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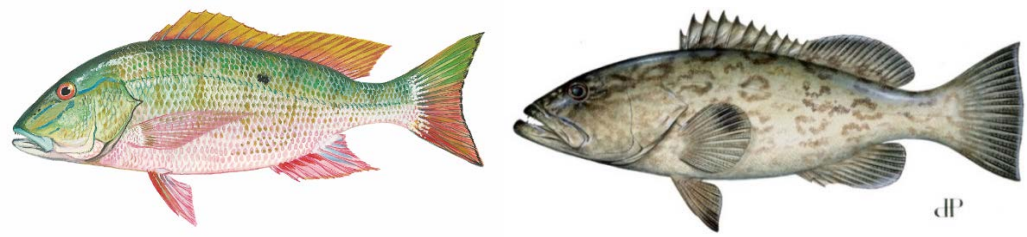
Modifications to Mutton Snapper and Gag Management Measures



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

February 2017

This is a publication of the Gulf of Mexico Fishery Management Council Pursuant to National Oceanic and Atmospheric Administration Award No. NA15NMF4410011.

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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

( ) Legislative
( ) 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) with the center of abundance in south Florida. 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, the 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; SEDAR 15A Update 2015.

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 the same in state

and federal waters (Table 1.1.2). For the commercial sector, bag limits are restricted to 10 fish per person per day, or per trip, in May and June (whichever is more restrictive) in Florida state waters and South Atlantic federal waters, while there is no commercial bag limit in Gulf federal waters (Table 1.1.3).

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 reef fish species 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. As of January 1, 2017, Florida increased the minimum size limit for mutton snapper to 18" TL. The South Atlantic has also selected 18" TL as their preferred alternative in Snapper Grouper Amendment 41, which is anticipated to be implemented in 2017.

Species	Recreational Regulations	Florida State Waters	Federal Waters Gulf of Mexico	Federal Waters South Atlantic
Mutton Snapper	Size Limit	18" TL	16" 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 reef fish species 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 for mutton snapper to 18" TL effective January 1, 2017. The South Atlantic has also selected 18" TL as their preferred Alternative in Snapper Grouper Amendment 41, which is anticipated to be implemented in 2017.

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

[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).

(SEDAR Update Assessment 2015). These aggregations are highly predictable and make mutton snapper highly vulnerable to fishing pressure while spawning. The Council is considering changes to spawning season closures, bag limits, and size limits. The Council may want to consider developing compatible regulations with both the South Atlantic Council and State of Florida to simplify management and increase compliance for anglers harvesting this species in south Florida.

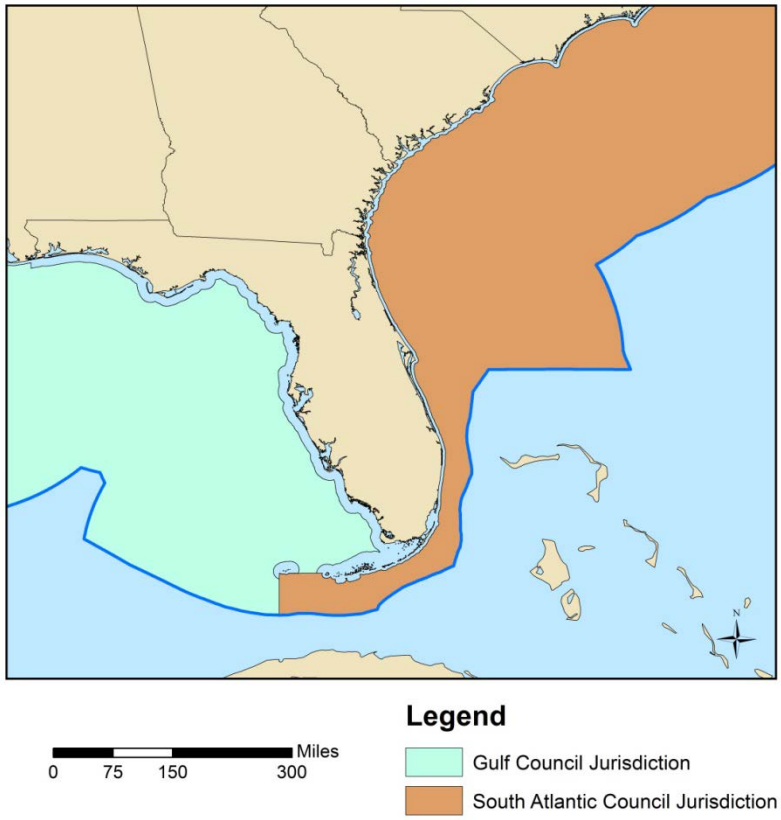

Figure 1.1.1. Jurisdictional boundaries of the Gulf (green) and South Atlantic (brown) Councils.

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. Recreational landings reported to 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**

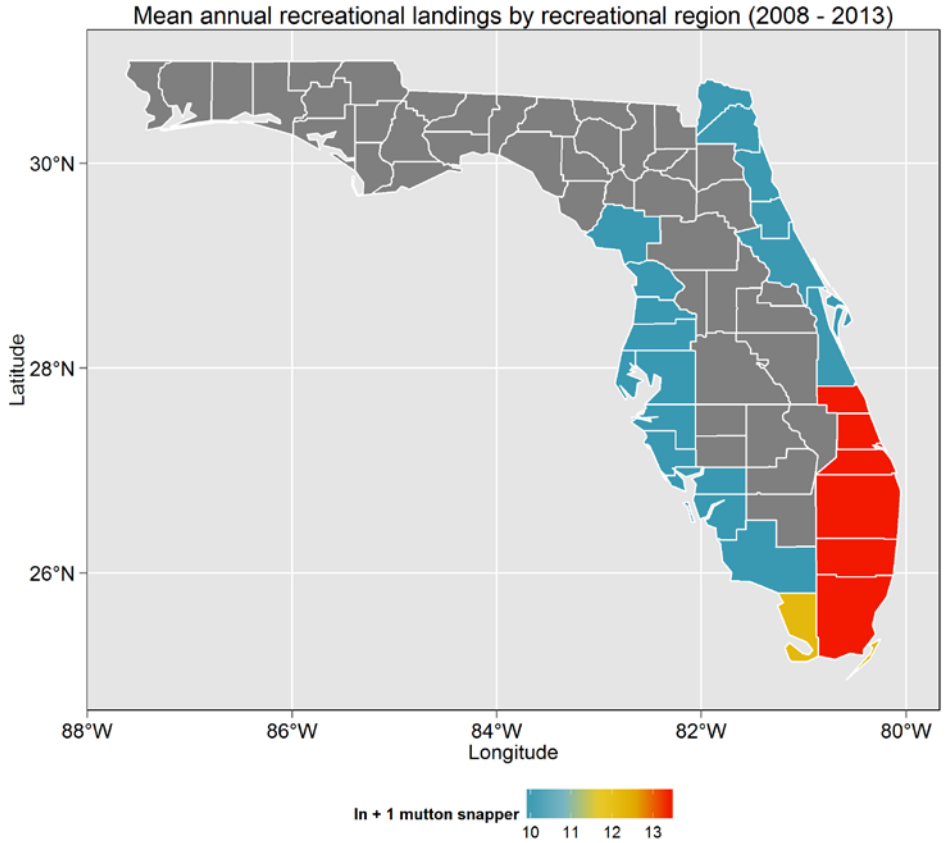

Figure 1.1.2. Mean annual recreational landings of mutton snapper by recreational data collection region. Landings are from 2008-2013, and represent the distribution of landings and effort used in the stock assessment. Data are represented on a log scale, with regions in blue having lower landings than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

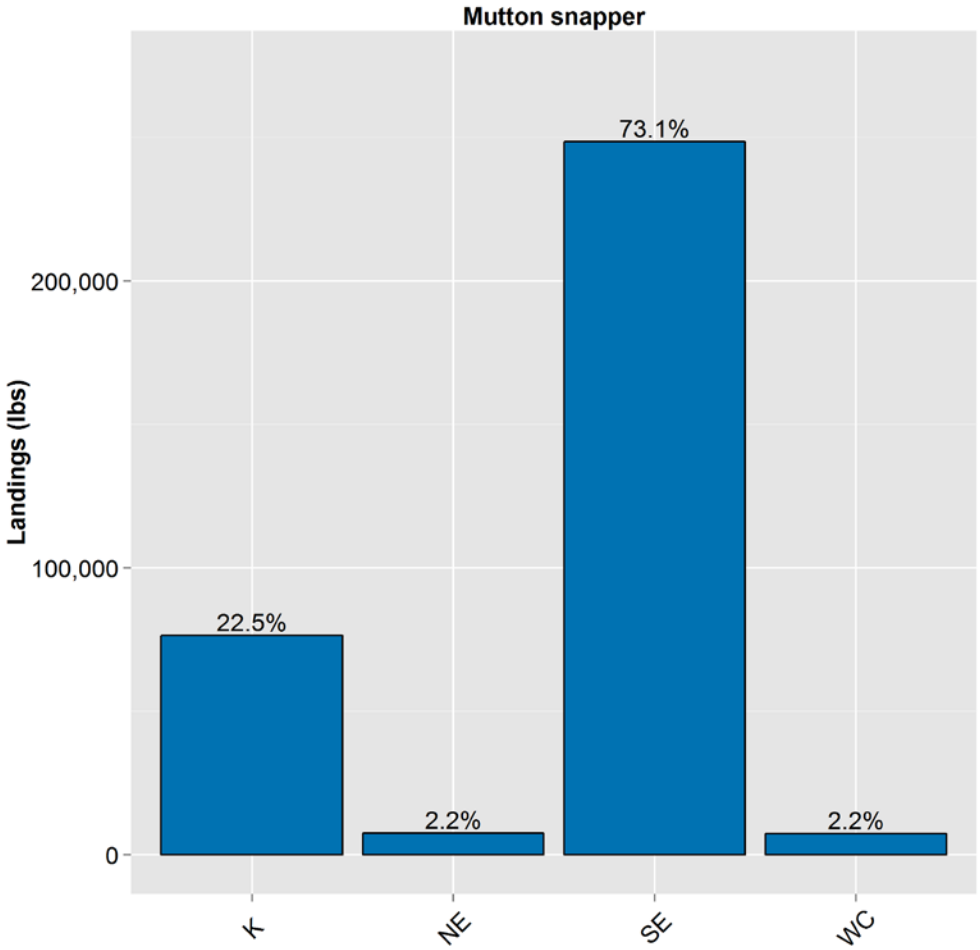

Figure 1.1.3. Recreational landings of mutton snapper in pounds by recreational data collection region. "K" represents the Florida Keys (Monroe County); "NE" represents Nassau to Brevard County; "SE" represents Indian River to Dade County; and "WC" represents Collier to Levy County. Source: Florida FWC

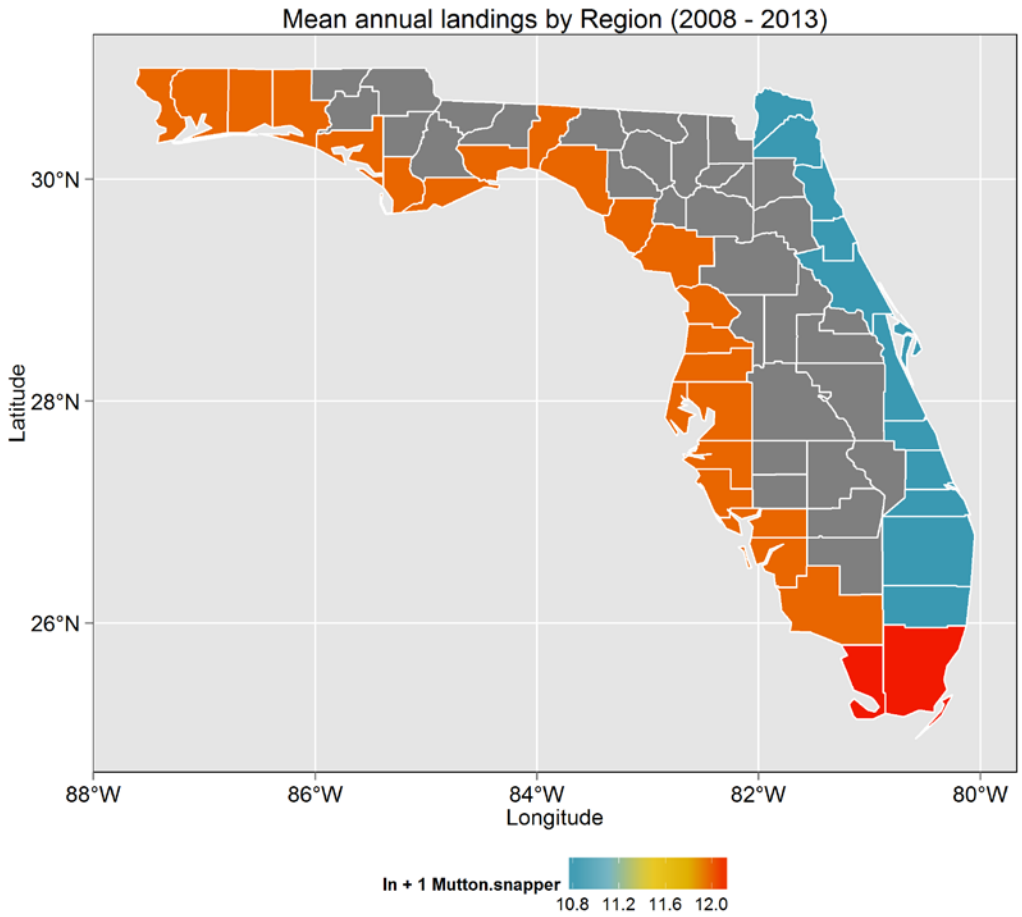

Figure 1.1.4. Mean annual commercial landings of mutton snapper aggregated across counties for confidentiality purposes. Data are represented on a log scale, with regions in blue having lower landings than regions in red. Regions in gray have no reported landings of mutton snapper. Source: Florida FWC

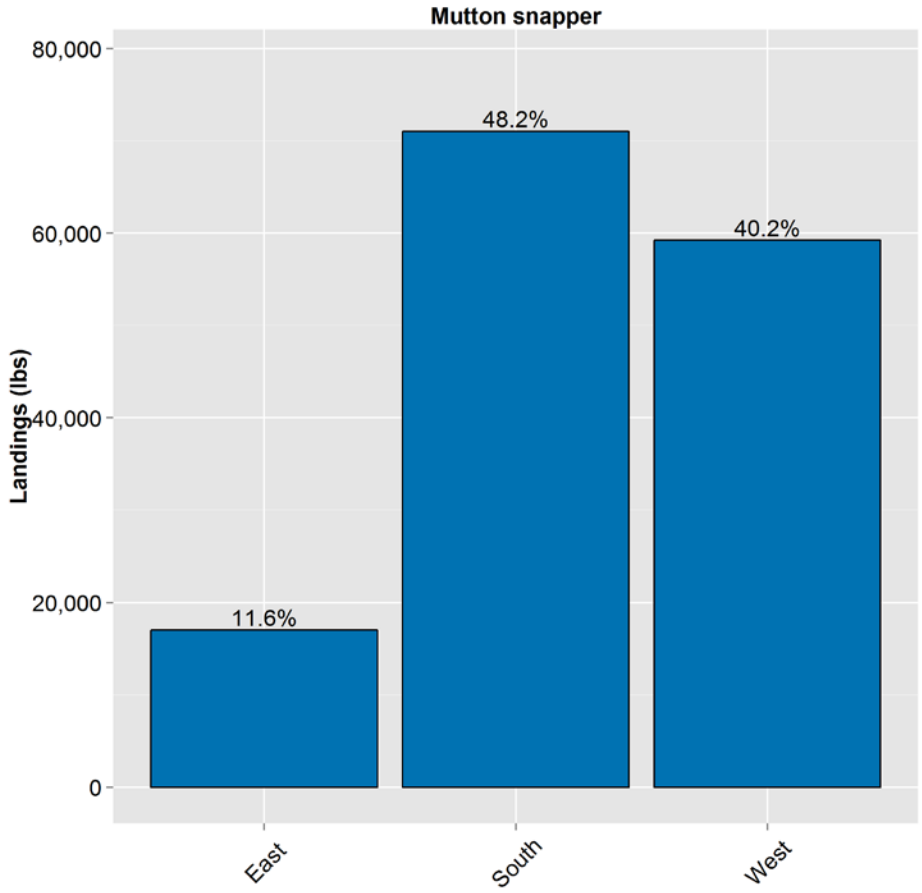

Figure 1.1.5. Commercial landings of mutton snapper in pounds aggregated across counties for confidentiality purposes. "South" represents Dade and Monroe County; "East" represents Nassau to Broward County; and "West" represents Collier to Escambia County. Source: Florida FWC

Gag Commercial Minimum Size Limit

Currently, the gag commercial minimum size limit is 22" TL in Gulf federal waters, while the recreational minimum size limit is 24" TL in Florida state waters and the federal waters of the Gulf and South Atlantic. 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" TL minimum size limit reduces dead discards. Alternative 2 in Action 4 considers increasing the minimum size limit to 24" TL to be consistent with regulations in adjoining waters and to be consistent with the recreational sector. Discard mortality of gag increases with depth, and is inversely related to the condition of the fish upon release (SEDAR 33 2014).

Gag in the Gulf have a maximum recorded age of 31 years (sampled in 2005); however most recent aging (since 2005) estimates the maximum age at 28-29 years (Lombardi et al. 2013). Gag mature first as females and then transition to males at older ages. The age at which gag are

sexually mature is recorded only for females. The age at maturity has decreased somewhat in the last couple decades: from 1991-1996, the age at which at least 50% of female gag were sexually mature (A_{50}) was 3.5 years, and the length at which at least 50% of gag were sexually mature females (L_{50}) was 538 mm fork length (FL) (554 mm TL, or 21.8 inches TL). From 1997-2012, these metrics decreased to A_{50} = 3.3 years, and L_{50} = 502 mm FL (516 mm TL, or 20.3 inches TL) (SEDAR 33 2014). 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).

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 of Mexico 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 south 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.

Amendments to the Reef Fish FMP

Amendment 1, 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”

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, 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, 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

A rule under the **Endangered Species Act**, implemented October, 2009, prohibits bottom longlining for Gulf reef fish east of 85º30’W longitude (near Cape San Blas, Florida) shoreward of the 35-fathom depth contour; restricts the number of hooks on board to 1,000 hooks per vessel with no more than 750 hooks being fished or rigged for fishing at any given time; replaced the 50-fathom boundary emergency rule to relieve social and economic hardship on longline fishermen who were prevented from fishing for shallow-water grouper by the emergency rule, and to keep fishing restrictions consistent.

Amendment 29 (with Environmental Assessment [EA], Regulatory Impact Review [RIR], and Regulatory Flexibility Analysis [RFA]), implemented January, 2010, established an individual fishing quota (IFQ) system for the commercial harvest of grouper and tilefish.

An Emergency Rule (2010): In response to an uncontrolled oil spill resulting from the April 20 explosion and subsequent sinking of the *Deepwater Horizon* oil rig, NMFS issued an emergency

rule to temporarily close a portion of the Gulf EEZ to all fishing [75 FR 24822]. The initial closed area extended from the mouth of the Mississippi River to south of Pensacola, Florida and covered an area of 6,817 square statute miles. The coordinates of the closed area were modified periodically in response to changes in the size and location of the area affected by the spill. At its largest size on June 1, 2010, the closed area covered 88,522 square statute miles, or approximately 37 percent of the Gulf EEZ. This closure was implemented for public safety.

Amendment 30B (FEIS/RIR/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 (FEIS/RIR/IRFA), implemented May 26, 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 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**, published December 1, 2010 [75 FR 74654]. 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 pounds gw (including the 100,000 pounds previously allowed) for the 2011 fishing year, and temporarily suspended the use of red grouper multi-use individual fishing quota (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. This temporary rule was 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].

Amendment 32, implemented March 12, 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 ACT 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 measures to the gag and red grouper recreational AMs to avoid exceeding the ACL.

Amendment 38, 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 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, 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, 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)

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

Note: The South Atlantic Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) recommended that the overfishing limit (OFL) be set equal to the equilibrium maximum sustainable yield proxy, which is the yield at the fishing mortality level which achieves a 30% spawning potential ratio ($F_{30\%SPR}$), or 1.52 million pounds (mp) whole weight (ww), including estimated dead discards, and 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 rather than landed weight and dead discards as was recommended by South Atlantic SSC. Also, this yield stream assumes that the entirety of the recommended harvest will be caught in 2017 and beyond. 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.

Discussion:

Mutton snapper is managed as a single stock that encompasses the U.S. South Atlantic and Gulf of Mexico, with more than 99% of landings occurring in Florida. In 2015, an update to the 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 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. This action considers alternatives that would incorporate this scientific advice into management of the mutton snapper stock. Consequently, the Council may modify existing management measures for mutton snapper (Actions 2 and 3) to achieve the desired combination of harvest and effort.

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.

Both **Alternative 2** and **Alternative 3** would be consistent with the SSC recommendation to reduce harvest and would require substantial reductions in allowable landings. **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. **Option 2b** would apply the ACL/ACT control rule to establish the ACT, 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.

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 not establish a 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).

Alternative 2 and **Alternative 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.

Table 2.1.2. A comparison of the current Gulf apportioned ACL in relation to the ACL under Alternative 3. Landings are 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%

Landings of mutton snapper in the Gulf have increased annually since 2010 (Table 1.1.4). Both **Alternative 2** and **Alternative 3** would result in allowable harvest levels which are below the most recent year's landings (2015: 134,886) by 5,790 lbs ww (**Alternative 2, Option 2a**), and 21,281 lbs ww (**Alternative 2, Option 2a** and **Alternative 3**), in 2017. These alternatives could therefore result in a reduction in effort which results in a seasonal closure of fishing effort for 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 **(Gulf Reef Fish AP Recommended)**

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 10 fish snapper aggregate- recreational bag limit in the Gulf and current regulations for mutton snapper in the Gulf and South Atlantic are shown in Tables 1.1.2 and 1.1.3. 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 a season closure for mutton snapper is more pronounced based on recent landings (Table 1.1.4) and the projected allowable landings in the alternatives presented in Action 1.

If similar regulations during the spawning and non-spawning seasons are preferred, **Alternative 2** would specify options of 3 fish (**Option 2a**) and 5 fish per person per day (**Option 2b**) on a year-round basis.

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. **(Gulf Reef Fish AP Recommended)**

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:

This action includes alternatives to increase the recreational and commercial minimum size limit for mutton snapper in the Gulf. **Alternative 1** would maintain the current 16" TL minimum size limit. Other alternatives consider larger size limits that increase the age (Figure 2.4.1) and likelihood of individuals reaching sexual maturity before entering the fishery. Increasing the size limit would also reduce the proportion of retained catch and slow the harvest rate at least initially for the recreational sector. This would contribute to achieving the harvest reductions necessary that are being considered in Action 1 of this document. Both the South Atlantic Council and the State of Florida are increasing the minimum size limit of mutton snapper to 18" 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 objective of reducing the rate of retained catch. **Alternative 2** is consistent with the actions being taken by the South Atlantic Council and State of 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 the State of 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" 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" TL_{max}) and 3 years of age.

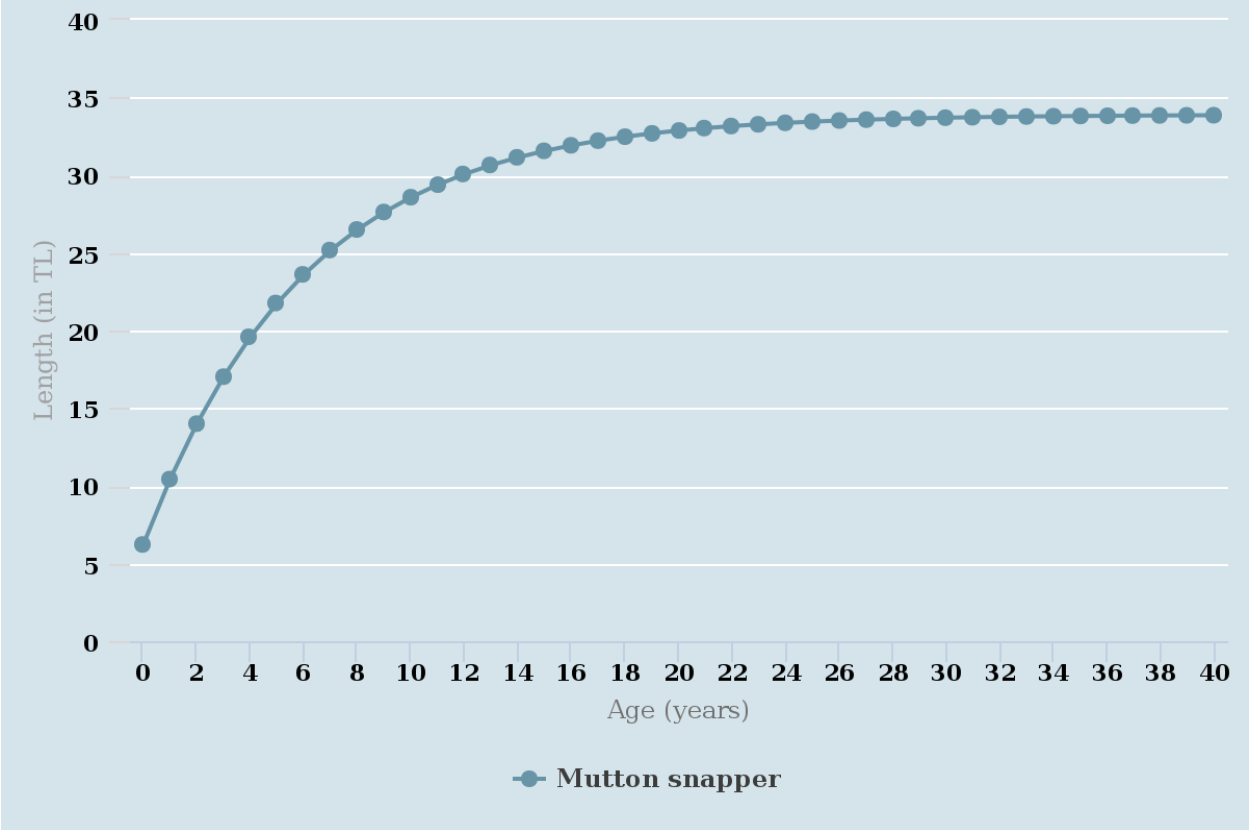

Figure 2.4.1. Age and growth relationship for mutton snapper based on data from the SEDAR 15A Update stock assessment (2015). Mutton snapper are approximately 2.6 years old at the current 16" TL minimum size limit. Individuals are approximately 3.4 years old at 18" TL and 4.2 years old at 20" TL. A sample 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" TL.

The smaller length and age at sexual maturity from fish sampled in US waters may be indicative of growth overfishing, 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" TL would result in a reduction in landings of approximately 0.2% (**Alternative 2**), while an increase in the minimum size limit to 20" TL would result in a reduction in landings of approximately 1% (**Alternative 3**) (see Appendix C).

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. (Gulf Reef Fish AP Recommended)

Discussion:

This action evaluates whether the current 22 inch TL gag commercial minimum size limit in the Gulf should be made consistent with the Gulf recreational and South Atlantic 24 inch TL minimum size limit. The range of alternatives is based on retaining inconsistent size limits (**Alternative 1**) or adopting a minimum size limit to be consistent with the Gulf's recreational and the South Atlantic's recreational and commercial minimum size limit (**Alternative 2**). Therefore, **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) assessment estimated that 50% of females are mature at 22 inch TL, but earlier assessments estimated the size at 24 inch TL.

The National Marine Fisheries Service's (NMFS) Southeast Fisheries Science Center (SEFSC) provided yield-per-recruit (YPR) and spawning potential ratio (SPR) analysis results 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 22to 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 in kilograms (kg) and spawning biomass per recruit (SBPR; kg) analysis results from the SEDAR 33 assessment model for the two size limits of 22 and 24 inches TL. Recruits are considered to be true age-0 fish.

Size Limit (inches TL)	YPR	SPR
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 inchesTL in 2016 (GMFMC 2016), and South Atlantic recreational and commercial minimum size limits, which were set to 24 inch TL in 1999 (SAFMC 1999). The 22" TL recreational minimum size limit was 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 inch 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 inch TL. However, that proposal was disapproved by NMFS on the basis that setting both the commercial and recreational minimum size limits at 24 inch TL would disproportionately impact the recreational sector, which catches smaller fish on average than the commercial sector. In 2012, Amendment 32 to the Reef Fish Fishery Management Plan reduced the commercial minimum size limit for gag to 22 inch 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 inch 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 South Atlantic's 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" TL to 24" TL (Figure 2.5.1). Given the rapid growth rate during this period and low 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 are at least 24" 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

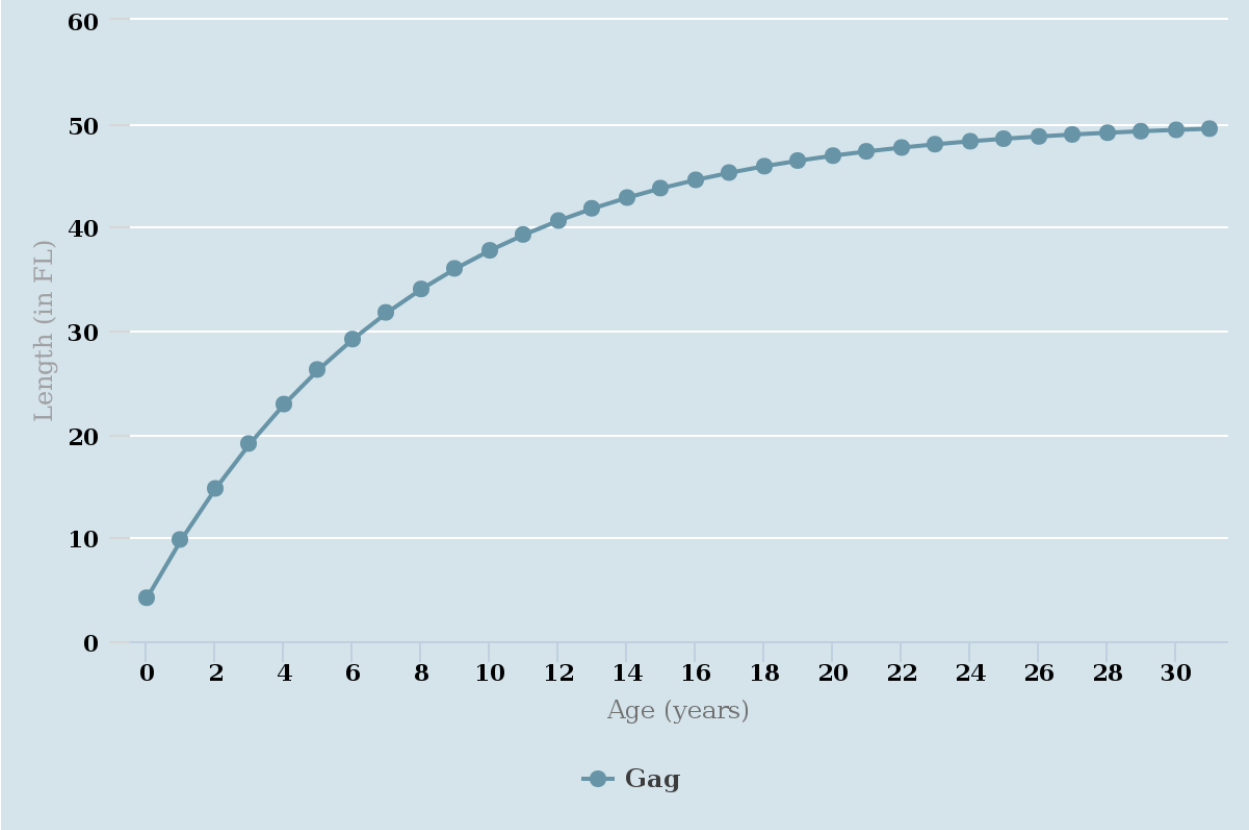

Figure 2.5.1. Age and growth relationship for gag based on data from SEDAR 33 (2014). Gag are approximately 3.8 years old at the current 22 inches TL commercial minimum size limit, and 4.3 years old at 24 inches TL.

CHAPTER 3. AFFECTED ENVIRONMENT

The affected environment as it pertains to the red snapper component of the Gulf of Mexico (Gulf) reef fish fishery has been described in detail in the following documents: Generic Essential Fish Habitat Amendment (GMFMC 2004a), February 2010 Regulatory Amendment (GMFMC 2010a), January 2011 Regulatory Amendment (GMFMC 2011a), Generic Annual Catch Limit/Accountability Measures Amendment (GMFMC 2011b), and March 2013 Framework Action (GMFMC 2013a). This information is incorporated by reference and is summarized below.

3.1 Description of the Physical Environment

The Gulf of Mexico (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 onto shore 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 2011a) 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.

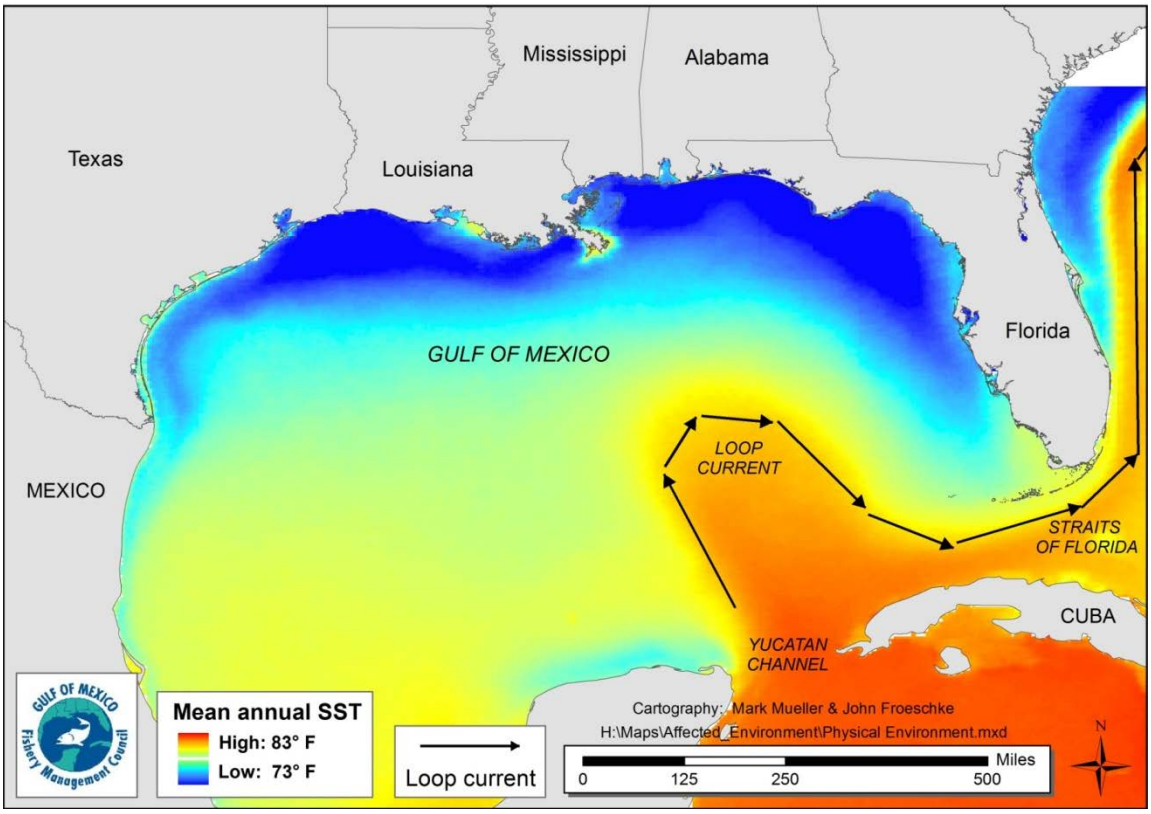

Figure 3.1.1. Physical environment of the Gulf including major feature names and mean annual sea surface temperature as derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://accession.nodc.noaa.gov/0072888)

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), transitioning then 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 are 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 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 fish that had sex reported 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 (Headboat 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 shows 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 the important habitat 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, and begin life as females and transitions 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; *Linf*, asymptotic length, and *k* (growth 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). However, there is little evidence for 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 have 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 and then 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 its peak was 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) 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 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)
- vermilion snapper (Porch and Cass-Calay 2001; SEDAR 9 2006a; SEDAR 9 Update 2011a)
- yellowtail snapper (Muller et al. 2003; SEDAR 3 2003; O'Hop et al. 2012)
- mutton snapper (SEDAR 15A 2008)
- gray triggerfish (Valle et al. 2001; SEDAR 9 2006b; SEDAR 9 Update 2011b)
- greater amberjack (Turner et al. 2000; SEDAR 9 2006c; SEDAR 9 Update 2010; SEDAR 33 2014a)
- hogfish (Ault et al. 2003; SEDAR 6 2004b)
- red grouper (NMFS 2002; SEDAR 12 2007; SEDAR 12 Update 2009)
- gag grouper (Turner et al. 2001; SEDAR 10 2006; SEDAR 10 Update 2009; SEDAR 33 2014b)
- black grouper (SEDAR 19 2010)
- yellowedge grouper (Cass-Calay and Bahnick 2002; SEDAR 22 2011b)
- tilefish (golden) (SEDAR 22 2011a)
- 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 3.2.1.

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, overfishing
Family Carangidae – Jacks		
greater amberjack	*Seriola dumerili*	Overfished, overfishing
lesser amberjack	*Seriola fasciata*	Unknown
almaco jack	*Seriola rivoliana*	Unknown
banded rudderfish	*Seriola zonata*	Unknown
Family Labridae - Wrasses		
hogfish	*Lachnolaimus maximus*	Overfished status unknown, 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*	Rebuilt, 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. 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 Endangered Species Act (ESA). Other species protected under the ESA include five sea turtle species (Kemp's ridley, loggerhead, green, leatherback, and hawksbill), two fish species (Gulf sturgeon and smalltooth sawfish), and five coral species (elkhorn, staghorn, lobed star, mountainous star, and boulder star). Critical habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean distinct population segment of loggerhead sea turtles also occur in the Gulf, though only loggerhead critical habitat occurs in federal waters.

The following sections provide a brief overview of the marine mammals, sea turtles, and fish that may be present in or near areas where Gulf reef fish fishing occurs and their general life history characteristics. Since none of the listed corals or designated critical habitats in the Gulf are likely to be adversely affected by the Gulf reef fish fishery, they are not discussed further.

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 dolphins) is found throughout the Gulf, including within bays, sounds, and estuaries; coastal waters over the continental shelf; and in deeper oceanic waters.

Sperm whales are one of the cetacean species found in offshore waters of the Gulf of Mexico (greater than 200m) and are listed endangered under the ESA. Sperm whales, are the largest toothed whales and are found year-round in the northern Gulf along the continental slope and in oceanic waters (Waring et al. 2013). There are several areas between Mississippi Canyon and De Soto Canyon where sperm whales congregate at high densities, likely because of localized, highly productive habitats (Biggs et al. 2005; Jochens et al. 2008). There is a resident population of female sperm whales, and whales with calves frequently sighted there.

Bryde's whales are the only resident baleen whales in the Gulf and are currently being evaluated to determine if listing under the ESA is warranted. Bryde's whales (pronounced "BREW-days") in the Gulf are currently restricted to a small area in the northeastern Gulf near De Soto Canyon in waters between 100 – 400 m depth along the continental shelf break, though information in the southern Gulf of Mexico is sparse (Waring et al. 2013). On September 18, 2014, NMFS received a revised petition from the Natural Resource Defense Council (NRDC) to list the Gulf Bryde's whale as an endangered Distinct Population Segment. On April 6, 2015, NMFS found the petitioned action may be warranted and convened a Status Review Team to prepare a status review report. The NMFS will rely on the information status review report to make a 12-month determination as to whether or not listing as endangered or threatened the species is warranted, and if so, a proposed rule will be published in the Federal Register.

Although they are all the same species, **bottlenose dolphins** in the Gulf can be separated into demographically independent populations called stocks. Bottlenose dolphins are currently managed

by NMFS as 36 distinct stocks within the Gulf. These include 31 bay, sound and estuary stocks, three coastal stocks, one continental shelf stock, and one oceanic stock (Waring et al. 2013). Additional climatic and oceanographic boundaries delineate the three coastal stocks such that the Gulf of Mexico Eastern Coastal Stock ranges from 84°W to Key West, FL, the Gulf of Mexico Northern Coastal Stock ranges from 84°W to the Mississippi River Delta, and the Gulf of Mexico Western Coastal stock ranges from the Mississippi River Delta to the Texas/Mexico border. Marine Mammal Stock Assessment Reports and additional information on these species in the Gulf are available on the NMFS Office of Protected Species website: http://www.nmfs.noaa.gov/pr/sspecies/. Bottlenose dolphin adults range from 6 to 9 feet (1.8 to 2.8 m) long and weigh typically between 300 to 600 pounds (136 to 272 kg). Females and males reach sexual maturity between ages 5 to 13 and 9 to 14, respectively. Once mature, females give birth once every 3 to 6 years. Maximum known lifespan can be 50 years for males and greater than 60 years for females (Reynolds 2000).
The MMPA requires that each commercial fishery be classified by the number of marine mammals they seriously injure or kill. NMFS's List of Fisheries (LOF) classifies US commercial fisheries into three categories based on the number of incidental mortality or serious injury they cause to marine mammals. More information about the LOF and the classification process can be found at: http://www.nmfs.noaa.gov/pr/interactions/fisheries/lof.html.

NMFS classifies reef fish bottom longline/hook-and-line gear in the Marine Mammal Protection Act 2015 LOF as a Category III fishery (79 FR 77919). 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.

3.2.4.2 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).

Green sea turtle hatchlings are thought to occupy pelagic areas of the open ocean and are often associated with *Sargassum* rafts (Carr 1987; Walker 1994). Pelagic stage green sea turtles are thought to be carnivorous. Stomach samples of these animals found ctenophores and pelagic snails (Frick 1976; Hughes 1974). At approximately 20 to 25 cm carapace length, juveniles migrate from pelagic habitats to benthic foraging areas (Bjorndal 1997). As juveniles move into benthic foraging areas a diet shift towards herbivory occurs. They consume primarily seagrasses and algae, but are also known to consume jellyfish, salps, and sponges (Bjorndal 1980, 1997; Paredes 1969; Mortimer 1981, 1982). The diving abilities of all sea turtles species vary by their life stages. The maximum diving range of green sea turtles is estimated at 110 m (360 ft) (Frick 1976), but they are most frequently making dives of less than 20 m (65 ft.) (Walker 1994). The time of these dives also varies by life stage. The maximum dive length is estimated at 66 minutes with most dives lasting from 9 to 23 minutes (Walker 1994).

The **hawksbill's** pelagic stage lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan 1988; Meylan and Donnelly

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

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

Leatherbacks are the most pelagic of all ESA-listed sea turtles and spend most of their time in the open ocean. Although they will enter coastal waters and are seen over the continental shelf on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherbacks feed primarily on cnidarians (medusae, siphonophores) and tunicates. Unlike other sea turtles, leatherbacks' diets do not shift during their life cycles. Because leatherbacks' ability to capture and eat jellyfish is not constrained by size or age, they continue to feed on these species regardless of life stage (Bjorndal 1997). Leatherbacks are the deepest diving of all sea turtles. It is estimated that these species can dive in excess of 1000 m (Eckert et al. 1989) but more frequently dive to depths of 50 m to 84 m (Eckert et al. 1986). Dive times range from a maximum of 37 minutes to more routines dives of 4 to 14.5 minutes (Standora et al. 1984; Eckert et al. 1986; Eckert et al. 1989; Keinath and Musick 1993). Leatherbacks may spend 74% to 91% of their time submerged (Standora et al. 1984).

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

and Nichols 1994; Lanyon et al. 1989) and they may spend anywhere from 80 to 94% of their time submerged (Limpus and Nichols 1994; Lanyon et al. 1989).

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, 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 Fish

Historically the **smalltooth sawfish** in the U.S. ranged from New York to the Mexico border. Their current range is poorly understood but believed to have contracted from these historical areas. 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. 2006). Smalltooth sawfish feed primarily on fish. Mullet, jacks, and ladyfish are 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 year in the entire ref 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 to the running average for the past five years of 5,543 square miles Gulf (see http://www.gulfhypoxia.net/). However, mutton snapper are not commonly found in the northern Gulf, so any impact of the hypoxic zone on mutton snapper should be minimal.

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. National Oceanic Atmospheric Administration (NOAA)'s Climate Change Web Portal (http://www.esrl.noaa.gov/psd/ipcc/ocn/) 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 mutton snapper distribution in the Gulf has been effected. Mutton snapper have not been used in the OceanAdapt model (http://oceanadapt.rutgers.edu/regional_data/) that shows distributional trends both in latitude and depth over the time period 1985-1013. 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. Finally, 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 Intergovernmental Panel on Climate Change (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).

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

Emission source	**CO2**	**Greenhouse Gas CH4**	**N2O**	**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
Recreational vessels	244,483	N/A	N/A	244,483
Percent commercial fishing	1.69	>0.01	0.59	1.43
Percent recreational vessels	0.71	NA	NA	0.59

3.3 Description of the Economic Environment

3.3.1 Commercial Sector

3.3.2 Recreational Sector

3.4 Description of the Social Environment

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 Description of 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 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 (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 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 Description of the Biological/Ecological Environment

Establishment ACLs and ACTs for mutton snapper is unlikely to directly affect the biological or ecological environment. Defined harvest levels provide fishery managers with forecasted landings to consider in developing regulatory measures. The ACLs and ACTs are used in part to evaluate whether harvest within a year is below or above recommended limits. Specifying these values would, however, indirectly affect the biological/ecological environment by defining the future level of harvest that is not to be exceeded.

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, use the historical Gulf apportionment of the ACL equal to 18% of the stock ABC. **Option 2b** of **Alternative 2** 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 (**Option 2a** of **Alternative 2**; **Alternative 3**), and if an ACT is used as a management tool (**Option 2b** of **Alternative 2**), 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 US 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 Description of the Economic Environment

4.1.4 Description of the Social Environment

4.1.5 Description of 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 **(Gulf Reef Fish AP Recommended)**

4.2.1 Description of 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 Description of 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 Description of the Economic Environment

4.2.4 Description of the Social Environment

4.2.5 Description of 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 the State of Florida. **Alternative 2**, **Option 2b** most closely aligns with similar actions taken by the South Atlantic Council and the State of 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.

4.5 Cumulative Effects Analysis

As directed by the National Environmental Policy Act, federal agencies are mandated to assess indirect, direct, and cumulative impacts of actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The affected area of the proposed actions encompasses the state and federal waters of the Gulf and Gulf communities 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. Some recent regulatory changes specific to mutton snapper and gag fishing include:

- A framework action, effective in July 2013, adjusted the recreational gag season to July 1 through December 3. The framework action also restricted the geographical extent of the fixed February 1 through March 31 shallow-water grouper closed season to apply only to waters seaward of the 20-fathom boundary. This allows grouper fishing to occur year-round while providing some protection to species that spawn during February and March.

Additionally, changes to regulations affecting other portions of the reef fish fishery could also impact mutton snapper and gag fishermen. Recent regulatory changes include:

- A framework action, effective in September 2013, set a 10-vermilion snapper bag limit within the 20-fish aggregate reef fish bag limit as a precautionary measure to reduce the chance of overfishing for this species. The action also increased the Gulf yellowtail snapper annual catch limit from 725,000 lbs to 901,125 lbs based on a recent stock assessment. Finally, the action eliminated the requirement to use venting tools when fishing for reef fish as some scientific studies have questioned the usefulness of venting tools in preventing barotrauma in fish and the action would give more flexibility to fishermen on when to vent or to use some other device like fish descenders.
- A framework action, effective in March 2014, required headboats to report their logbooks electronically in the Gulf reef fish and coastal migratory pelagic fisheries.
- Accountability measures were implemented for several species of reef fish. The red grouper recreational bag limit was reduced from four to three fish on May 5, 2014, and the season closed on October 4, 2014. The gray triggerfish recreational season was closed on May 1, 2014. The greater amberjack recreational season was closed on August 25, 2014.

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[3]:

- Amendment 36 would revise the red snapper IFQ program based on recommendations from the red snapper advisory panel. These recommendations would be based on a review of the program completed in 2013.

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 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

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

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

These proposed actions, in combination with any past, present, or reasonably foreseeable future actions are 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 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.

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.

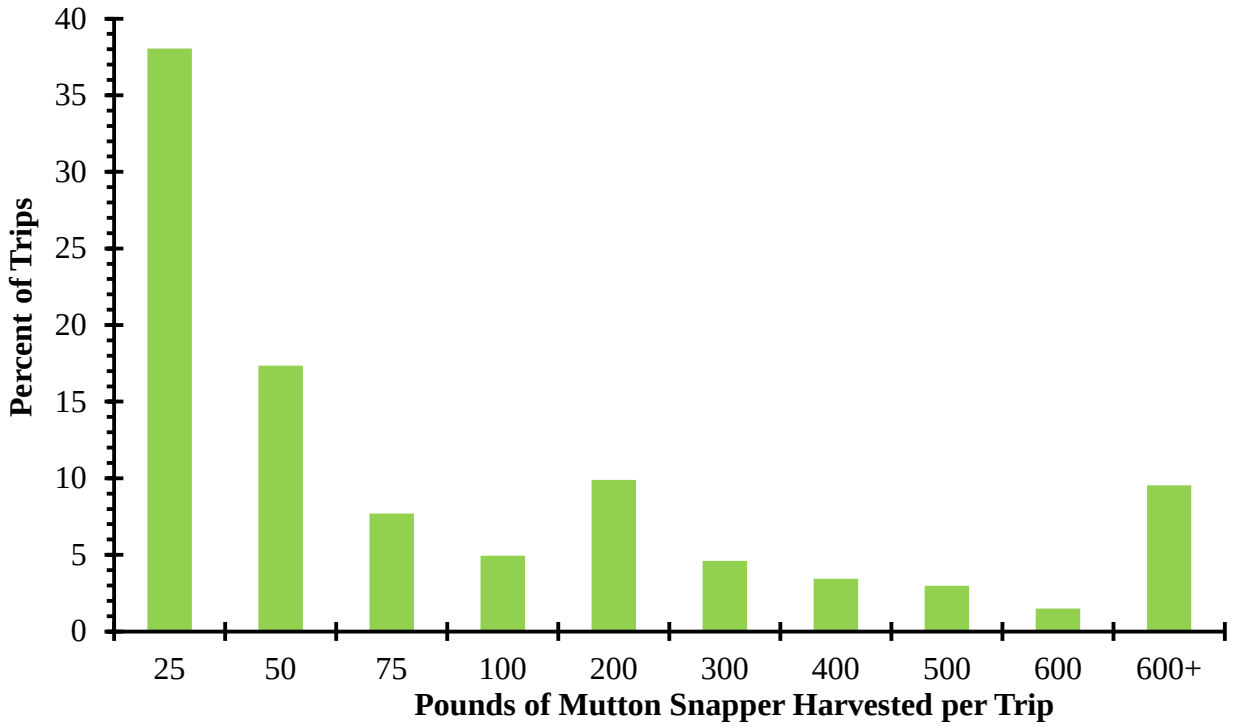

Figure 1. Distribution of the mutton snapper harvested per trip (lbs ww) during the regular season in the Gulf of Mexico region. The regular season is from January through March then

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

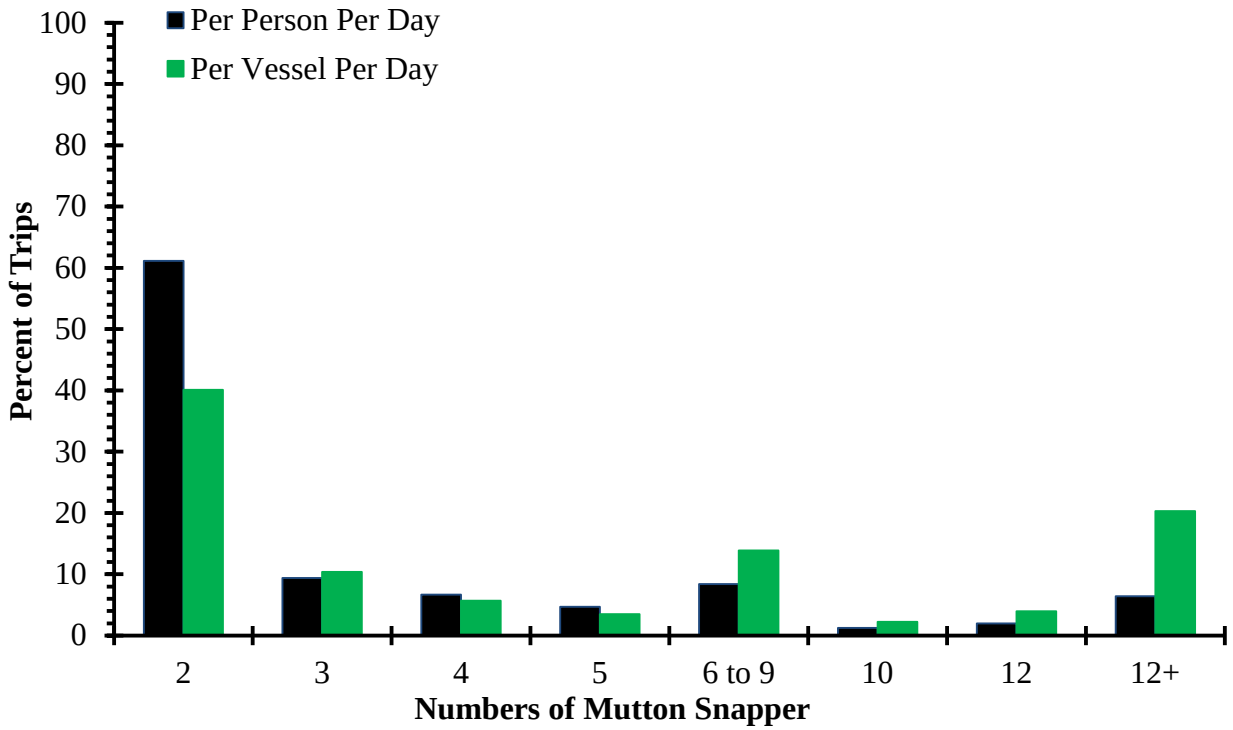

Figure 2. Distribution of the number of mutton snapper harvested both per person per day and per vessel per day during the spawning season in the Gulf of Mexico region. The spawning season is from April to June. Data comes from the commercial logbook dataset from 2013 to 2015 (n = 404 trips).

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).

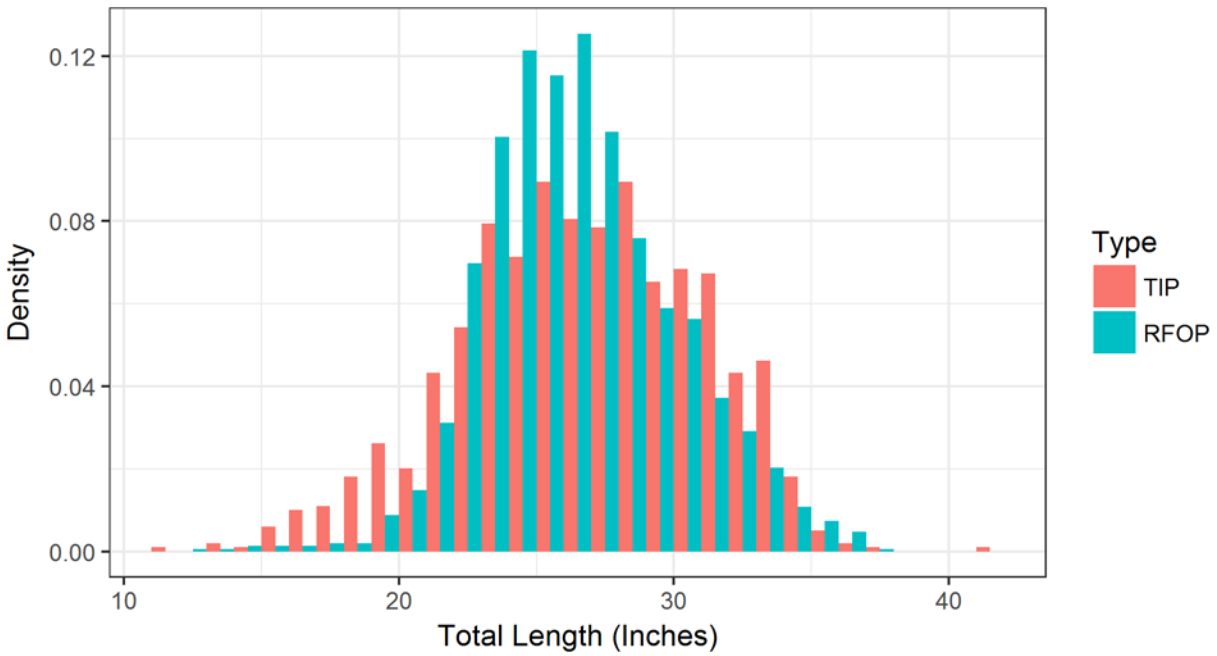

Figure 1. Histogram comparing Gulf of Mexico mutton snapper total length distribution generated from commercial TIP (n=994) and RFOP (n=1,475) data from 2013 to 2015.

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.

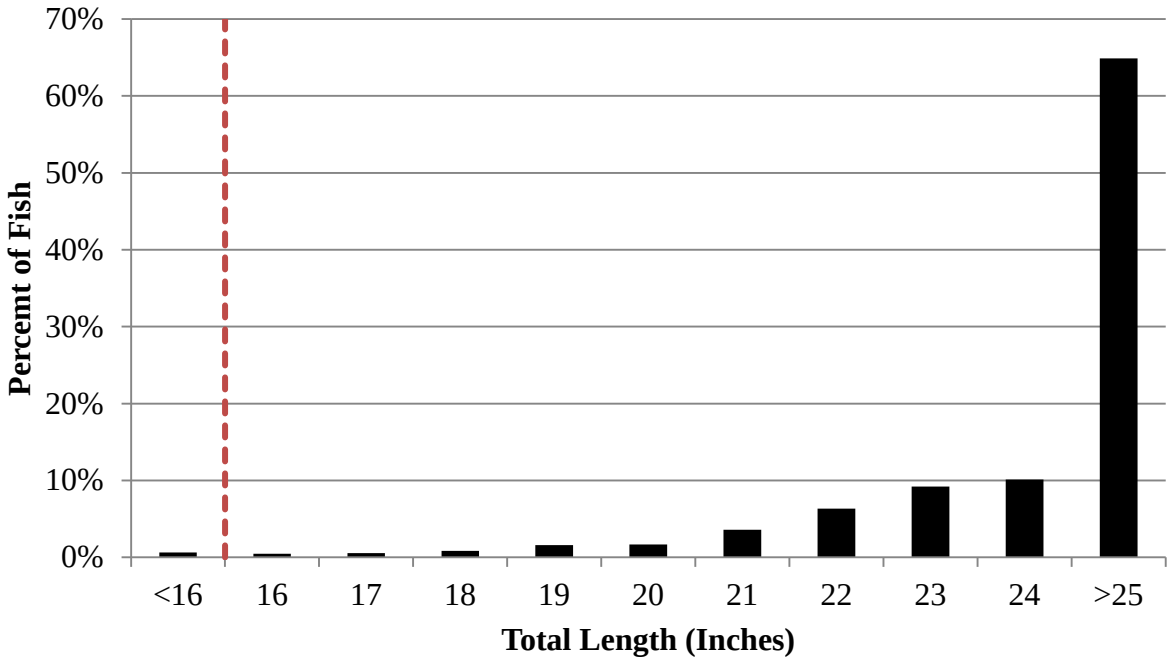

Figure 2. Gulf of Mexico mutton snapper total length distribution generated from commercial TIP (n=994) and RFOP (n=1,475) data from 2013 to 2015. The dashed red line denotes the current commercial minimum size limit of 16 inches TL.

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.

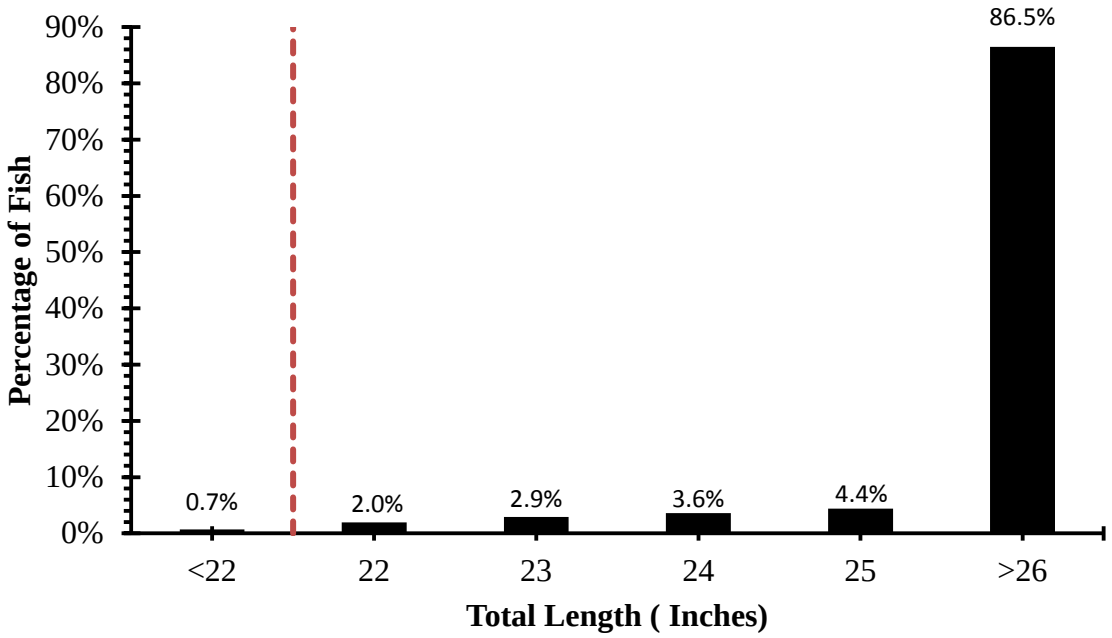

Figure 1. Gulf of Mexico gag grouper total length distribution generated from commercial TIP (n=8,559) and RFOP (n=4,505) data from 2013 to 2015. The dashed red line denotes the current commercial minimum size limit of 22 inches TL.

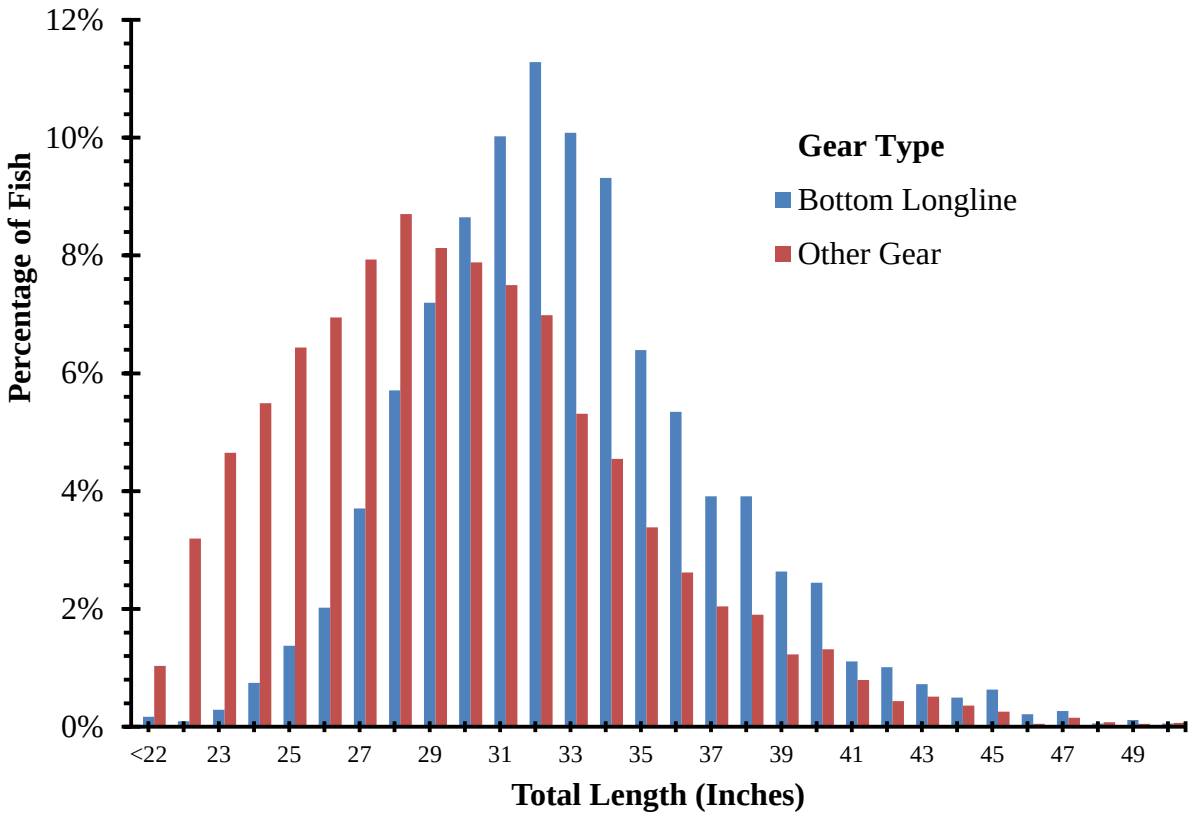

Figure 2. Gulf of Mexico gag grouper total length distribution for gear types bottom longline (n=5,237) and other gear (n=7,827) from 2013 to 2015.

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 ACLand ACT (or ABC and ACL)

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

User adjustable

User adjustable

Unweighted	11
Weighted	**12**

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)		
		Apply this component to recreational fisheries, not commercial or IFQ fisheries		
Precision of Landings Data Recreational	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.		