4.4.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain the 22-inch TL minimum size limit for commercial gag in the Gulf. Therefore, **Alternative 1** would not affect commercial gag harvests and would not be expected to result in economic effects.

Alternative 2 would increase the commercial minimum size limit for gag in the Gulf to 24 inches TL. **Alternative 2** would set a Gulf commercial minimum size limit consistent with the Gulf's recreational and the South Atlantic's recreational and commercial minimum size limit. The decrease in commercial gag landings expected to result from the minimum size increase is estimated at 1.3% (Table 1, Appendix D). With a current commercial gag quota of 939,000 lbs, **Alternative 2** could potentially reduce commercial gag landings by 12,207 lbs. Based on a median ex-vessel price per pound of $5.07 (NMFS SERO, 2016), the decreases in ex-vessel value associated with these potential reductions in commercial gag harvests are estimated at approximately $61,890. However, increases in the minimum size limit are not expected to result in reductions in harvests because gag are managed under a commercial IFQ program. It is likely that IFQ participants would either adjust their trip-level catch composition throughout the year or sell a portion of their annual gag allocation to other fishermen rather than suffer a loss in ex-vessel value.

4.4.4 Direct and Indirect Effects on the Social Environment

Although additional effects would not be expected from retaining the commercial minimum size limit of gag at 22 inches TL (**Alternative 1**), some recreational fishermen feel it is unfair that the commercial minimum size limit is smaller than for a gag caught by a recreational angler. Thus, retaining **Alternative 1** would allow this tension between the sectors to continue. **Alternative 2** would increase the commercial minimum size limit for gag to 24 inches TL, making the minimum size consistent with the recreational sector and the South Atlantic Council's jurisdiction. Thus, some social benefits would be expected from **Alternative 2**, as the minimum size is made consistent between sectors, compared with **Alternative 1**.

In some cases, there are biological reasons for establishing different minimum size limits for the harvest of the same species by different sectors, which usually has to do with the rate of discards by sector. In the case of gag, the minimum size limit for the commercial sector was decreased from 24 inches TL to 22 inches TL in 2012 through Amendment 32 (GMFMC 2011) to reduce discards. Nevertheless, commercial fishermen have more recently expressed support for

increasing the minimum size limit during public testimony at Council meetings, stating that they rarely land a gag smaller than 24 inches TL. Thus, negative effects are not expected, or would be minimal under **Alternative 2**, as a result of requiring fishermen to discard fish between 22 and 24 inches TL. Also, the Reef Fish AP recommends increasing the minimum size limit to 24 inches TL.

4.4.5 Direct and Indirect Effects on the Administrative Environment

Alternative 1, which maintains the 22 inch TL minimum size limit, will continue to create enforcement complications in the south Florida area due to having a different size limit in the South Atlantic and in Florida state waters off Monroe County. **Alternative 2**, which adopts a minimum size limit that is consistent with the South Atlantic size limit will ease enforcement in the south Florida area.

4.5 Cumulative Effects Analysis

As directed by the National Environmental Policy Act, federal agencies are mandated to assess not only the indirect and direct impacts, but cumulative impacts of actions as well. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts of FMP and non-FMP actions are analyzed in detail in Amendment 40 (GMFMC 2014b) and are incorporated here by reference. The affected area of this proposed action encompasses the state and federal waters of the Gulf and Gulf communities which are dependent on reef fish fishing. The following are some specific past, present, and future actions that could impact the environment in the area where mutton snapper and gag are harvested.

Past Actions

Participation in and the economic performance of the reef fish fishery addressed in this document have been affected by a combination of regulatory, biological, social, and external economic factors. Regulatory measures have obviously affected the quantity and composition of harvests of species addressed in this document, through the various size limits, seasonal restrictions, trip or bag limits, and quotas. Chapter 1.3 discusses the history of management actions that have affected mutton snapper and gag in further detail.

Biological forces that either motivate certain regulations or simply influence the natural variability in fish stocks have likely played a role in determining the changing composition of the fisheries addressed by this document. Additional factors, such as changing career or lifestyle preferences, stagnant to declining prices due to imports, increased operating costs (gas, ice, insurance, dockage fees, etc.), and increased waterfront/coastal value leading to development pressure for other than fishery uses have impacted both the commercial and recreational fishing sectors. In general, the regulatory environment for all fisheries has become progressively more complex and burdensome, increasing the pressure on economic losses, business failure, occupational changes, and associated adverse pressures on associated families, communities, and businesses. Some reverse of this trend is possible and expected through management. However, certain pressures would remain, such as total effort and total harvest considerations, increasing input costs, import induced price pressure, and competition for coastal access.

The cumulative effects from the *Deepwater Horizon* MC252 (DWH) oil spill and response may not be known for years. The impacts of the oil spill on the physical environment are expected to be significant and may be long-term. Oil was dispersed on the surface, and because of the heavy use of dispersants, oil was also documented as being suspended within the water column. Floating and suspended oil washed onto shore in several areas of the Gulf as well as non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are more persistent in the environment and can be transported hundreds of miles.

The effects of the DWH oil spill may not begin to manifest themselves measurably until recruits from the 2010 year class begin to enter the adult spawning population and be caught by anglers. Recent stock assessments on mutton snapper and gag (SEDAR 33 2014; SEDAR 15A Update 2015; SEDAR 33 Update 2017) did detect a slight reduction of recruitment for 2010. Because

recruitment occurs at approximately three years of age, any 2010 year-class failure is likely to be detected in the next stock assessment. Should the 2010 year class be adversely affected, reduced fishing success and reduced spawning potential could result, and would need to be taken into consideration in future assessments and actions. Oil exposure could also create sub-lethal effects on the eggs, larva, and early life stages. In a 2014 study (Incardona et al), embryos of bluefin tuna, yellowfin tuna, and amberjack exposed to environmentally realistic levels of hydrocarbons showed defects in heart function. The oil itself could adversely affect adult red snapper and other reef fish species. Weisberg et al. (2014) suggested the hydrocarbons associated with the DWH oil spill may be associated with the occurrences of reef fish with lesions and other deformities. However, Murawski et al. (2014) reported that the incidence of lesions on bottom-dwelling fish had declined between 2011 and 2012 in the northern Gulf. Other studies of the effects of hydrocarbon are ongoing. The stressors could potentially be additive, and each stressor may increase susceptibility to the harmful effects of the other.

Indirect and inter-related effects on the ecological environment of the reef fish fishery in concert with the DWH oil spill are not well understood. Changes in the population size structure could result from shifting fishing effort to specific geographic segments of populations, combined with any anthropogenically induced natural mortality that may occur from the impacts of the oil spill. The impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators may be significant in the future. Impacts to mutton snapper and gag from the oil spill may similarly impact other species that may be preyed upon by mutton snapper and gag, or that might benefit from a reduced mutton snapper or gag stock. However, since the majority of the spawning biomass for both of these species occurs outside the main areas affected by the DWH oil spill plume, it is less likely that a direct effect on either species will be detected.

Present Actions

Reasonably Foreseeable Future Actions

The following are actions important to mutton snapper and gag, and the reef fish fishery in general[5]:

- The Gulf Council is expected to submit the Framework Amendment to modify charter vessel and headboat reporting requirements in 2017.
- The South Atlantic Council submitted a Framework Amendment to modify charter vessel and headboat reporting requirements in March 2017.
- The South Atlantic Council submitted Framework Amendment 41 to modify mutton snapper management measures in February 2017.

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 impact a wide range

[5] Information on these developing actions can be found on the Council's website at www.gulfcouncil.org.

of organisms and ecosystems (Solomon et al. 2007). These influences could affect biological factors such as migration, range, larval and juvenile survival, prey availability, and susceptibility to predators. At this time, the level of impacts cannot be quantified, nor is the time frame known in which these impacts would occur. The Environmental Protection Agency's climate change webpage (http://www.epa.gov/climatechange/) provides basic background information on these and other measured or anticipated effects. A compilation of scientific information on climate change can be found in the United Nations Intergovernmental Panel on Climate Change's Fourth Assessment Report (Solomon et al. 2007) and incorporated here by reference. Global climate changes could have significant effects on Gulf of Mexico fisheries; however, the extent of these effects is not known at this time. Possible impacts are outlined in Amendment 31 (GMFMC 2009), the Generic ACL amendment (GMFMC 2011a), and Amendment 32 (GMFMC 2011b). In addition, oil from the *Deepwater Horizon* MC252 incident that occurred in April 2010 may affect mutton snapper and gag populations. However, the effects of this oil on these and other reef fish populations are incomplete and unavailable (see 40 CFR § 1502.22) at this time because studies of the effects of the oil spill are still ongoing. If the oil impacts important habitat for these species or interrupt critical life history stages, the effects could reduce these species' population sizes.

Monitoring

The effects of the proposed action are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. Landings data for the recreational sector in the Gulf of Mexico is collected through MRFSS/MRIP, HBS, and TPWD's Marine Recreational Fishing Survey. The MRFSS program has been replaced by Marine Recreational Information Program, a program designed to improve the monitoring of recreational fishing. Commercial data are collected through trip ticket programs, port samplers, and logbook programs. In response to the *Deepwater Horizon* MC252 incident, increased frequency of surveys of the recreational sector's catch and effort, along with additional fishery independent information regarding the status of the stock are being conducted. This will allow future determinations regarding the impacts of the *Deepwater Horizon* MC252 incident on various fishery stocks, including mutton snapper and gag, but is currently it not possible to make such determinations.

The proposed actions relate to the harvest of an indigenous species in the Gulf and Atlantic, and the activities 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, the aforementioned actions do 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.

Conclusion

This action, in combination with any past, present, or reasonably foreseeable future actions is not expected to have significant beneficial or adverse cumulative effects on the physical and biological/ecological environments. The cumulative social and economic effects of past, present,

and future amendments may be described as limiting fishing opportunities in the short-term, with some exceptions of actions that alleviate some negative social and economic impacts. The intent of these amendments is to improve prospects for sustained participation in the respective fisheries over time and the proposed actions in this amendment are expected to result in some important long-term benefits to the commercial and for-hire fishing fleets, fishing communities and associated businesses, and private recreational anglers. The proposed changes in management for mutton snapper and gag will contribute to changes in the fishery within the context of the current economic and regulatory environment at the local and regional level.

This analysis found the effects on the biophysical environment are positive because they would maintain the mutton snapper and gag stocks at a level that allows the maximum benefits in yield. However, short-term negative impacts on the socioeconomic environment associated with mutton snapper fishing are likely to continue due to the need to limit directed harvest. These negative impacts can be minimized by selecting measures that would provide the least disruption to the mutton snapper component of the reef fish fishery.

CHAPTER 5: REGULATORY IMPACT REVIEW

5.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866. This RIR analyzes the impacts this action would be expected to have on the mutton snapper and gag components of the Gulf of Mexico reef fish fishery.

5.2 Problems and Objectives

The problems and objectives addressed by this action are discussed in Section 1.2.

5.3 Description of Fisheries

A description of the mutton snapper and gag components of the Gulf reef fish fishery is provided in Section 3.2.

5.4 Impacts of Management Measures

5.5 Public and Private Costs of Regulations

5.6 Determination of Significant Regulatory Action

CHAPTER 6: REGULATORY FLEXIBILITY ANALYSIS

6.1 Introduction

6.2 Statement of the Need for, Objective of, and Legal Basis for the Proposed Action

6.3 Description and Estimate of the Number of Small Entities to which the Proposed Action would Apply

6.4 Description of the Projected Reporting, Record-keeping and Other Compliance Requirements of the Proposed Action

6.5 Identification of All Relevant Federal Rules, which may Duplicate, Overlap or Conflict with the Proposed Action

6.6 Significance of Economic Impacts on a Substantial Number of Small Entities

6.7 Description of the Significant Alternatives to the Proposed Action and Discussion of How the Alternatives Attempt to Minimize Economic Impacts on Small Entities

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GMFMC = Gulf of Mexico Fishery Management Council, SAFMC = South Atlantic Fishery Management Council, NMFS = National Marine Fisheries Service, SF = Sustainable Fisheries Division, PR = Protected Resources Division, HC = Habitat Conservation Division, GC = General Counsel

The following have or will be consulted:

National Marine Fisheries Service

- Southeast Fisheries Science Center
- Southeast Regional Office
- Protected Resources
- Habitat Conservation

- Sustainable Fisheries

NOAA General Counsel
Environmental Protection Agency
United States Coast Guard
Texas Parks and Wildlife Department
Alabama Department of Conservation and Natural Resources/Marine Resources Division
Louisiana Department of Wildlife and Fisheries
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Florida Fish and Wildlife Conservation Commission

CHAPTER 8. REFERENCES

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APPENDIX A: GULF OF MEXICO MUTTON SNAPPER TRIP LIMIT ANALYSIS

Action 3 of the Gulf Council's Framework Action considered a trip limit in pounds of fish during the regular season (non-spawning months, January through March and July through December) and a trip limit in numbers of fish within the spawning season (April to June). The rationale behind these modifications was concern regarding mutton snapper harvest during the spawning season. Currently, there is no trip limit for mutton snapper in the Gulf of Mexico.

Commercial logbook data (accessed April 25, 2016) from the Southeast Fisheries Science Center (SEFSC) was analyzed to determine the harvest of mutton snapper per trip. The most recent years of complete data (2013-2015) had 1,274 trips that harvested mutton snapper in the Gulf of Mexico. The Framework Action was examining different trip limits outside and within the spawning season, therefore, the commercial trips were separated by the different seasons (regular season and spawning). The distribution of the pounds of mutton snapper harvested per trip in the regular season is displayed in Figure 1. Within the spawning season the Framework Action was proposing a trip limit in numbers of mutton snapper in both fish per person and fish per vessel. The pounds of mutton snapper per trip from the logbook data were converted to numbers of mutton snapper by dividing the pounds by the average weight. Current average weight of Gulf of Mexico mutton snapper in the commercial sector was determined to be 3.5 pounds whole weight (lbs ww) in the most recent assessment (SEDAR 15A). Figure 2 provides the distribution of both the fish per person and fish per vessel within the spawning season.

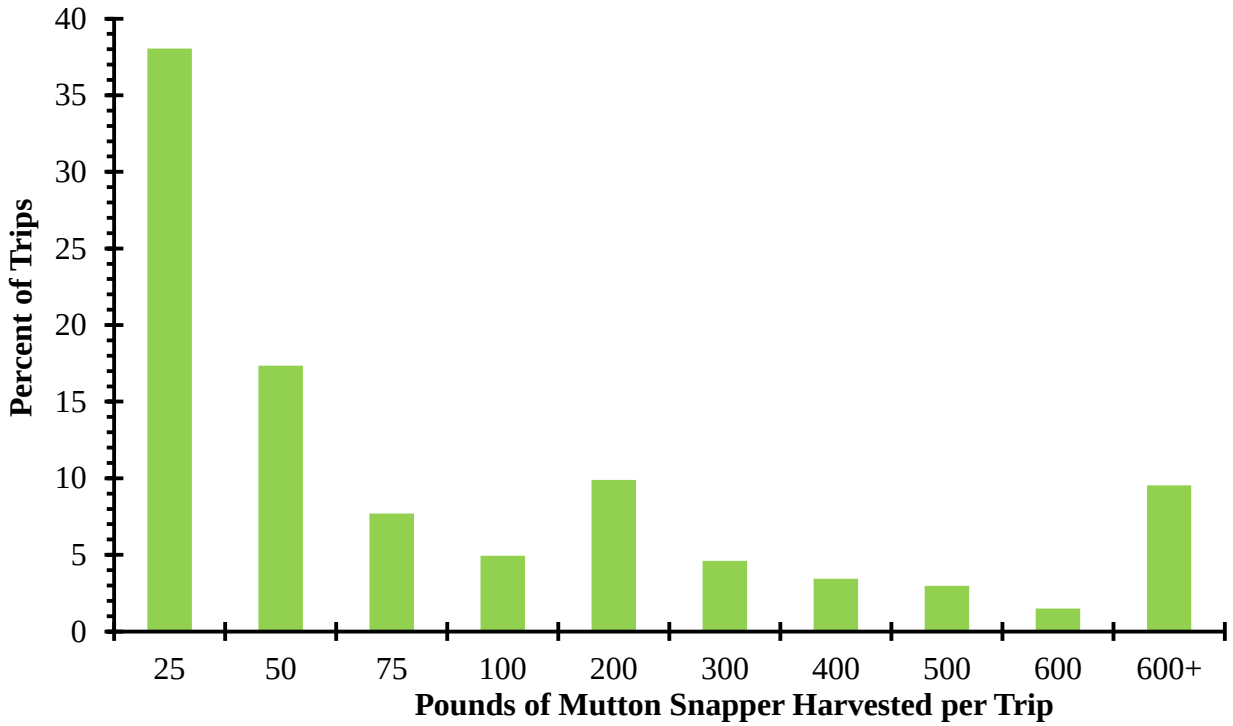

Figure 1. Distribution of the mutton snapper harvested per trip (lbs ww) during the regular season in the Gulf of Mexico region. The regular season is from January through March then

July through December. Data comes from the commercial logbook dataset from 2013 to 2015 (n = 870 trips).

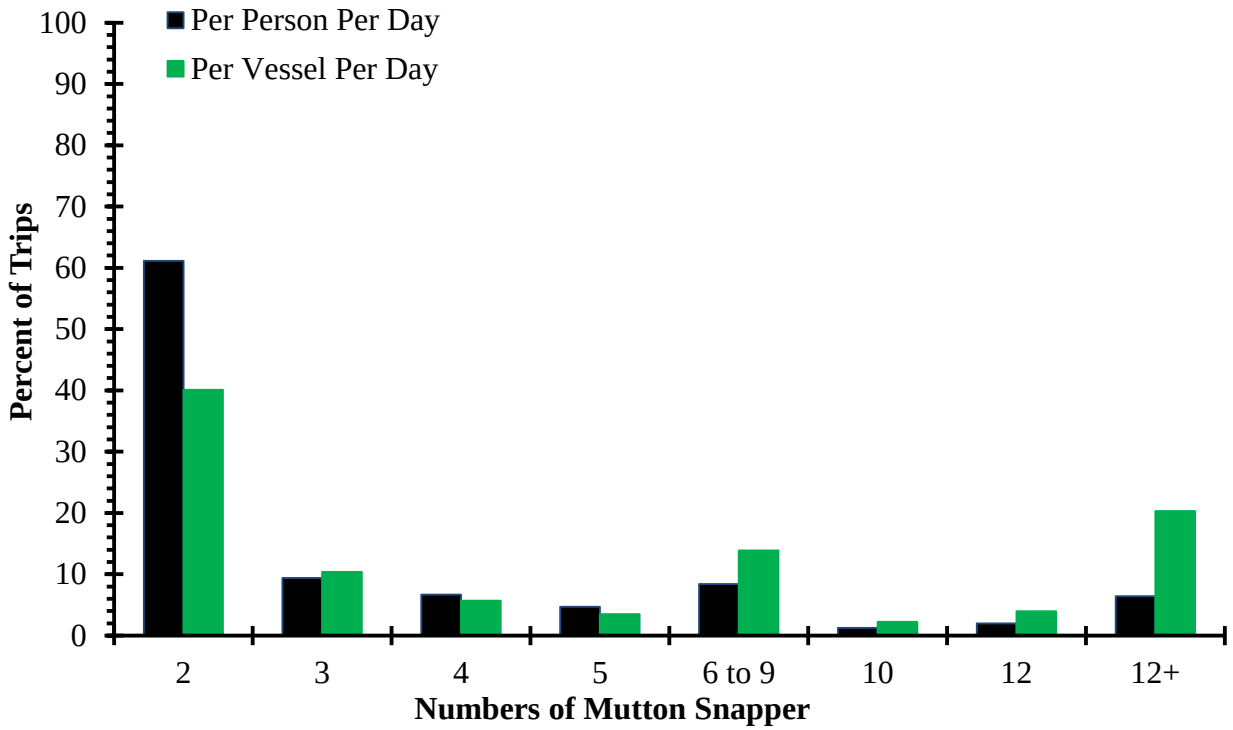

Figure 2. Distribution of the number of mutton snapper harvested both per person per day and per vessel per day during the spawning season in the Gulf of Mexico region. The spawning season is from April to June. Data comes from the commercial logbook dataset from 2013 to 2015 (n = 404 trips).

Trip Limit Analysis

Alternative 2 of Action 3 considered implementing a trip limit during the regular season of 300, 400, and 500 pounds whole weight (lbs ww). The SEFSC logbook data were analyzed by imposing the proposed trip limits under Alternative 2 only during the regular season. For example, a trip in the regular season that harvested 600 lb ww of mutton snapper was reduced to 300 lbs ww to analyze the proposed 300 lbs ww trip limit, while landings during the spawning season were not reduced. The reduced landings from the imposed trip limit were compared to the total annual unmodified landings to estimate the percent reduction in landings (Table 1).

Table 1. Percent decreases in total landings for various commercial trip limits proposed under Alternative 2 in Action 3. This analysis only modified landings for the trip limits being proposed in the regular season (January through March and July through December). Landings outside the regular season were not modified. Data comes from the commercial logbook dataset for 2013 through 2015.

Trip Limit	Percent Reduction
300 lbs ww	42.5%

400 lbs ww	38.1%
500 lbs ww	34.7%

The commercial logbook data provides landings in pounds; however, the proposed trip limits during the spawning season (April to June) are specified in numbers of fish. To conduct the analysis, landings in pounds were converted to numbers of fish by dividing the harvest by the average weight of mutton snapper in the commercial sector. Average weight of mutton snapper in the Gulf of Mexico was determined to be 3.5 lbs ww in the commercial sector in the most recent stock assessment (SEDAR 15A).

Alternative 3 of Action 3 proposed commercial trip limits in the spawning season in numbers of fish in two ways: per person per day, and per vessel per day. Specifically the Sub-alternatives under Alternative 3 proposed limits of 2 fish/person/day (Option 3a), 3 fish/person/day (Option 3b), 10 fish/vessel/day (Option 3c), 12 fish/vessel/day (Option 3d), and no retention (Option 3e) during the spawning season. The per-person trip limits were analyzed by dividing the total catch by the total number of people, including the captain, on the commercial trip. The per-vessel trip limit analysis focused on trip level data and ignored the number of people on the boat. The per-day part of the analysis was analyzed by dividing the catch per trip by the number of days at sea reported. Figure 2 provides the distribution of the percentage of trips for the harvest of mutton snapper in numbers of fish for both per person per day and per vessel per day during the spawning season from 2013 through 2015. An examination of this commercial logbook mutton snapper trip data during the spawning season revealed only 4% of the trips (n = 16 trips) had only 1 person on the trip, and some trips had as much as 6 people. Therefore, the majority of the trips had more than one person. An examination of the number of days for a trip had only 28% (n = 114 trips) of the mutton snapper commercial fishing trips during the spawning season as one-day trips. Therefore, the majority of the commercial trips harvesting mutton snapper are multiday trips.

Percent reductions in commercial landings were calculated for the proposed trip limits of 0, 2, and 3 mutton snapper per person per day by reducing trips that exceeded the proposed trip limit to match the trip limit being considered. For example, to analyze the reduced trip limit of 3 fish/person/day, a trip that reported harvest of 9 mutton snapper/person/day was reduced to 3 mutton snapper/person/day. Landings during the regular season were not modified. The reduced total annual landings were then compared against unmodified total annual landings to determine the percent reduction in landings from the trip limit being considered.

Table 2. Percent decrease in landings for various commercial trip limits proposed in Alternative 3 of Action 3. The estimates were calculated from mutton snapper commercial logbook data from 2013 through 2015, and the reductions were calculated for changes to the trip limit inside the spawning season. The spawning season is April to June.

Trip Limit	Percent Reduction
2 Fish/Person/Day	18%
3 Fish/Person/Day	15%
10 Fish/Vessel/Day	16%

12 Fish/Vessel/Day	14%
No Retention	28%

This analysis attempted to predict realistic changes to the landings from the various trip limit options presented in the amendment. Uncertainty exists in these projections, as economic conditions, weather events, changes in catch-per-unit effort, fisher response to management regulations, and a variety of other factors may cause departures from this assumption. The bounds of this uncertainty are not captured by the model as currently configured; as such, it should be used with caution as a 'best guess' for future dynamics. In addition to the aforementioned sources of uncertainty, the modeled reductions associated with management measures assume that past performance in the fishery is a good predictor of future dynamics. An attempt was made to constrain the range of data considered to recent years to reduce the unreliability of this assumption.

References

SEDAR 15A. 2015. Stock Assessment of Mutton Snapper (*Lutjanus analis*) of the U.S. South Atlantic and Gulf of Mexico through 2013. Southeast Data, Assessment and Review. North Charleston, South Carolina. http://www.sefsc.noaa.gov/sedar/.

APPENDIX B: CONSIDERED BUT REJECTED ACTIONS AND ALTERNATIVES

Action 3: Modify Mutton Snapper Commercial Trip Limit in the Gulf of Mexico

Alternative 1: No action. There is no trip limit for the commercial sector in the Gulf of Mexico.

Alternative 2. Establish a commercial trip limit for mutton snapper during the regular season (i.e., non-spawning months in the Gulf of Mexico).

Option 2a. 300 pounds whole weight
Option 2b. 400 pounds whole weight
Option 2c. 500 pounds whole weight

Alternative 3. Specify a commercial trip limit for mutton snapper during the spawning months of May and June in the Gulf of Mexico.

Option 3a. 2 fish/person/day
Option 3b. 3 fish/person/day
Option 3c. 10 fish/vessel/day
Option 3d. 12 fish/vessel/day
Option 3e. No retention

Rationale:
The Council reviewed Action 3, which considered changes to commercial trip limits. The Council discussed that trip limits may not be an effective management measure to reduce harvest when using bottom longline gear and that imposing commercial trip limits would result in unnecessary regulatory discards.

Action 4: Modify mutton snapper minimum size limit in the Gulf of Mexico

Alternative 2: Increase the minimum size limit for mutton snapper in the Gulf of Mexico to 17 inches TL.

Alternative 4: Increase the minimum size limit for mutton snapper in the Gulf of Mexico to 19 inches TL.

Rationale:
The Council reviewed Action 4 which considers changes to the minimum size limit for mutton snapper. The Council discussed the necessity of Alternatives 2 and 4 as the other Alternatives capture a reasonable range, and determined that Alternatives 2 and 4 were not necessary.

Action 2: Modify the Gulf Mutton Snapper Recreational Bag Limit

Alternative 2: Retain mutton snapper within the aggregate 10-snapper recreational bag limit in the Gulf, but specify a bag limit for mutton snapper during spawning months (April – June).

Option 2a: 2 fish/person/day
Option 2b: 3 fish/person/day
Option 2c: 4 fish/person/day
Option 2d: 5 fish/person/day

Alternative 3: Retain mutton snapper within the aggregate 10-snapper recreational bag limit in the Gulf, but modify the bag limit for mutton snapper during the regular season i.e., non-spawning months (January – March and July – December).

Option 3a: 2 fish/person/day
Option 3b: 3 fish/person/day
Option 3c: 4 fish/person/day
Option 3d: 5 fish/person/day

Alternative 4: Retain mutton snapper within the aggregate 10-snapper recreational bag limit in the Gulf, but specify a bag limit for mutton snapper within the aggregate bag limit year round.

Option 4a: 2 fish/person/day
Option 4c: 4 fish/person/day

Rationale:
The Council reviewed Action 2 which considers changes to the recreational bag limit for mutton snapper. The Council discussed the necessity of Alternatives 2 and 3 as the other Alternatives capture a reasonable range, and determined that Alternatives 2 and 3 were not necessary. The Council also discussed the range of options presented for Alternative 4, and determined that Options 4a and 4c were not necessary.

APPENDIX C: GULF OF MEXICO MUTTON SNAPPER COMMERCIAL MINIMUM SIZE LIMIT ANALYSIS

The Gulf of Mexico Fishery Management Council is considering modifying the mutton snapper minimum size limit for the commercial sector through a framework action to the current Fishery Management Plan. The length measurements of Gulf of Mexico mutton snapper harvested by the commercial sector were collected from two different programs: 1) dock-side intercepts of commercial fishers from the Southeast Fisheries Science Center's (SEFSC) Trip Intercept Program (TIP), and 2) at-sea fishery observer data from the Galveston, TX SEFSC Reef Fish Observer Program (RFOP). Length measurements were used from both programs to increase the sample size of Gulf of Mexico mutton snapper harvested in the commercial sector.

TIP is a shore-based sampling program to collect detailed data for individual trips with samplers placed strategically throughout the Southeast. The emphasis for the TIP is to sample more individual trips rather than take a large number of samples from a few trips (Saari and Beerkircher, 2014). Fishing trips are selected to be representative of each region with every effort to sample from as many vessels and gear types as possible. A random subsample of fish measurements are obtained in roughly the same proportion for each species comprising the entire landings.

In contrast, the RFOP samples a more limited number of trips than TIP; however, observer protocol is to provide a census of measurements for all species captured during that trip (NMFS, 2016). The RFOP selects vessels randomly by quarter based on sampling effort stratified by season and gear for the eastern and western Gulf of Mexico. Additionally, TIP samplers do not sample vessels that carried an observer for a trip to avoid double sampling.

Both datasets were filtered to the years 2013 to 2015 which resulted in 994 mutton snapper in the TIP data and 1,475 mutton snapper in the RFOP data. Only retained mutton snapper were used in the RFOP data. The distributions of the lengths from the two programs were compared (Figure 1) and the means were not statistically different (t-test, t-value = 1.04, df =1,797, P = 0.298).

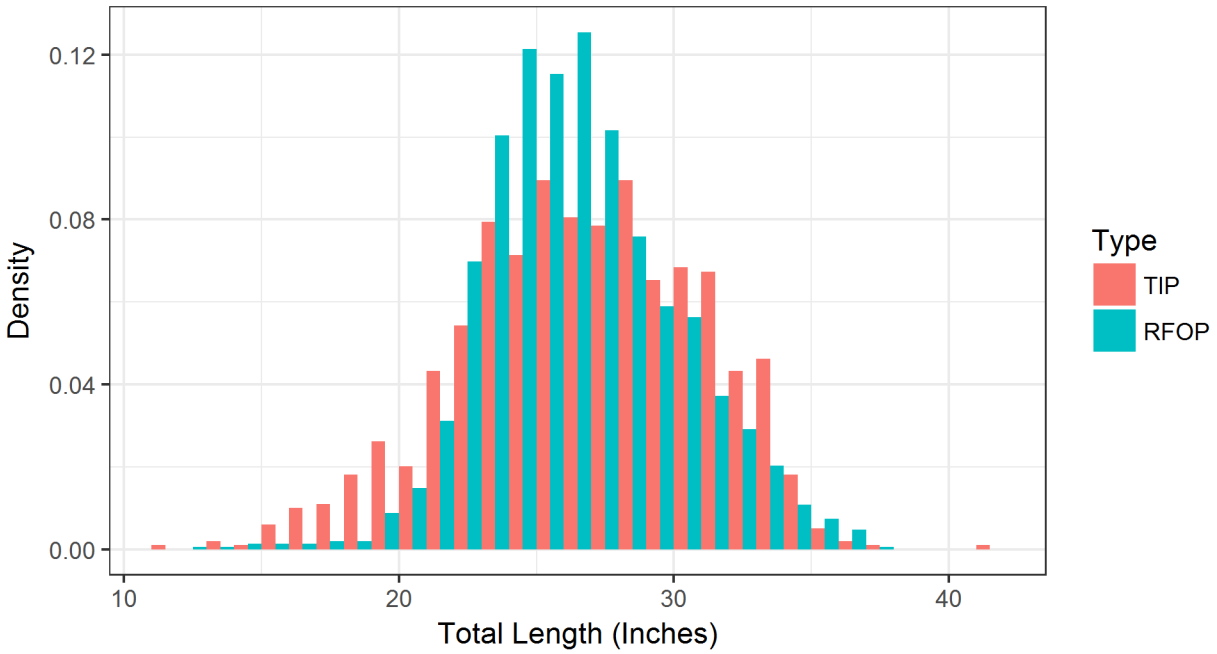

Figure 1. Histogram comparing Gulf of Mexico mutton snapper total length distribution generated from commercial TIP (n=994) and RFOP (n=1,475) data from 2013 to 2015.

All lengths were converted to inches total length (TL) using standard conversion factors and equations used in SEDAR 15A (2015). The size limit analysis estimated the percent reduction in whole weight. Thus the weight of each fish was required. When whole weight data was available it was used, and gutted weights were converted using the SEFSC conversion factor of 1.11. When weight data was unavailable, it was estimated from length using the mutton snapper weight-length equations defined in SEDAR 15A (2015).

Figure 2 provides the Gulf of Mexico commercial sector mutton snapper length distribution from both TIP and RFOP in 1 inch increments from 2013 to 2015. The majority of the mutton snapper are harvested well above any of the minimum size limits being considered. The largest minimum size limit being considered in the framework action is 20 inches TL and more than 95% of the lengths were above this length.

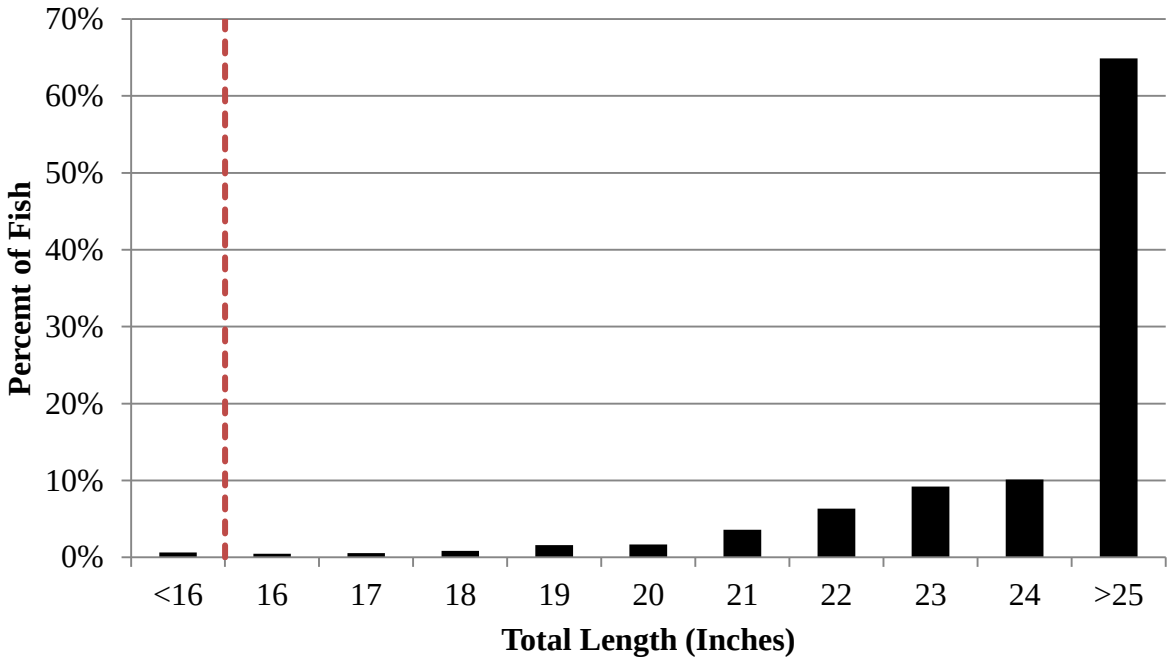

Figure 2. Gulf of Mexico mutton snapper total length distribution generated from commercial TIP (n=994) and RFOP (n=1,475) data from 2013 to 2015. The dashed red line denotes the current commercial minimum size limit of 16 inches TL.

Reductions in landings in weight were calculated for minimum size limits (MSL) at 1 inch intervals between 16-20 inches TL as follows:

Percent reduction = *((C – (G+R)) - B)/C*, where:
C = catch in pounds
G = weight of fish that are greater than or equal to the MSL
R = release mortality multiplied against the fish that are larger than the 16-inch TL MSL and are less than the MSL being considered
B = weight of fish smaller than the 16-inch TL MSL (non-compliance)

Percent reductions associated with MSL were normalized to a 0% reduction at the commercial status quo size limit of 16 inches total length. Data were pooled for the three years of complete data (2013-2015) with the assumption that recent lengths will likely reflect future lengths harvested in the fishery. All of the weights used in the analysis are in pounds whole weight. Release mortality was incorporated into the analysis, and was determined to be 15% following SEDAR 15A (2015).

Table 1. The estimated percent reduction in whole weight of commercial mutton snapper landings for each of the minimum size limits considered in the modification. The reductions were generated with TIP and RFOP data from 2013 to 2015, and came from a sample of 2,469 fish.

Minimum Size Limit (inches TL)	Percent Reduction
16	0.0
17	0.1
18	0.2
19	0.5
20	1.0

The reliability of this analysis is dependent upon the accuracy of the underlying data and input assumptions. This analysis assumes that the commercial harvest of mutton snapper size distribution from 2013 to 2015 will reflect the size distribution of mutton snapper commercial harvest in the future.

References

NMFS. 2016. Characterization of the U.S. Gulf of Mexico and southeastern Atlantic otter trawl and bottom reef fish fisheries. Observer Training Manual. NMFS, Southeast Fisheries Science Center, Galveston Lab., Galveston, Texas. http://www.galvestonlab.sefsc.noaa.gov/forms/observer/obs_training_manual_5_2016.pdf.

Saari, Courtney, R., and Lawrence R. Beerkircher. 2014. User's guide for the Trip Interview Program (TIP). Version 6.0. USDS/NOAA/NMFS Southeast Fisheries Science Center. http://www.sefsc.noaa.gov/docs/TIP_UsersGuide_Ver6.pdf.

SEDAR 15A. 2015. Stock assessment of mutton snapper (*Lutjanus analis*) of the U.S. South Atlantic and Gulf of Mexico through 2013. SEDAR Update Assessment. North Charleston, South Carolina. http://www.sefsc.noaa.gov/sedar/.

APPENDIX D: GULF OF MEXICO GAG COMMERCIAL MINIMUM SIZE LIMIT ANALYSIS

The Gulf of Mexico Fishery Management Council is considering modifying the gag grouper minimum size limit for the commercial sector through a framework action to the current Fishery Management Plan. The length measurements of Gulf of Mexico gag grouper harvested in the commercial sector were collected from two different programs: 1) dock-side intercepts of commercial fishers from the Southeast Fisheries Science Center's (SEFSC) Trip Intercept Program (TIP), and 2) at-sea fishery observer data from the Galveston, TX SEFSC Reef Fish Observer Program (RFOP). Length measurements were used from both programs to increase the sample size of Gulf of Mexico gag grouper harvested in the commercial sector.

TIP is a shore-based sampling program to collect detailed data for individual trips with samplers placed strategically throughout the Southeast. The emphasis for the TIP is to sample more individual trips rather than take a large number of samples from a few trips (Saari and Beerkircher, 2014). Fishing trips are selected to be representative of each region with every effort to sample from as many vessels and gear types as possible. A random subsample of fish measurements are obtained in roughly the same proportion for each species comprising the entire landings.

In contrast, the RFOP samples a more limited number of trips than TIP; however, observer protocol is to provide a census of measurements for all species captured during that trip (NMFS, 2016). The RFOP selects vessels randomly by quarter based on sampling effort stratified by season and gear for the eastern and western Gulf of Mexico. Additionally, TIP samplers do not sample vessels that carried an observer for a trip to avoid double sampling. All lengths were converted to inches total length (TL) using standard conversion factors and equations used in SEDAR 33 (2014).

Gulf of Mexico gag grouper length distributions distribution for the commercial sector from both TIP and RFOP are shown in Figure 1. The distribution is shown in 1 inch increments using the lengths from 2013 to 2015. In the commercial sector, > 94% of the gag grouper harvested are above the minimum size limit being considered of 24 inches TL. In Figure 2, the length distributions between gear types, bottom longline and other gear (primary vertical line)))),) were compared since a significant difference between mean lengths was detected. For bottom longline gear, > 99% of gag grouper harvested are above the proposed minimum size limit compared to vertical line gear where > 91% of gag grouper harvested are above the minimum 24 inch TL size limit being considered.

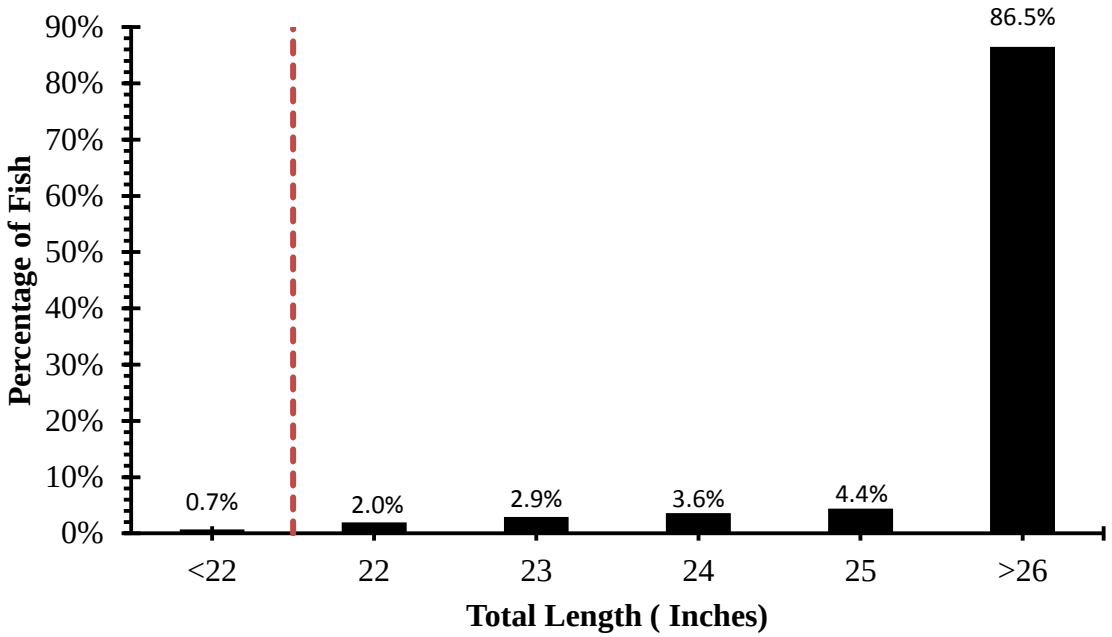

Figure 1. Gulf of Mexico gag grouper total length distribution generated from commercial TIP (n=8,559) and RFOP (n=4,505) data from 2013 to 2015. The dashed red line denotes the current commercial minimum size limit of 22 inches TL.

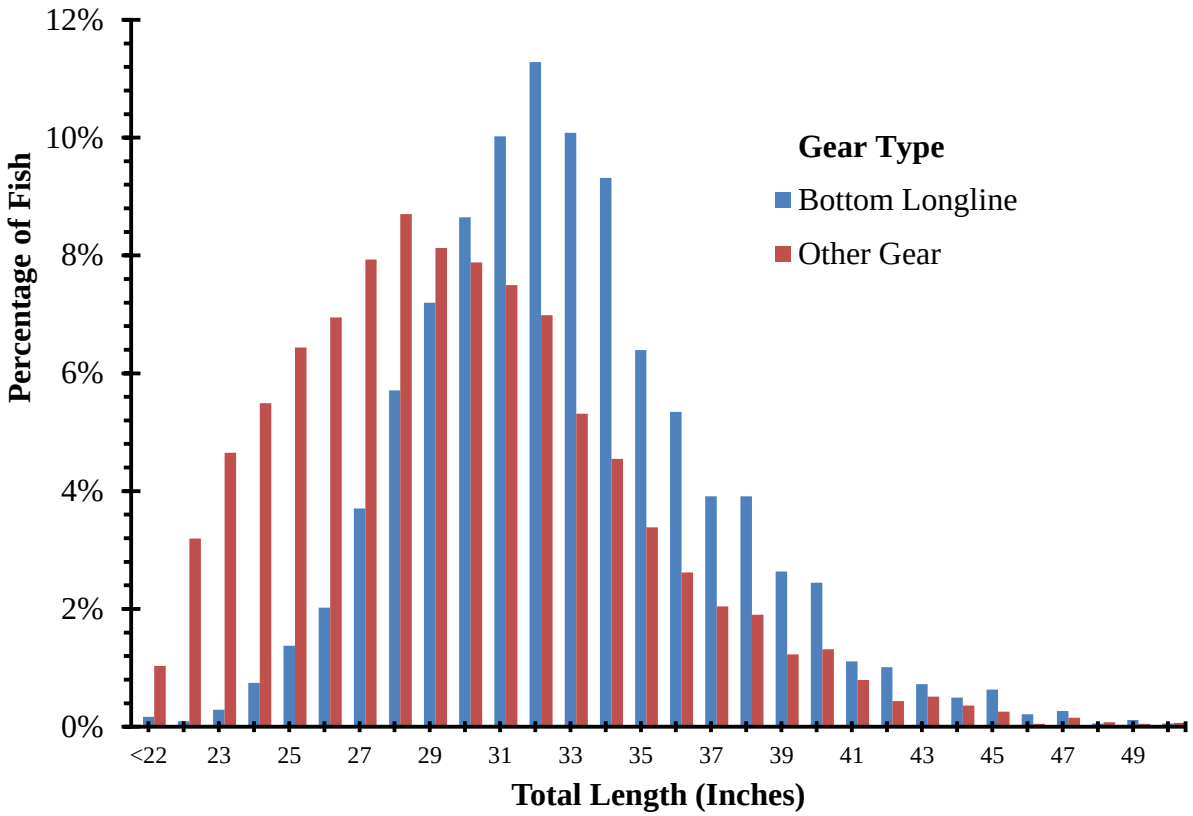

Figure 2. Gulf of Mexico gag grouper total length distribution for gear types bottom longline (n=5,237) and other gear (n=7,827) from 2013 to 2015.

The size limit analysis estimated the percent reduction in whole weight. Thus the weight of each fish was required. When whole weight data was available it was used. If gutted weights were available they were converted to whole weight using the SEFSC conversion factor of 1.18. When weight data was unavailable, it was estimated from length using the gag grouper weight-length equations defined in SEDAR 33 (2014). Reductions in landings in weight were calculated for minimum size limits (MSL) at 1 inch intervals between 22-28 inches TL as follows:

Percent reduction = $((C – (G+R)) - B)/C$, where:

C = catch in pounds
G = weight of fish that are greater than or equal to the MSL
R = release mortality multiplied against the fish that are larger than the 22-inch TL MSL and are less than the MSL being considered
B = weight of fish smaller than the 22-inch TL MSL (non-compliance)

Percent reductions associated with MSL were normalized to a 0% reduction at the commercial status quo size limit of 22 inches total length. Data were pooled for the three years of complete data (2013-2015) with the assumption that recent lengths will likely reflect future lengths harvested in the fishery. All of the weights used in the analysis are in pounds whole weight. A release mortality point estimate of 30% was incorporated into the analysis. The mean depth of

capture (202 feet) from the RFOP data set for gag grouper was used to approximate mortality at that depth from the meta-analysis model used in SEDAR 33 (2014).

Table 1. The estimated percent reduction of commercial gag grouper landings for each of the minimum size limit considered in the framework action. The reductions were generated with TIP and RFOP data from 2013 to 2015, and came from a sample of 13,064 fish.

Minimum Size Limit (inches TL)	Percent Reduction
22	0.0
23	0.5
24	1.3
25	2.4
26	4.0
27	6.0
28	8.7

The reliability of this analysis is dependent upon the accuracy of the underlying data and input assumptions. This analysis assumes that the commercial harvest of gag grouper size distribution from 2013 to 2015 will reflect the size distribution of gag grouper commercial harvest in the future.

References

NMFS. 2016. Characterization of the U.S. Gulf of Mexico and southeastern Atlantic otter trawl and bottom reef fish fisheries. Observer Training Manual. NMFS, Southeast Fisheries Science Center, Galveston Lab., Galveston, Texas. http://www.galvestonlab.sefsc.noaa.gov/forms/observer/obs_training_manual_5_2016.pdf.

Saari, Courtney, R., and Lawrence R. Beerkircher. 2014. User's guide for the Trip Interview Program (TIP). Version 6.0. USDS/NOAA/NMFS Southeast Fisheries Science Center. http://www.sefsc.noaa.gov/docs/TIP_UsersGuide_Ver6.pdf.

SEDAR. 2014. SEDAR 33 - Gulf of Mexico Gag Stock Assessment Report. SEDAR, North Charleston, South Carolina. http://www.sefsc.noaa.gov/sedar/.

APPENDIX E: ACL/ACT CONTROL RULE BUFFER SPREADSHEET FOR GULF MUTTON SNAPPER

ACL/ACT Buffer Spreadsheet version 4.1 - April 2011 **Combined Mutton Snapper**

sum of points 4

max points 7.0

Buffer between ACL and ACT (or ABC and ACL)

Unweighted 11

Weighted **12**

Min. Buffer	**0**	**min. buffer**	User adjustable
Max Unw.Buff	19	max unwt. Buff	
Max Wtd Buff	**25**	**max wtd. buffer**	User adjustable

Component	Element score	Element	Selection	Element result
Stock assemblage	0	This ACL/ACT is for a single stock.	x	0
	1	This ACL/ACT is for a stock assemblage, or an indicator species for a stock assemblage		

Ability to Constrain Catch	0	Catch limit has been exceeded 0 or 1 times in last 4 years	X	0
	1	Catch limit has been exceeded 2 or more times in last 4 years		
		For the year with max. overage, add 0.5 pts. For every 10 percentage points (rounded up) above ACL		
		Not applicable (there is no catch limit)		
Precision of Landings Data Recreational		Apply this component to recreational fisheries, not commercial or IFQ fisheries		
	0	Method of absolute counting		2
	1	MRIP proportional standard error (PSE) <= 20		
	2	MRIP proportional standard error (PSE) > 20	x	
		Not applicable (will not be included in buffer calculation)		

		Apply this component to commercial fisheries or any fishery under an IFQ program		
Precision of Landings Data Commercial	0	Landings from IFQ program		1
	1	Landings based on dealer reporting	x	
	2	Landings based on other		
		Not applicable (will not be included in buffer calculation)		
Timeliness	0	In-season accountability measures used or fishery is under an IFQ		1
	1	In-season accountability measures not used	x	

Sum 4

Weighting factor

	Element weight	Element	Selection	Weighting
Overfished status	0	1. Stock biomass is at or above B_{OY} (or proxy).		0.1
	0.1	2. Stock biomass is below B_{OY} (or proxy) but at or above B_{MSY} (or proxy).	x	
	0.2	3. Stock biomass is below B_{MSY} (or proxy) but at or above minimum stock size threshold (MSST).		
	0.3	4. Stock is overfished, below MSST.		
	0.3	5. Status criterion is unknown.		

APPENDIX F. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

The Gulf of Mexico Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) §303(a) (11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable minimize bycatch, and minimize the mortality of bycatch that cannot be avoided. The Magnuson-Stevens Act at §3(2) defines bycatch as "fish which are not harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program." Economic discards are fish that are discarded because they are undesirable to the harvester. This category of discards generally includes certain species, sizes, and/or sexes with low or no market value.

Regulatory discards are fish that are required by regulation to be discarded, but also include fish that may be retained but not sold. National Marine Fisheries Service (NMFS) outlines at 50 CFR §600.350(d) (3) (i) ten factors that should be considered in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable.

1. Population effects for the bycatch species.
2. Ecological effects due to changes in the bycatch of that species (effects on other species in the ecosystem).
3. Changes in the bycatch of other species of fish and the resulting population and ecosystem effects.
4. Effects on marine mammals and birds.
5. Changes in fishing, processing, disposal, and marketing costs.
6. Changes in fishing practices and behavior of fishermen.
7. Changes in research, administration, and enforcement costs and management effectiveness.
8. Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources.
9. Changes in the distribution of benefits and costs.
10. Social effects.

The Councils are encouraged to adhere to the precautionary approach outlined in Article 6.5 of the Food and Agriculture Organization of the United Nations Code of Conduct for Responsible Fisheries when uncertain about these factors.

The harvest of mutton snapper is currently regulated with minimum size limits, bag limits, and annual catch limits (ACLs). However, these management tools may have the unavoidable adverse effect of creating regulatory discards, which reduces landings. Additionally, harvesting gag grouper commercially could be simplified by developing compatible commercial regulations in the Gulf, South Atlantic and Florida state waters. Consequently, the Council is considering in this Amendment the practicability of taking additional action to further minimize mutton snapper and gag grouper bycatch, by sector.

Release Mortality Rates

Mutton Snapper

Mutton snapper discard rates for the commercial and recreational sectors were calculated for SEDAR 15a Update (2015). Fishing mortality rates were higher until the 16-inch minimum size limit was implemented in 1994 and then catch rates decreased. The current fishing mortality rate on fully selected ages, expressed as the geometric mean of the rates from 2011-2013, was 0.12 per year and the MFMT was 0.18 per year which was defined as the fishing mortality rate associated with a spawning potential ratio of 30% (GMFMC 2011a and SAFMC 2011, SEDAR 15a Update 2015) such that mutton snapper was not undergoing overfishing.

The commercial fishery uses two primary gears: hook-and-line and longlines but mutton snapper are also caught infrequently in other gears such as traps and trawls. Commercial discard data began to be collected in logbooks in 2002. Early logbook discard data found that approximately 22% of the commercial fish discarded were dead at the time of discarding and these fish were added to the landings. The remainder of the released fish (78%) was believed to experience the shallow water 15% release mortality rate. There are no estimated discards for the longline fishery because there are no discards of mutton snapper in their logbook data and that is reasonable given that longlines are restricted to deeper waters, thus less likely to encounter mutton snapper less than the 16-inch minimum size limit.

For the recreational sector, estimates of the number of recreational discards were available from Marine Recreational Information Program (MRIP) and the National Marine Fisheries Service headboat survey (HBS). The MRIP system classifies recreational catch into three categories:

- Type A - Fishes that were caught, landed whole, and available for identification and enumeration by the interviewers.
- Type B - Fishes that were caught but were either not kept or not available for identification:
    - Type B1 - Fishes that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
    - Type B2 - Fishes that were caught and released alive.

Since nearly all mutton snapper discarded were reported as released alive, there were very few reported dead discards (Type B1) in the MRIP survey data. The remainder of released fish (Type B2) was assumed subject to a shallow water 15% release mortality rate in the SEDAR 15a Update (2015). Headboat captains began to report their discards in 2004 and at-sea sampling began in 2005. The SEDAR 15a Update typified discards with the at-sea sampling data instead of using the captain's reports because the at-sea sampling data also included the length of the fish and the condition of the fish at the time of release. Mutton snapper whose release condition was bad, dead, or preyed upon (on average 6.6% in the Gulf) were included in the headboat landings and the rest of released fish were considered subject to the assumed 15% shallow water mortality rate.

Gag Grouper

Gag grouper discard rates for the commercial sector were calculated for SEDAR 33 (2014). Discard rates of gag grouper in the commercial vertical line fishery were calculated by stratifying observer and coastal logbook data by year and region. Discards were calculated as the stratum specific discard rate*stratum specific effort reported to the coastal logbook program. Discards calculated for all strata within a year were summed to provide yearly discards (**Figure X.1**).

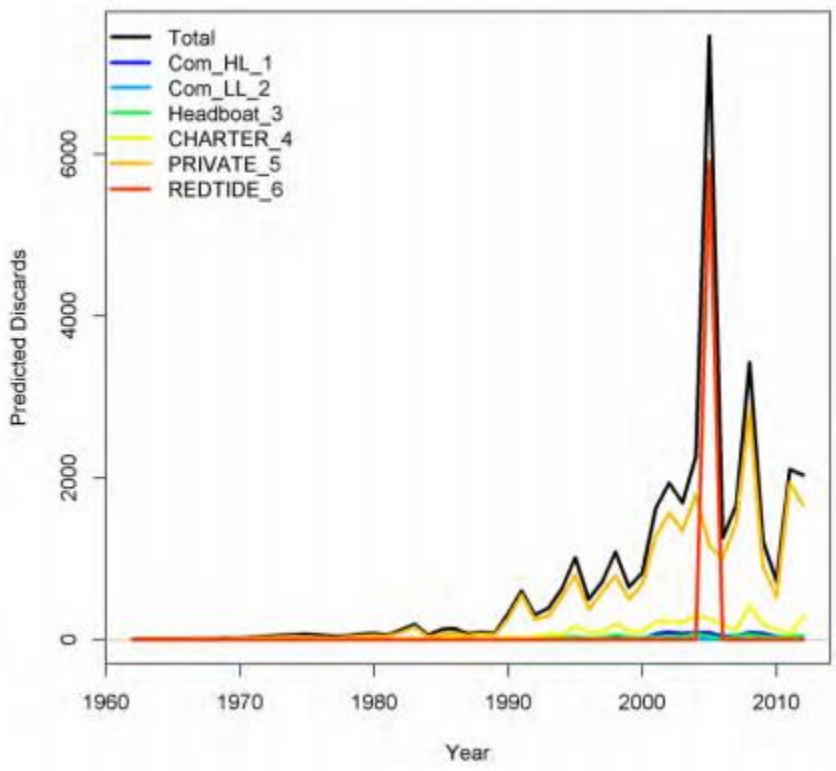

Figure F.1. The modeled predicted discards (thousands of fish) by fleet from SEDAR 33. Note: The 2005 red tide event was used in the model as a discard fishery.

Release mortality for gag grouper from SEDAR 33 was determined by applying the depth-mortality function from Sauls (2013) that assumes 90% survivorship for gag grouper released in good condition for the commercial vertical line sector. For the commercial longline sector that typically fishes at deeper depths, SEDAR 33 recommended applying the discard mortality estimates from a baseline meta-analysis model to estimate mortality. The average depth was used for point estimates of discard mortality for each fleet and calculated from observer data. Each commercial fishing fleet used in the assessment model has an observer program that records fate (kept/discarded alive/discarded dead) and depth of capture for each gag grouper during a trip. Using the average depth of capture for each fleet, discard mortality rate point estimates were calculated for fish released alive (Table F.1).

Table F.1. The calculated average depth of released gag grouper by fishing fleet and associated discard mortality rate estimate using Sauls (2013) from SEDAR 33.

Fishing fleet	Avg. depth (m)	Sauls (2013)	SEDAR 10
Vertical line	31	0.27	0.57
Longline	58	0.27	0.76
Headboat	27	0.16	0.21
Charter boat	25	0.16	0.21
Private recreational	17	0.12	0.21

Other Reef Fish

The management measures in this Amendment are addressing mutton snapper and gag grouper, and therefore other reef fish species are not specifically addressed further in this section. Criteria 3 in the following Practicability Analysis discusses bycatch of other reef fish in additional detail.

Sea Turtles and Sawfish

No change in sea turtle or smalltooth sawfish bycatch is expected as a result of the proposed management measures. The Council and NMFS took action in Amendment 18A (GMFMC 2005b) to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) (effective September 8, 2006) to comply with the reasonable prudent measures that ensure any sea turtle or smalltooth sawfish taken in the reef fish fishery is handled in such a way as to minimize stress to the animal and increase its survival rate. Regulations were implemented requiring sea turtle release gear be onboard reef fish-permitted vessels when fishing to facilitate the safe release of any incidentally caught sea turtles. In addition, vessels with commercial and for-hire reef fish vessel permits are required to possess specific documents providing instructions on the safe release of incidentally caught sea turtles or smalltooth sawfish. The reasonable and prudent measures also required better data collection from the fishery on incidental takes of sea turtles.

Bottom longline gear was restricted in the Gulf of Mexico in Reef Fish Amendment 31 (GMFMC 2009). This Amendment reduced effort with bottom longline gear by establishing a gear endorsement thereby reducing the chance of sea turtle interactions through prohibition of bottom longline gear in certain areas, depths, months, or some combination of the three (outside 35 fathoms during the months of June, July, and August and beyond 25 fathoms the remainder of the fishing season). The more abundant sea turtles are in a given area and the higher the fishing effort in that area, the greater the probability a sea turtle will be incidentally caught by the gear. For example, most observed sea turtle takes occurred on fishing trips west of the Tampa Bay, Florida area, all but one sea turtle take was on a set at 50 fathoms (91 meters) or less, and 76% of sea turtles takes occurred from June through August (NMFS 2009). Most of the bottom longline fishing effort is conducted in these places and at these times. The rule also restricted vessels to 1,000 hooks per vessel with no more than 750 hooks rigged at any given time.

The September 30, 2011, biological opinion (BiOp) estimated that reef fish commercial bottom longline gear and commercial vertical line gear will capture two sawfish every 3 years,

respectively. The September 30, 2011, BiOp also indicated that recreational reef fish vertical line gear would capture four sawfish every three years.

Other Bycatch

Marine mammals may be incidentally encountered by the reef fish fishery. The Gulf of Mexico commercial reef fish fishery is considered to be listed a Category III fishery in NMFS' List of Fisheries, based on the use of vertical line and longline gear (81 FR 20550) This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population.

Seabirds are another species group of concern. The three primary orders of seabirds in the Gulf of Mexico are Procellariiformes (petrels, albatrosses, and shearwaters), Pelecaniformes (pelicans, gannets and boobies, cormorants, tropic birds, and frigate birds), and Charadriiformes (phalaropes, gulls, terns, noddies, and skimmers) (Clapp et al. 1982; Harrison 1983). Several other species of seabirds also occur in the Gulf of Mexico, and are listed as threatened or endangered by the U.S. Fish and Wildlife Service, including: piping plover, least tern, roseate tern, bald eagle, and brown pelican (the brown pelican is endangered in Mississippi and Louisiana and delisted in Florida and Alabama). Human disturbance of nesting colonies and mortalities from birds being caught on fishhooks and subsequently entangled in monofilament line are primary factors affecting sea birds. Oil or chemical spills, erosion, plant succession, hurricanes, storms, heavy tick infestations, and unpredictable food availability are other threats. No evidence exists that the directed reef fish fishery adversely affects seabirds.

Practicability of current management measures in the directed mutton snapper and gag grouper fishery relative to their impact on bycatch and bycatch mortality.

Currently the harvest of commercial mutton snapper is managed with a 16-inch total length (TL). Currently the harvest of commercial gag grouper is managed with a 22-inch total length (TL). The following discusses current and proposed management measures with respect to their relative impacts on bycatch.

Size limits

Minimum size limits are estimated to be the greatest source of regulatory discards for most reef fish species. The minimum size limit for mutton snapper is a likely source of discards. The 16 and 18-inch TL minimum size limits are less than the size where 50% reach first maturity, at 19 inches TL (SEDAR 15a Update). An increase in the minimum size limit could also potentially benefit the stock by increasing spawning potential (larger fish are more fecund).

Increasing minimum size limits are typically established to reduce fishing mortality. Additionally, increasing the minimum size limit is anticipated to increase yield-per-recruit and prevent growth overfishing. Also, increasing the minimum size limit is estimated to increase the proportion of dead discards to landings, but the overall magnitude of dead fish is estimated to be less from increasing the size limit relative to the status quo because of the concurrent reductions

in harvest. The minimum size limit analysis for the commercial sector is available in Appendix C.

For gag grouper harvested by the commercial sector, > 94% of the gag grouper harvested are above the minimum 24-inch TL size limit being considered. Any reduction in landings will likely be offset by a substantial increase in spawning stock potential. The minimum size limit analysis for commercially captured gag grouper is available in Appendix D.

Closed Seasons

The Generic ACL Amendment (GMFMC 2011a) implemented post-season accountability measures that close the mutton snapper fishing season when the sum of the commercial and recreational landings estimated by NMFS will exceed the ACL. Then during the following fishing year, if the sum of commercial and recreational landings reaches or is projected to reach the stock ACL, the fishing season will close through the remainder of the year. The commercial gag grouper fishery is managed under an individual fishing quota system (Amendment 29), thus not likely to exceed the ACL

Bag Limits

The recreational sector for mutton snapper is managed in the aggregate 10-snapper recreational bag limit. A more restrictive bag limit can encourage discards from high-grading after the bag limit is met. However, recreational data from MRIP, HBS, LA Creel, and Texas Parks and Wildlife Division (TPWD) indicates that mutton snapper landed per trip per angler is less than one fish per angler on 89% of the trips when a mutton snapper is landed (Figure X.2). Therefore, high grading may not be a problem because few fishers catch the current bag limit. The Council has selected to reduce the bag limit to X mutton snapper within the 10-snapper aggregate. In recent years (2013-2015) the number of Gulf of Mexico recreational trips that harvested mutton snapper and were captured by MRIP, HBS, LA Creel, and TPWD are low (90 trips). Therefore, it is not possible to do a meaningful recreational mutton snapper bag limit analysis for the Gulf of Mexico region.

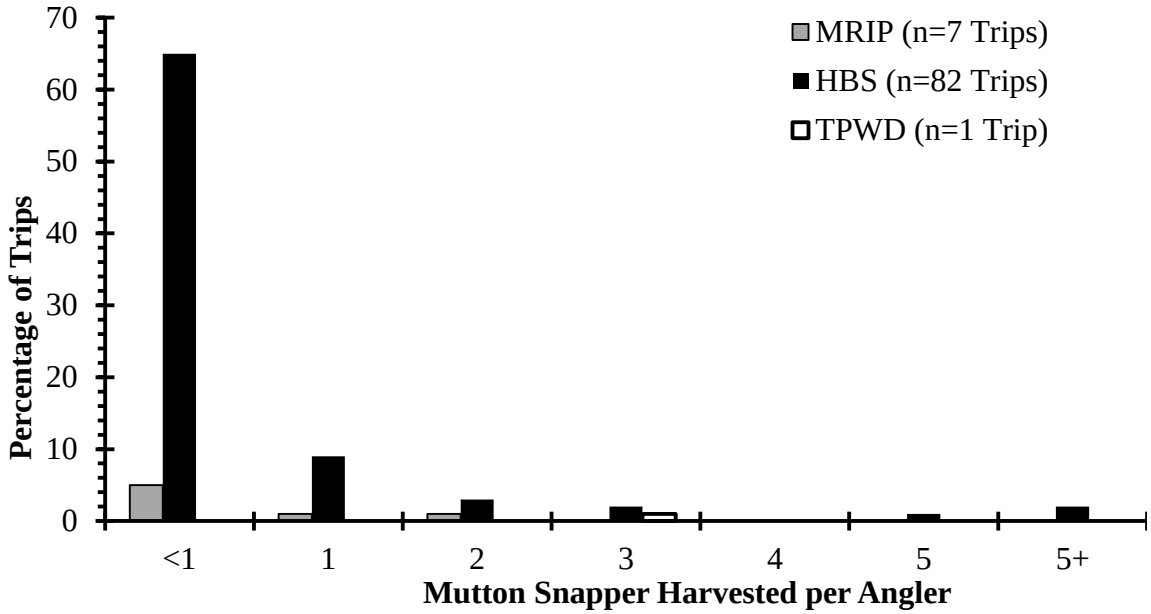

Figure F.2. Number of mutton snapper harvested per angler from the Gulf of Mexico (n = 90 trips) from 2013 through 2015. SERO - MRIP, HBS, LA Creel, and TPWD.

Alternatives being considered to minimize bycatch

Methods to reduce dead discards in the reef fish fishery can be accomplished either by reducing the number of fish discarded or reducing the release mortality rate of discards. To reduce the number of discards, management measures must limit fishing effort or change the selectivity of fishing gears in such a way that reduces the harvest of sub-legal fish. Additionally, sources of release mortality should be identified (e.g., depth, length, hooking location, surface interval, temperature) and management measures must be imposed to reduce discard mortality rates. The Council and NMFS have taken numerous actions to reduce bycatch for specific species and have developed management measures to minimize bycatch or release mortality in general including requirements to use of circle-hooks, de-hookers and venting tools.

Therefore, there are few ways to further reduce discard mortality for either species. Discards and release mortality are anticipated to increase with the proposed management measures. Increasing the size limit, decreasing the commercial trip limit, and reducing the recreational bag limit are expected to increase the amount of mutton snapper and gag grouper discards. However, as mentioned above, the effect of these discards should be minimal because of the species' ability to survive the capture process. Therefore, these measures are overall beneficial for the stock and meet the purpose of this Amendment.

Practicability Analysis

Criterion 1: Population effects for the bycatch species

Bycatch mortality of mutton snapper due to management measures such as in-season closures could result in loss of yield. Based on a theoretical analysis, closing the recreational sector is expected to increase the bycatch and discards of mutton snapper. Given that mutton snapper are

normally caught as a bycatch on commercial trips targeting other reef fish species, the management measures proposed herein is not expected to alter the manner in which the reef fish fishery is prosecuted; therefore, there should be no changes in the effects to other reef fish species. Bycatch of gag grouper due to an increased size limit will likely increase the bycatch and discards in the commercial sector. An analysis by the SEFSC determined the increase in size limit, also including discard mortality, results in a substantial increase in spawning potential ratio and will likely increase the abundance of the stock.

Criterion 2: Ecological effects due to changes in the bycatch of mutton snapper and gag grouper (on other species in the ecosystem)

Relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict. This Amendment is not expected to affect major changes in bycatch of other fish species. Bycatch of other species is incidental in the hook-and-line fishery for mutton snapper and gag grouper. Furthermore, improved data monitoring and reporting measures have been implemented, and will continue to improve in the near future, which could be expected to reduce bycatch and discards.

Criterion 3: Changes in the bycatch of other species of fish and invertebrates and the resulting population and ecosystem effects

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. Fishers do not generally target mutton snapper. Snappers, groupers, and other reef fishes are commonly caught in association with mutton snapper. The data found in **Tables F-2** and **F-3** list the species that contributed the most harvest (by weight) on commercial trips that harvested mutton snapper and gag grouper in the Gulf of Mexico. This analysis was conducted by isolating all of the 2011-2015 commercial logbook reported trips that had at least one pound of mutton snapper or gag grouper harvested in the Gulf of Mexico region. Then the landings were summed by harvest weight for each species, and the top six were listed in **Tables X-2** and **X-3**. There was one species (red grouper), which had more harvest than mutton snapper. There were three species (red grouper, red snapper, and vermilion snapper), which had more harvest than gag grouper.

Table F-2. Top six species caught on commercial trips where at least one pound of mutton snapper was caught in the Gulf of Mexico for 2011 through 2015. This analysis was conducted with the Southeast Fisheries Science Center (SEFSC) commercial logbook data.

Species	Percent of Harvest
Red Grouper	60.5%
Mutton Snapper	6.0%
Yellowtail Snapper	5.7%
Gag Grouper	4.6%
Red Snapper	4.6%
Scamp Grouper	2.6%
Black Grouper	2.3%

Source: Southeast Fisheries Science Center Commercial Logbook (February 2017).

Table F-3. Top six species caught on commercial trips where at least one pound of gag grouper was caught in the Gulf of Mexico for 2011 through 2015. This analysis was conducted with the Southeast Fisheries Science Center (SEFSC) commercial logbook data.

Species	Percent of Harvest
Red Grouper	46.7%
Red Snapper	18.6%
Vermilion Snapper	10.3%
Gag Grouper	6.5%
Yellowedge Grouper	2.9%
Red Porgy	2.4%
Scamp Grouper	2.0%

Source: Southeast Fisheries Science Center Commercial Logbook (February 2017).

Criterion 4: Effects on marine mammals and birds

The effects of current management measures on marine mammals and birds are described above in this Chapter in Other Bycatch. There is no information to indicate marine mammals and birds rely on mutton snapper or gag grouper for food, and they are not generally caught by fishers harvesting mutton snapper or gag grouper.

Criterion 5: Changes in fishing, processing, disposal, and marketing costs

Modifying the recreational bag limit and minimum size limit for mutton snapper can potentially decrease harvest and extend the fishing season to later in the year. Reduction in harvest may cause commercial fishers to incur losses in revenue. However, mutton snapper is considered a bycatch species compared to other targeted reef fish, and the management measures proposed in this Amendment may not affect discards.

Criterion 6: Changes in fishing practices and behavior of fishermen

Changes to the bag limit and size limits may alter angler effort and could potentially affect decisions about when and where to fish. Shifts or changes in fishing locations and seasons could have an effect on fishing behavior and practices that may potentially affect the bycatch of other reef fish. However, these effects should be minor because mutton snapper are generally not targeted, but are incidentally caught when fishers fish for other species. Similarly, these effects should be minor for gag grouper because only a commercial size limit increase is being considered in this Amendment.

Criterion 7: Changes in research, administration, and enforcement costs and management effectiveness

The proposed measures are not expected to significantly impact administrative costs. Size limits, bag limits, and in-season closures are currently used to regulate the commercial and recreational

sectors. All of these measures will require additional research to determine the magnitude and extent of changes in bycatch and bycatch mortality.

Criterion 8: Changes in the economic, social, or cultural value of fishing activities and non-consumptive uses of fishery resources

The economic benefits of modifying the bag limit and minimum size limit for mutton snapper is expected to decrease harvest. It is plausible to infer that commercial fishers could mitigate the adverse effects by taking more fishing trips. However, such a scenario is very unlikely for mutton snapper because it is essentially an incidentally caught species. The increase in size limit for gag grouper is expected to result in an overall slight decrease in landings adversely affecting the economic value of the fishery. Any reduction in gag grouper commercial landings should be offset by the positive impact of substantially increasing the spawning stock potential.

Criterion 9: Changes in the distribution of benefits and costs

Proposed management measures in this Amendment should not significantly alter bycatch of mutton snapper. However, the proposed management measures are expected to provide an overall net benefit to the stock and increase the health of the stock, which will benefit both fishing sectors. The proposed minimum size limit could reduce the commercial fisher's ability to harvest larger amounts of mutton snapper, which in turn is expected to maintain higher market prices. For the recreational sector, there may be some social impacts for all anglers and some economic impacts to the for-hire fleet because of the changes to the bag limit and minimum size limit. However, such changes are expected to be minor effects, given that mutton snapper is a bycatch species, harvested during fishing trips targeting other reef fish species. The proposed increased size limit for gag grouper is expected to provide an overall net benefit to the stock and increase the health of the stock, which will benefit both fishing sectors. The proposed commercial size limit change could reduce the commercial fisher's ability to harvest larger amounts of gag grouper per trip, which in turn is expected to maintain higher market prices.

Criterion 10: Social effects

Bycatch is considered wasteful and it reduces overall yield obtained from the fishery. Minimizing bycatch to the extent practicable will increase efficiency, reduce waste, and benefit the health of the stock, thereby resulting in net social benefits.

CONCLUSIONS

This section evaluates the practicability of taking additional action to minimize bycatch and bycatch mortality using the ten factors provided at 50 CFR section 600.350(d)(3)(i). In summary, measures proposed in this Amendment are intended to revise management measures, update biological benchmarks, and modify allowable fishing levels for mutton snapper and gag grouper recommended by the latest stock assessment updates. These actions are necessary to base mutton snapper and gag grouper management measures on the best scientific information available in order to achieve and maintain OY and to prevent overfishing while minimizing, to

the extent practicable, adverse social and economic effects. As summarized above, the actions in this Amendment are not expected to result in significant changes in bycatch of mutton snapper or gag grouper. In addition, the Council, NMFS, and the SEFSC have implemented and plan to implement numerous management measures and reporting requirements that have improved, or are likely to improve monitoring efforts of discards and discard mortality. Therefore, no additional action is needed to minimize bycatch or bycatch mortality within the Gulf of Mexico reef fish fishery.