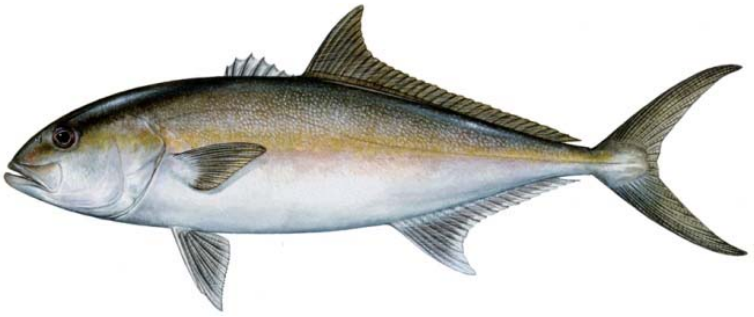
Modifications to Greater Amberjack Allowable Harvest and Management Measures



Framework Action to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico including Draft Environmental Assessment, Regulatory Impact Review, and Regulatory Flexibility Act Analysis

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Name of Action

Modifications to Greater Amberjack Allowable Harvest and Management Measures

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Type of Action

( ) Administrative
(X) Draft

( ) Legislative
( ) Final

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	Acceptable biological catch
ACL	Annual catch limit
ACT	Annual catch target
AMs	Accountability measures
ALS	accumulated landings system
B_{MSY}	Stock biomass level capable of producing an equilibrium yield of MSY
Council	Gulf of Mexico Fishery Management Council
CS	consumer surplus
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential fish habitat
EIS	Environmental impact statement
ELMR	Estuarine living marine resources
ESA	Endangered Species Act
FL	fork length
F_{MSY}	Fishing mortality rate corresponding to an equilibrium yield of MSY
$F_{30\% SPR}$	Fishing mortality corresponding to 30% spawning potential ratio
FMP	Fishery Management Plan
GMFMC	Gulf of Mexico Fishery Management Council
HAPC	Habitat area of particular concern
IRFA	Initial regulatory flexibility analysis
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	Maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
mp	million pounds
MRFSS	Marine Recreational Fisheries Survey and Statistics
MRIP	Marine Recreational Information Program
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	Same as NMFS
NOR	net operating revenues
NOS	National Ocean Service
NS1	National Standard 1 guidelines
OFL	Overfishing level
OY	Optimum yield
PS	Producer surplus
RIR	Regulatory impact review
SAV	Submerged aquatic vegetation
Secretary	Secretary of Commerce
SEDAR	Southeast Data, Assessment and Review
SEFSC	Southeast Fisheries Science Center

SERO	Southeast Regional Office
SSBR	Spawning stock biomass per recruit
SSC	Scientific and Statistical Committee
SPR	Spawning potential ratio
TAC	Total allowable catch
TPWD	Texas Parks and Wildlife Department
ww	whole weight
YPR	Yield per recruit

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CHAPTER 1. INTRODUCTION

1.1 Background

The greater amberjack stock assessment was completed and reviewed by the Scientific and Statistical Committee (SSC) at their June 2014 meeting. The SSC accepted the 2014 Southeast Data, Assessment and Review (SEDAR) greater amberjack assessment as the best scientific information available. The SSC concluded that greater amberjack was overfished and experiencing overfishing and the stock did not meet the 10-year rebuilding plan that ended in 2012. The National Standard 1 guidelines state that when a stock has exceeded its maximum rebuilding time and is not yet rebuilt, the yield should be set at the yield corresponding to $F_{REBUILD}$ or to 75% of maximum fishing mortality threshold (MFMT), whichever is less. A target rebuild date is required to calculate $F_{REBUILD}$ but has not been specified by the Gulf of Mexico Fishery Management Council (Council). Based on this information, the SSC used the Acceptable Biological Catch (ABC) Control Rule to establish the overfishing limit (OFL) and ABC for a time period of four years beginning in 2015 equivalent to 75% of MFMT.

Secretarial Amendment 2 (GMFMC 2003) to the Reef Fish Fishery Management Plan (FMP) established a rebuilding plan for greater amberjack based on a stock assessment conducted in 2000 (Turner et al. 2000). That assessment determined that the greater amberjack stock was overfished and undergoing overfishing as of 1998. Management measures to reduce the recreational bag limit from three to one fish were implemented in January 1997 and the commercial seasonal closure from March through May were implemented in January 1998; however, these closures were not incorporated into the 2000 assessment. The projected effects of these management measures were expected to eliminate overfishing; therefore, no new management measures to further restrict effort were implemented.

In 2006, an updated stock assessment was completed which determined the greater amberjack stock was not recovering at the rate previously projected. The stock was declared to be overfished and experiencing overfishing (SEDAR 9 2006). The Council and National Marine Fisheries Service (NMFS) developed and implemented Amendment 30A in 2008 in response to the stock assessment results and the requirement to end overfishing and rebuild the stock by 2012 (GMFMC 2008). The minimum reduction required to rebuild the stock by 2012 was 40% of current fish mortality. The total allowable catch (TAC) implemented in Amendment 30A was 1,871,000 lbs whole weight for 2008 through 2010 (GMFMC 2008). Amendment 30A also established quotas for the recreational and commercial sectors equal to 1,368,000 and 503,000 lbs, respectively. Amendment 30A also implemented sector-specific accountability measures such that if either sector exceeds its allocated portion of the TAC, the Regional Administrator will close that sector for the remainder of the year. Additionally, if a sector's landings exceed that sector's share of the TAC, the Regional Administrator will reduce the fishing season by the amount of time necessary to account for the overage in the following fishing year. The Greater Amberjack 2010 SEDAR 9 update stock assessment also determined that the stock remained overfished and was continuing to experience overfishing. In December 2012, Amendment 35 (GMFMC 2012) reduced the stock's annual catch limit (ACL), or quota (previously called the TAC), to 1,780,000 lbs in an effort to end overfishing and rebuild the stock. The commercial

ACL equal to 481,000 lbs, and a recreational ACL equal to1,299,000 lbs, were also established based on the interim sector allocation established in Amendment 30A (GMFMC 2008).

The greater amberjack stock ACL has been exceeded twice in the last four years. Therefore, this document includes a range of alternatives for adjusting the stock ACL, as well as recreational and commercial management measures to end overfishing and rebuild the stock.

Landings Data

Table 1.1.1. Commercial and recreational landings of greater amberjack (pounds whole weight) from 2002 to 2013.

Year	Headboat	Charter	Private	Recreational Total	Commercial	Grand Total
2002	160,636	1,114,754	857,969	2,133,359	703,303	2,836,662
2003	199,347	1,072,018	1,630,455	2,901,820	857,125	3,758,945
2004	108,769	1,068,819	1,214,641	2,392,230	871,016	3,263,246
2005	61,281	365,893	1,089,984	1,517,158	662,285	2,179,443
2006	79,892	1,030,943	589,348	1,700,183	566,384	2,266,567
2007	59,436	516,253	291,797	867,485	589,235	1,456,720
2008	54,544	478,614	785,504	1,318,662	439,176	1,757,838
2009	103,191	653,160	723,955	1,480,306	601,446	2,081,752
2010	53,203	460,740	711,279	1,225,222	534,095	1,759,317
2011	62,835	583,813	303,351	949,999	508,489	1,458,488
2012	99,680	546,086	592,952	1,238,719	307,921	1,546,640
2013	73,246	604,626	938,757	1,616,629	457,821	2,074,450

Source: Southeast Fisheries Science Center recreational (8/5/2014) and commercial (7/10/2014) ACL datasets. Recreational landings exclude Monroe County, Florida.

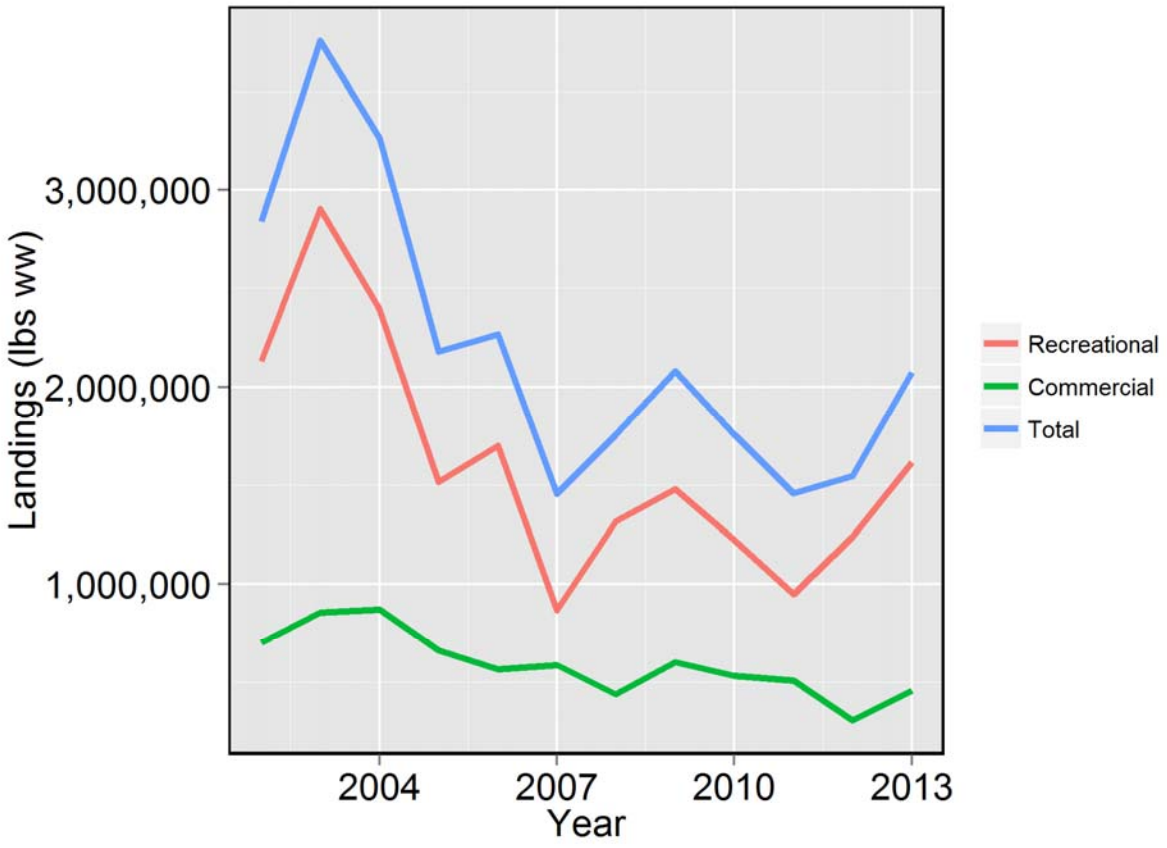

Figure 1.1.1. Recreational, commercial, and total landings in pounds whole weight of greater amberjack from 2002 through 2013. Recreational landings were estimated (AB1) from the MRIP, TPWD, and Southeast Headboat Surveys. Source: SEFSC recreational (8/5/2014) and commercial (7/10/2014) ACL datasets.

1.2 Purpose and Need

The purpose of this amendment is to modify the ACL and the annual catch target (ACT), incorporate updated stock status information from the 2014 stock assessment, modify management measures for the recreational size limit and seasons, and commercial trip limit in order to end the overfishing and rebuild the greater amberjack stock in the Gulf of Mexico. The need for this amendment is that the current acceptable biological catch (ABC) of 1,780,000 pounds established in Amendment 35 to the Reef Fish FMP exceeds the 1,720,000 pound ABC recommendation for 2015 (GMFMC 2012). In addition section 600.310(g)(3) of the National Standard 1 ACL and accountability measure (AM) guidelines states that the system of ACLs and AMs should be re-evaluated, and modified if necessary, if catch exceeds the ACL for a given stock or stock complex more than once in the last four years.

1.3 History of Management

The Reef Fish FMP [with its associated environmental impact statement (EIS)] was implemented in November 1984. The original list of species included in the management unit consisted of snappers, groupers, and sea basses. Gray triggerfish and *Seriola* species, including greater amberjack, were in a second list of species included in the fishery, but not in the management unit. The species in this list were not considered to be target species because they were generally taken incidentally to the directed fishery for species in the management unit. Their inclusion in the Reef Fish FMP was for purposes of data collection, and their take was not regulated.

Amendment 1 [with its associated environmental assessment (EA), regulatory impact review (RIR), and initial regulatory flexibility analysis (IRFA)] to the Reef Fish FMP, implemented in 1990, added greater amberjack and lesser amberjack to the list of species in the management unit. It set a greater amberjack recreational minimum size limit of 28 inches fork length (FL) and a three-fish recreational bag limit, and a commercial minimum size limit of 36 inches FL. This amendment set as a primary objective of the FMP the stabilization of long-term population levels of all reef fish species by establishing a survival rate of biomass into the stock of spawning age to achieve at least 20% spawning stock biomass per recruit (SSBR), relative to the SSBR that would occur with no fishing. A framework procedure for specification of TAC was created to allow for annual management changes. This amendment also established a commercial vessel reef fish permit as a requirement for harvest in excess of the bag limit and for the sale of reef fish.

Amendment 4 (with its associated EA and RIR), implemented in May 1992, added the remaining *Seriola* species (banded rudderfish and almaco jack) to the management unit, and established a moratorium on the issuance of new commercial reef fish vessel permits for a maximum period of three years.

Amendment 5 (with its associated supplemental EIS, RIR, and IRFA), implemented in February 1994, 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.

Amendment 12 (with its associated EA and RIR), submitted in December 1995 and implemented in January 1997, reduced the greater amberjack bag limit from three fish to one fish per person, and created an aggregate bag limit of 20 reef fish for all reef fish species not having a bag limit (including lesser amberjack, banded rudderfish, almaco jack and gray triggerfish). NOAA Fisheries Service disapproved proposed provisions to include lesser amberjack and banded rudderfish along with greater amberjack in an aggregate one-fish bag limit and to establish a 28-inch FL minimum size limit for those species.

Amendment 15 (with its associated EA, RIR, and IRFA), implemented in January 1998, closed the commercial sector for greater amberjack Gulf-wide during the months of March, April, and May. A regulatory amendment in August 1999 (with its associated EA, RIR, and IRFA) closed two areas (i.e., create two marine reserves), 115 and 104 square nautical miles respectively, year-round to all fishing under the jurisdiction of the Council with a four-year sunset closure.

Generic Sustainable Fisheries Act Amendment (with its associated EA, RIR, and IRFA), partially approved and implemented in November 1999, set the MFMT for greater amberjack at $F_{30\% SPR}$. Estimates of MSY, MSST, and OY were disapproved because they were based on spawning potential ratio (SPR) proxies rather than biomass-based estimates.

Amendment 16B (with its associated EA, RIR, and IRFA), implemented in November 1999, set a slot limit of 14 to 22 inches FL for banded rudderfish and lesser amberjack for both the commercial and recreational fisheries, and an aggregate recreational bag limit of five fish for banded rudderfish and lesser amberjack.

Secretarial Amendment 2, implemented in July, 2003 for greater amberjack, specified MSY as the yield associated with $F_{30\% SPR}$ (proxy for F_{MSY}) when the stock is at equilibrium, OY as the yield associated with an $F_{40\% SPR}$ when the stock is at equilibrium, MFMT equal to $F_{30\%SPR}$, and MSST equal to (1-M)*B_{MSY} or 75% of B_{MSY}. It also set a rebuilding plan limiting the harvest to 2.9 mp for 2003-2005, 5.2 mp for 2006-2008, 7,000,000 lbs for 2009-2011, and for 7.900,000 pounds for 2012. This was expected to rebuild the stock in seven years. Regulations implemented in 1997 and 1998 (Amendments 12 and 15 to the Reef Fish FMP) were deemed sufficient to comply with the rebuilding plan so no new regulations were implemented.

Amendment 30A implemented August 2008, was developed to stop overfishing of gray triggerfish and greater amberjack. The amendment established annual catch limits and accountability measures for greater amberjack and gray triggerfish. For greater amberjack, the rebuilding plan was modified, increasing the recreational minimum size limit to 30 inches FL, implementing a zero bag limit for captain and crew of for-hire vessels, and set commercial and recreational quotas.

Temporary Rule implemented in June 2010, specified the greater amberjack accountability measures for annual catch limits for the 2010 fishing season. The accountability measures developed in Amendment 30A required the commercial and recreational quotas for greater amberjack to be reduced to compensate for the harvest being exceeded in 2009. The commercial quota was reduced from 503,000 lbs whole weight to 373,072 lbs, while the recreational harvest was reduced from 1,368,000 lbs to 1,243,184 lbs.

Regulatory Amendment implemented in June 2011, specified the greater amberjack recreational closed season from June 1 – July 31 (76 FR 23904). The intended effect of this final rule was to mitigate the social and economic impacts associated with implementing in-season closures. As well as allowing the recreational sector to have the ability to fish for at least one targeted and prized fish species such as red snapper.

Amendment 35

In response to a 2010 update stock assessment, the Council approved Amendment 35 to the Reef Fish FMP on October 4, 2012. The final rule that became effective on December 13, 2012, implemented a new annual catch limit (ACL) equal to the acceptable biological catch at 1,780,000 pounds, which was less than the current annual catch limit of 1,830,000 lbs. Reducing the stock ACL by 18% from no action was expected to end overfishing; however, whether

overfishing has ended would remain unknown until completion of the next benchmark assessment, in 2013. The rule also established a commercial trip limit of 2,000 lbs ww throughout the fishing year. The commercial trip limit was anticipated to provide a longer fishing season for the commercial sector. The annual commercial closed season will be March 1 through May 31, and re-opens on June 1, as long as the annual catch target has not been exceeded or is projected to be exceeded. The Council also considered bag limits and closed season management measures for the recreational fishing sector but did not alter any recreational management measures.

Table 1.3.1. Summary of recent annual commercial landings relative to management targets (pounds whole weight).

Year	Commercial ACT	Commercial ACL	Stock OFL	Commercial Harvest	Harvest - ACL	Closure date
2008	503,000		MFMT	439,176	-63,824	
2009	503,000		MFMT	601,446	98,446	11/7/2009
2010	503,000 (373,072)		MFMT	534,095	161,023	10/28/2010
2011	503,000 (342,091)		MFMT	508,489	166,398	6/18/2011
2012	503,000 (237,438)	503,000 (237,438)	2,380,000	307,921	70,483	3/1/2012
2013	338,157	481,000 (410,157)	2,380,000	457,821	47,654	7/1/2013
2014	409,000	481,000	2,380,000			8/25/2014

Note: The accountability measures implemented in Amendment 30A (GMFMC 2008) require that annual commercial harvest exceeding the commercial ACL be deducted from the commercial ACL in the subsequent calendar year. In these cases, the adjusted commercial ACL values are indicated in parentheses. Also, these overage adjustments are made on preliminary landings as final landings are not completed by the beginning of the subsequent calendar year. This may result in minor deviations from the final overage (if any) and the overage deduction.

Table 1.3.2. Summary of recent annual recreational landings relative to management targets (pounds whole weight).

Year	Recreational ACT	Recreational ACL	Stock ACL	Stock OFL	Recreational Harvest	Harvest-ACL	Closure date
2008		1,368,000	1,871,000	MFMT	1,318,662	-49,338	
2009		1,368,000	1,871,000	MFMT	1,480,306	112,306	10/24/09
2010		1,368,000 (1,243,184)	1,871,000	MFMT	1,225,222	-17,962	
2011	1,368,000	1,368,000 (1,315,224)	1,871,000	MFMT	949,999	-365,225	
2012	1,299,000	1,368,000	1,780,000	2,380,000	1,238,719	-129,281	
2013	1,299,000	1,299,000	1,780,000	2,380,000	1,616,629	317,629	
2014	888,839	1,299,000 (1,063,538)	1,780,000	2,380,000			8/25/14

Note: The accountability measures implemented in Amendment 30A (GMFMC 2008) requires that annual recreational harvest exceeding the recreational ACL be deducted from the recreational ACL in the subsequent calendar year. In these cases, the adjusted recreational ACL values are indicated in parentheses. Also, these overage adjustments are made on preliminary landings as final landings are not available at the beginning of the subsequent fishing year. This results is minor deviations from the final overage (if any) and the overage deduction.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1 - Modifications to the Greater Amberjack Annual Catch Limits and Annual Catch Targets

Note: Commercially harvested greater amberjack are typically landed gutted rather than whole. However, the management alternatives in this action are stated in whole weight consistent with current federal regulations and sector allocations. A reminder was published July 29, 2014 (FB14-55) clarifying that one pound gutted weight is equivalent to 1.04 pounds whole weight using the standard conversion.

Alternative 1: Maintain the current acceptable biological catch (ABC), annual catch limit (ACL), and annual catch target (ACT)(quota).

Year	ABC/Stock ACL	Recreational ACL	ACT	Commercial ACL	ACT
2014	1,780,000	1,299,000	1,130,000	481,000	409,000

Alternative 2: Use the ABC schedule recommended by the Scientific and Statistical Committee (SSC) from 2015 to 2018.

Option a: Apply ACL/ACT Control Rule:

Commercial Buffer =15%

Recreational Buffer = 13%

		Recreational		Commercial	
Year	ABC/Stock ACL	ACL	ACT	ACL	ACT
2015	1,720,000	1,255,600	1,092,372	464,400	394,740
2016	2,230,000	1,627,900	1,416,273	602,100	511,785
2017	2,490,000	1,817,700	1,581,399	672,300	571,455
2018	2,620,000	1,912,600	1,663,962	707,400	601,290

Option b: Apply a 20% buffer to set the ACL and ACT for 2015-2018.

		Recreational		Commercial	
Year	ABC/Stock ACL	ACL	ACT	ACL	ACT
2015	1,720,000	1,255,600	1,004,480	464,400	371,520
2016	2,230,000	1,627,900	1,302,320	602,100	481,680
2017	2,490,000	1,817,700	1,454,160	672,300	537,840
2018	2,620,000	1,912,600	1,530,080	707,400	565,920

Alternative 3: Set a constant ABC at the level recommended the Scientific and Statistical Committee (SSC) for 2015.

Option a: Apply ACL/ACT Control Rule:

Commercial Buffer = 15%

Recreational Buffer = 13%

		Recreational		Commercial	
Year	ABC/Stock ACL	ACL	ACT	ACL	ACT
2015 +	1,720,000	1,255,600	1,092,372	464,400	394,740

Option b: Use a 20% buffer to set the ACL and ACT for 2015-2018

		Recreational		Commercial	
Year	ABC/Stock ACL	ACL	ACT	ACL	ACT
2015 +	1,720,000	1,255,600	1,004,480	464,400	371,520

Alternative 4: Set the stock ACL at zero (i.e., no allowable harvest).

Discussion:

The SEDAR 33 (2014) stock assessment determined that the greater amberjack stock remains overfished and is experiencing overfishing (as of 2012, terminal year of data in the assessment). The status determination criteria used to make these determinations were established in Secretarial Amendment 2 (GMFMC 2003) and are defined as follows: maximum sustainable yield (MSY) is the yield associated with $F_{30\% \text{ SPR}}$ (proxy for MSY) when the stock is at equilibrium; optimum yield (OY) is the yield associated with an $F_{40\% \text{ SPR}}$ when the stock is at equilibrium; maximum fishing mortality threshold (MFMT) is equal to $F_{30\%SPR}$; and minimum stock size threshold (MSST) is equal to (1-M)*B_{MSY}, or 75% of biomass at maximum sustainable yield (B_{MSY}). Natural mortality (M) equals 0.25 for greater amberjack.

Action 1 includes alternatives to modify the acceptable biological catch (ABC), annual catch limit (ACL), and annual catch target (ACT)(quota) for greater amberjack based on the SEDAR 33 stock assessment (2014) and subsequent Scientific and Statistical Committee (SSC) review including recommendations for the ABC. Amendment 35 (GMFMC 2012) established a stock ABC of 1,780,000 lbs, which exceeds the current ABC recommendation of 1,720,000 lbs for 2015. The ABC established in Amendment 35 was set using Tier 3b of the ABC control rule, where the ABC was set at the mean of recent landings. The SSC adopted this procedure as the projections from the stock assessment were unstable and highly uncertain (SEDAR 9 update 2010).

The SSC used the Acceptable Biological Catch (ABC) Control Rule to establish the overfishing limit (OFL) and ABC for a time period of four years beginning in 2015 equivalent to 75% of MFMT. This is consistent with the NS1 Guidelines.

An additional goal of this framework action is to re-evaluate the systems of ACLs and AMs as both the recreational and commercial sectors have exceeded their ACLs and ACTs (quotas) in the last four years. The National Standard 1 guidelines section 600.310 (g)(3) states "If catch exceeds the ACL for a given stock or stock complex more than once in the last four years, the system of ACLs and AMs should be re-evaluated, and modified if necessary, to improve its performance and effectiveness."

Alternative 1 (no action) would retain the current ABC, equivalent to the stock ACL. Based on the greater amberjack SEDAR 33 Update (2014) and the SSC's recommendations for the ABC, the ACL would be exceeding the ABC in 2015 (albeit only by 60,000 lbs). Therefore, this alternative is inconsistent with National Standard 1 guideline. However, the current ABC is below the SSC's recommendation beyond for 2016 through 2018 and would be expected to rebuild the stock (i.e., SSB to SPR 30%) by 2019.

Alternative 2 would set the stock ACL equal to the ABC recommended by the SSC from 2015 through 2018 and is projected rebuild the stock (i.e., SSB to SPR 30%) by 2020. Based on the allocation (73% recreational and 27% commercial), the respective sector ACLs would be 1,255,600 lbs ww for the recreational sector (2015) and 464,400 lbs ww for the commercial sector (2015). **Alternative 2** would also establish a new stock ACL that is 60,000 lbs below the current stock ACL in 2015, followed by increases each year from 2016 through 2018. However, at the August 2014 SSC meeting, the SSC discussed the harvest projections from SEDAR 33 (2014) and the ABC schedule recommended at the previous SSC meeting in June 2014. The additional discussion occurred because 1) the stock remains overfished and continues to experience overfishing, 2) the previous 10-year rebuilding plan was not met, and 3) the stock biomass has been relatively stable (at overfished levels) for a long period while experiencing harvest levels below what is currently projected to rebuild the stock in upcoming years. The SSC discussed that historical stock assessment model projections were quite uncertain, and retrospectively, were overly optimistic about the productivity of the stock. A SSC member noted that the current SEDAR 33 stock assessment differed in terms of modeling environment and approach from previous assessments and the current SS3 modeling environment allowed a length structured assessment with uncertainty in both lengths and landings. These are substantial improvements over previous stock assessments and should add reliability to the results and projections relative to previous assessments of greater amberjack.

Greater amberjack are currently managed toward harvesting the ACT (i.e., quota). This strategy provides a management buffer between the ACT and ACL, ultimately reducing the likelihood of exceeding the ACL and triggering AMs. The Council established an ACL/ACT Control Rule in the Generic ACL/AM Amendment (GMFMC 2011). The Council developed the ACL/ACT Control Rule so it could objectively and efficiently assign catch limits and targets that take into account management uncertainty (GMFMC 2011). The rule uses different levels of information about catch levels, sector overages, stock management practices, and data quality to assign levels of reduction for either sector ACLs or ACTs.

Alternative 2 includes two options. **Option a** would apply the ACL/ACT Control Rule that results in a buffer of 15% for the commercial sector (i.e., management target), and the recreational ACT would result from applying a 13% buffer to the sector's ACL, to accommodate uncertainty in the effectiveness of the management strategy to constrain catch.

Option b would not use the ACL/ACT Control Rule and instead apply a 20% buffer, reducing the ACL by 20% to establish the ACT, or management target. The rationale for **Option b** is that recreational harvest has previously exceeded the sector ACL and this would increase both the buffer and the likelihood of rebuilding the stock to target biomass levels.

Both **Alternatives 2** and **3** include **Options a** and **b,** and propose the same ACLs and ACTs for the year 2015. However, **Alternative 3** does not allow for increases in the ACL and ACT in subsequent years (2016 - 2018) as compared to **Alternative 2**. **Alternative 3** is projected rebuild the stock (i.e., SSB to SPR 30%) by 2019. **Alternative 3, Option a** would apply the ACL/ACT Control Rule corresponding to a 15% commercial buffer and a 13% recreational buffer for each year 2015 to 2018 inclusive. **Alternative 3, Option b** would apply a constant 20% buffer between the ACL and ACT from 2015 through 2018.

Alternative 4 would set the stock ACL and stock ACT at zero and is a reasonable alternative given that this stock is overfished and experiencing overfishing despite previous management efforts to rebuild the stock within the ten year rebuilding plan. **Alternative 4** is projected to rebuild the stock by 2017. However, this alternative will have the greatest short-term, negative socio-economic impacts.

Post-season accountability measures (AMs) such as overage adjustments would only occur if the respective sector ACL was exceeded. Any ACL overage by a sector would then reduce the respective sector's ACL and ACT the following year, by the amount of the sector ACL overage.

Both **Alternative 2** and **Alternative 3** (including **Options)** under consideration would retain the same ABC. **Option a** under **Alternatives 2** and **3** would maintain an ACT (commercial sector buffer =15% and the recreational buffer =13%) where the buffer is established using the ACL/ACT control rule. This would retain an ACT value as the "target" yet AMs would not be triggered unless the ACL was exceeded. **Options b** under **Alternatives 2 and 3** would also establish an ACT value as the "target" yet with larger buffers (5% larger commercial; 7% larger recreational) than **Option a** under either **Alternative 2 or 3**. **Option b** under either alternative would reduce the likelihood of exceeding the ACL and aid in preventing overages that have occurred frequently in the management of this species. However, if the buffer is too large, it could prevent the fishery from landing the allowable catch.

2.2 Action 2 - Recreational Management Measures

Action 2.1: Modify the Recreational Minimum Size Limit for Greater Amberjack

Alternative 1: No Action – do not modify the current recreational minimum size limit of 30 inches fork length (FL).

Alternative 2: Modify the minimum size limit for greater amberjack to 32 inches FL.

Alternative 3: Modify the minimum size limit for greater amberjack to 34 inches FL.

Alternative 4: Modify the minimum size limit for greater amberjack to 36 inches FL.

Discussion:

Action 2 includes alternatives to increase the recreational minimum size limit for greater amberjack. **Alternative 1** would maintain the current 30-inch fork length (FL) recreational minimum size limit. Based on recreational landings in 2009-2010, the most frequently landed size of greater amberjack was 31 inches FL (Figure 2.2.1). A 30-inch FL greater amberjack is approximately two years old and likely has not reached sexual maturity (Figure 2.2.2). At the current 30-inch FL minimum size limit, 11% (95% confidence interval (0 - 23%)) of the females in the population have achieved reproductive maturity (Table 2.2.1).

Alternative 2 would modify the minimum size limit for greater amberjack to 32 inches FL. At 32 inches FL, 45% of females (95% confidence interval (23 - 66%)) are reproductively mature. **Alternative 3** would modify the minimum size limit for greater amberjack to 34 inches FL. At 34 inches FL, 85% of females (95% confidence interval (69 - 100%)) are reproductively mature. **Alternative 4** would modify the minimum size limit for greater amberjack to 36 inches FL. At 36 inches FL, 97% of females (95% confidence interval (92 - 100%)) are reproductively mature. For **Alternative 3** or **Alternative 4**, greater than 50% of female greater amberjack are estimated to be reproductively mature and **Alternative 4** would be consistent with the commercial sector's minimum size limit.

As minimum size limits increase from 30 inches FL, dead discards are estimated to increase and subsequent estimates of changes in harvest and dead discards for various minimum size limits could be calculated. Dead discard mortality is estimated at 20% and is used to estimate increases in total dead discards with various minimum size limits consistent with SEDAR 33 (2014) SEDAR 9 Update (2010).

Spawning potential ratio (SPR) (Figure 2.2.3) and yield-per-recruit (YPR) (Figure 2.2.4) were calculated for a range of fishing mortality rates for three different minimum size limits following SERO-LAPP-2011-4. The calculations incorporated discard selectivity and discard mortality for sub-legal fish and harvest selectivity within 2 inches of the minimum size limit. SPR and YPR calculations were updated with SEDAR 33 (2014) parameter estimates of length-weight

conversion, von Bertalanffy growth model, length at maturity model, natural mortality, fishing mortality, and discard mortality.

SPR addresses the spawning potential of the stock relative to the stock with no fishing mortality. The largest minimum size limit considered (**Alternative 4**; 36 inches FL) resulted in the largest spawning potential for the stock. YPR addresses the fishing mortality rate that produces the maximum yield of the fishery. The smallest minimum size considered (**Alternative 1**; 30 inches FL) resulted in the largest yield of the fishery. Thus, the SPR and YPR results reveal a trade-off between SPR and YPR. If the management goal is to achieve a higher SPR, then increasing the minimum size would be beneficial; however, this results in less YPR. If the management goal is to maximize yield then the current minimum size limit of 30 inches FL appears appropriate.

The SPR and YPR analysis presented herein only takes into account growth and mortality. Recruitment is assumed to be constant which is likely unrealistic since recruitment varies over time based on changing stock size and environmental conditions. Thus, there is uncertainty associated with these results. Also, this analysis does not address the issue of determining a fishing mortality rate that will produce a maximum yield that is likely to be sustainable.

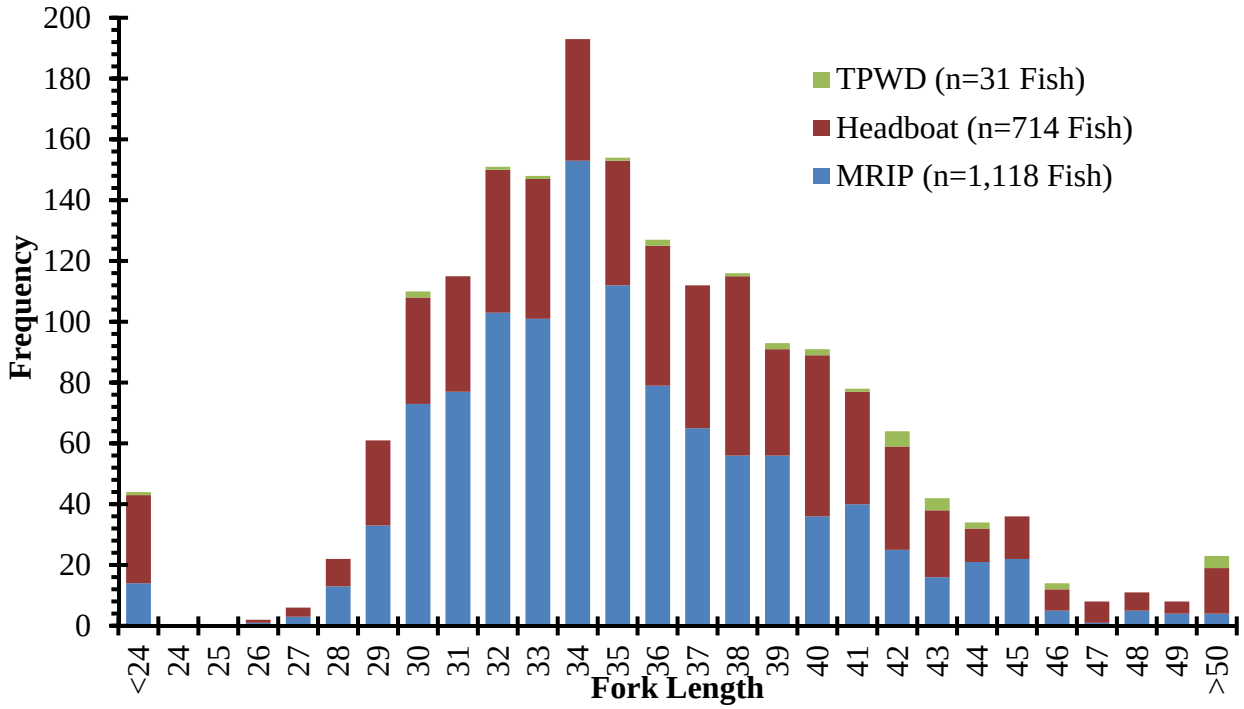

Figure 2.2.1. Size frequency distribution of recreational greater amberjack landings in 2012-2013 in the Gulf of Mexico. The current minimum size limit is 30 inches FL. Note: Landings in blue = Marine Recreational Information Program (MRIP), red = Southeast Headboat Survey, and green = Texas Parks and Wildlife Division. Source: SERO 2014.

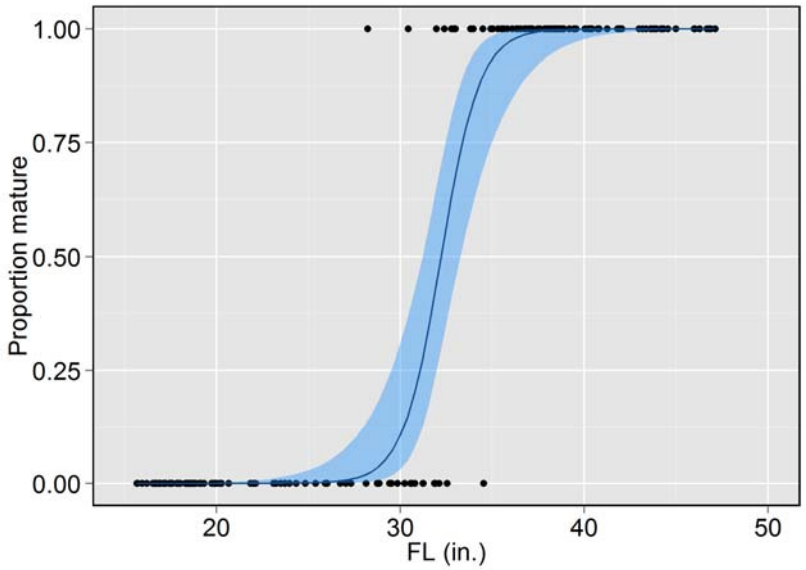

Figure 2.2.2. Proportion of mature females by length for greater amberjack in the Gulf of Mexico. Solid line represents the logistic regression model, blue shaded region represents 95% confidence interval. Filled black circles are individual samples that were noted as mature or immature. Source: D. Murie, personal communication and SERO 2014.

Table 2.2.1. Proportion of mature females at selected lengths for greater amberjack in the Gulf of Mexico. At each selected length, the proportion of mature females is estimated using logistic regression. The 95% lower (LCL) and upper (UCL) confidence limits are also provided.

Proportion of mature females			
Fork length (FL, in inches)	**Proportion mature**	**LCL**	**UCL**
30	0.11	0.00	0.23
32	0.45	0.23	0.66
34	0.85	0.69	1.00
36	0.97	0.92	1.00

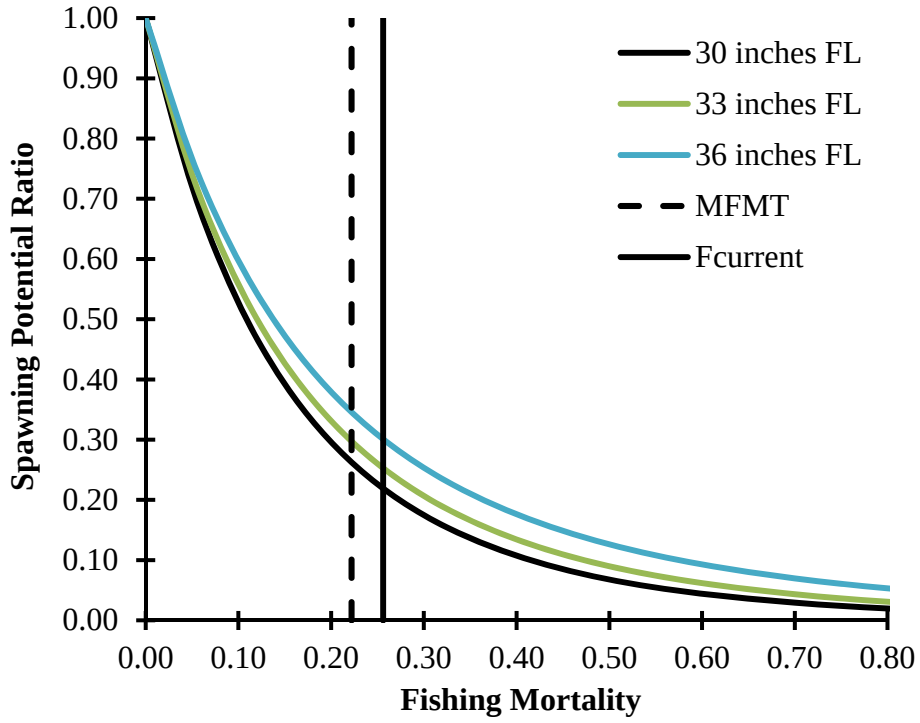

Figure 2.2.3. Gulf of Mexico greater amberjack spawning potential ratio plotted against fishing mortality rates for three different minimum size limits. The black bar represents the current fishing morality rate (Fcurrent = 0.256) and the dashed line represents the Maximum Fishing Mortality Threshold (MFMT = 0.222) as stated in SEDAR 33 (2014).

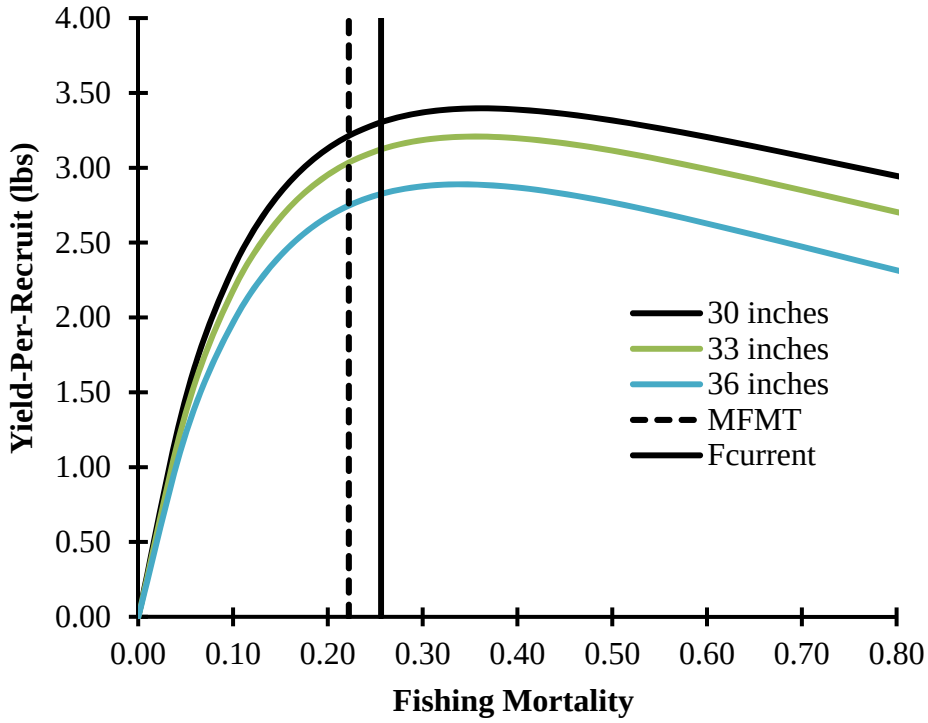

Figure 2.2.4. Gulf of Mexico greater amberjack yield-per-recruit (YPR) plotted against fishing mortality rates for three different minimum size limits. The black bar represents the current fishing morality rate (Fcurrent = 0.256) and the dashed line represents the Maximum Fishing Mortality Threshold (MFMT = 0.222) as stated in SEDAR 33 (2014).

Action 2.2: Modify the Recreational Closed Seasons for Greater Amberjack

Alternative 1: No Action – do not modify the current June 1 - July 31 recreational closed season.

Alternative 2: Eliminate the closed season and open January 1 until the ACT is harvested.

Alternative 3: Modify the recreational seasonal closure to March 1 - May 31.

Alternative 4: Modify the recreational seasonal closures to January 1 – May 31 and November 1 – December 31.

Discussion:

Minimum size limits are one of many management measures that can be used to achieve the management goal of 30% SPR. Another measure the Council is considering is modification to the recreational closed season. The primary reason for a fixed recreational closed season is to eliminate in-season quota closures in the fall, which can be very disruptive to the reef fish fishery.

Alternative 1 would maintain the current fixed closed season June 1-July 31. The rationale for this fixed recreational closed season was to eliminate in-season quota closures and allow one highly targeted species to be open when the other was closed (red snapper and greater amberjack). In addition, by establishing a fixed closed season the fishery is more likely to stay open through the remainder of the calendar year.

Alternative 2 would eliminate the fixed closed season (June 1-July 31) and the fishing season for greater amberjack would open January 1 until the ACT is projected to be met. This was the structure of the recreational fishing season until the implementation of the 2010 Regulatory Amendment (GMFMC 2010b) which established a fixed closed season June 1-July 31, 2011.

Alternative 3 would eliminate the fixed closed season (June 1-July 31) and establish a recreational fixed closed season from March 1-May 31. This alternative would be consistent with the commercial fixed closed season and would also protect greater amberjack during peak spawning.

Alternative 4 would eliminate the fixed closed season (June 1-July 31) and establish recreational fixed closed seasons from January 1-May 31 and from November 1-December 31 providing protection for spawning greater amberjack and allowing recreational fishing effort to occur throughout the summer into early fall (September-October).

Action 2.1 and **Action 2.2** consider management alternatives to 1) achieve the ACT selected in Action 1 and; 2) consider changes in minimum size limits and or closed seasons to maximize benefits from the greater amberjack stock while ending overfishing and allowing for rebuilding of the stock. A recreational decision tool was developed to evaluate combinations of size limits and closed seasons on the total removals of the stock (catch + dead discards) as well as the number of days required to harvest the ACT (catch, not including dead discards). This permits evaluation of tradeoffs in management alternatives to maximize benefits (e.g., season length) and minimize negative attributes (e.g., dead discards). The estimated season length for combinations of minimum size limits (Action 2.1, Alternatives 1 -4) and recreational closed seasons (**Action 2.2**, **Alternatives 1 -4**) are presented in Table 2.2.1. These estimates are restricted to calendar year 2015 as some alternatives include constant ACT values and uncertainty increases with each successive year of the projection. As such, the number of days presented in Table 2.2.1 represents the best estimate and are considered useful in a comparative sense. The combinations yielding the longest season length include a 36-inch FL minimum size limit and a closed season during June and July when harvest rates are typically greatest. The split season closure (**Alternative 4**) is predicted to yield the shortest fishing season of all the alternatives considered, as the closed seasons occur in relatively low-effort periods, thus requiring longer closed seasons to achieve the same level of harvest reductions.

Table 2.2.2. Recreational sector season length in days under selected closed seasons (Action 2.2), minimum size limits (Action 2.1), and ACT options (Action 1).

Closed Seasons	Size Limit	ACT Alt 1	ACT Alt 2		ACT Alt 3	
		13% buffer	13% buffer	20% buffer	13% buffer	20% buffer
June 1 - July 31	**30**	182	179	172	179	172
January 1 until ACT harvested	**30**	190	187	181	187	181
March 1 to May 31	**30**	145	142	135	142	135
January 1 – May 31 and November 1 – December 31	**30**	97	92	85	92	85
June 1 - July 31	**32**	196	191	180	191	180
January 1 until ACT harvested	**32**	199	195	188	195	188
March 1 to May 31	**32**	152	149	142	149	142
January 1 – May 31 and November 1 – December 31	**32**	108	102	91	102	91
June 1 - July 31	**34**	215	209	196	209	196
January 1 until ACT harvested	**34**	211	208	200	208	200
March 1 to May 31	**34**	168	162	150	162	150
January 1 – May 31 and November 1 – December 31	**34**	123	118	104	118	104
June 1 - July 31	**36**	258	237	222	237	222
January 1 until ACT harvested	**36**	227	224	215	224	215
March 1 to May 31	**36**	192	185	170	185	170
January 1 – May 31 and November 1 – December 31	**36**	147	140	125	140	125

2.3 Action 3 - Commercial Management Measures

Alternative 1: No Action – Maintain the 1,923-lb gutted weight trip limit (2,000-lb whole weight trip limit) for greater amberjack. Note: The current regulation is specified in pounds whole weight.

Alternative 2: Establish a 1,500-lb gutted weight trip limit (1,560-lb whole weight trip limit) for greater amberjack.

Alternative 3: Establish a 1,000-lb gutted weight trip limit (1,040-lb whole weight trip limit) for greater amberjack.

Alternative 4: Establish a 750-lb gutted weight trip limit (780-lb whole weight trip limit) for greater amberjack.

Alternative 5: Establish a 500-lb gutted weight trip limit (520-lb whole weight trip limit) for greater amberjack.

Discussion:

Commercially harvested greater amberjack are typically landed gutted rather than whole. As such, the management alternatives are stated in gutted weight (gw) with equivalent whole weight (ww) conversions noted in parentheses. However, the federal regulations are currently provided in whole weight. A reminder was published July 29, 2014 (FB14-55) clarifying that 2,000 lbs ww is equivalent to 1,923 lbs gw using the standard conversion.

Action 3 includes alternatives to reduce commercial trip limits for greater amberjack. A 1,923-lb gw (2,000 lbs ww) commercial trip limit was established in Amendment 35 (GMFMC 2012) in an effort to reduce harvest rates and prevent ACL overages. Greater amberjack are currently managed toward harvesting the ACT. This strategy provides a management buffer between the ACT and ACL, ultimately reducing the likelihood of exceeding the ACL and triggering AMs. Prior to implementation of the commercial trip limit, the commercial ACL was exceeded each year from 2009 to 2012. While the trip limit moderately reduced the average poundage landed per trip, the commercial ACT and ACL were also exceeded in 2013. If the commercial ACT and ACL are reduced from status quo to meet the objectives of the rebuilding plan (i.e., Action 1), an additional reduction to the commercial trip limit could reduce the likelihood of exceeding the ACL. **Alternative 1** would retain the 1,923-lb gutted weight (2,000 lbs whole weight) commercial trip limit. **Alternatives 2-5** would reduce the commercial greater amberjack trip limit to 1,500 lbs gw (**Alternative 2**); 1,000 lbs gw (**Alternative 3**), 750 lbs gw (**Alternative 4**), and 500 lbs gw (**Alternative 5**), respectively. The reduced trip limits are expected to reduce the rate of harvest and the likelihood of exceeding the ACT and extend the season length. This could be an effective management measure to achieve harvest targets and prevent triggering of AMs (i.e., exceeding the ACL).

To estimate season lengths necessary to harvest the commercial ACT, a decision tool was developed to compare **Alternatives 1-5**. Estimates are restricted to fishing year 2015 as projection uncertainty increases with each subsequent year estimated. These season lengths are reported as a range since they are dependent upon the ACT value selected in Action 1. **Alternative 1** (1,923 gw trip limit) would provide the shortest season among the alternatives, such that the season is projected to range from 75 to 82 days, assuming a January 1, 2015 opening date (Table 2.3.2). **Alternative 2** would slow the overall harvest rate of the fleet by restraining trip harvest to 1,500 lbs gw and the projected season length ranges from 83 to 91 days. **Alternative 3** would enact a 1,000-lb gw trip limit with a projected season length ranging from 110 to 123 days. **Alternative 4** (750-lb gw trip limit) would require 140 to 157 days to harvest the ACT. **Alternative 5** (500-lb trip limit) is the smallest trip limit under consideration and would require 207 to 233 days to harvest the ACT. In all cases, **Alternative 5** would have the longest season length at the expense of the smallest allowable harvest per trip.

Table 2.3.1. Total greater amberjack commercial landings (2008 - 2013). The commercial ACL was exceeded each year from 2009 to 2013. A 2,000-lb ww trip limit was implemented in December 2012, (fully implemented in 2013). Note, the ACL was adjusted for prior year overages in some years as explained in Table 1.3.1.

Year	Total Landings (ww)	ACL (ww)	Closure Date
2008	439,176	503,000	
2009	601,446	503,000	11/7/2009
2010	534,095	373,072	10/28/2010
2011	508,489	342,091	6/18/2011
2012	307,921	314,734	3/1/2012
2013	457,821	410,157	7/1/2013

Table 2.3.2. Estimated commercial season length (i.e., days open) under five management alternatives. The table represents the number of fishing necessary to harvest the ACT as specified in Action 1. The color scale ranges from yellow (i.e., fewest days) to green (i.e., most days).

Action 3 Alternatives	Action 1 Alternatives					
	Trip Limit (lbs gw)	Alternative 1	Alternative 2		Alternative 3	
			15% buffer	20% buffer	15% buffer	20% buffer
Alt. 1	**1923* (status quo)**	82	79	75	79	75
Alt. 2	**1500**	91	87	83	87	83
Alt.3	**1000**	123	118	110	118	110
Alt. 4	**750**	157	151	140	151	140
Alt. 5	**500**	233	223	207	223	207

*2000-lb ww

CHAPTER 3. AFFECTED ENVIRONMENT

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). Mean annual sea surface temperatures ranged from 73 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.

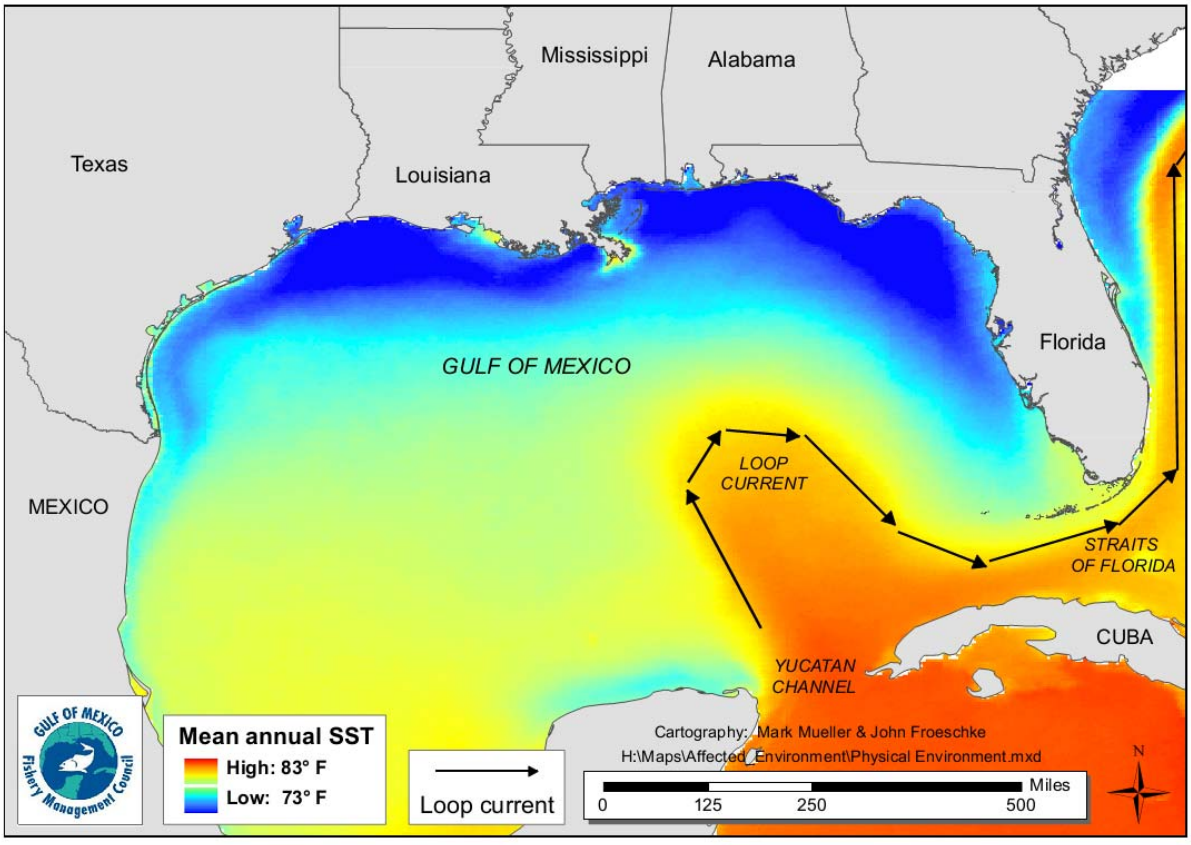

Figure 3.1.1. Mean annual sea surface temperature derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://pathfinder.nodc.noaa.gov).

The physical environment for Gulf reef fish is detailed in the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004a) and the Generic Annual Catch Limit

(ACL)/Accountability Measure (AM) Amendment (GMFMC 2011) which are hereby incorporated by reference.

Habitat Areas of Particular Concern (HAPC)

Generic Amendment 3 (GMFMC 2005) for addressing EFH, HAPC, and adverse effects of fishing in the following fishery management plans of the Gulf Reef Fish Resources, Red Drum, and Coastal Migratory Pelagics is hereby incorporated by reference.

Environmental Sites of Special Interest Relevant to Reef Fish, Red Drum, Coastal Migratory Pelagics, Spiny Lobster, Red Drum, and Coral and Coral Reefs (Figure 3.1.2)

Longline/Buoy Gear Area Closure – Permanent closure to use of these gears for reef fish harvest inshore of 20 fathoms (36.6 meters) off the Florida shelf and inshore of 50 fathoms (91.4 meters) for the remainder of the Gulf, and encompasses 72,300 square nautical miles (nm^2) or 133,344 km^2 (GMFMC 1989). Bottom longline gear is prohibited inshore of 35 fathoms (54.3 meters) during the months of June through August in the eastern Gulf (GMFMC 2009), but is not depicted in Figure 3.2.1.

Madison-Swanson and Steamboat Lumps Marine Reserves - No-take marine reserves (total area is 219 nm^2 or 405 km^2) sited based on gag spawning aggregation areas where all fishing is prohibited except surface trolling from May through October (GMFMC 1999; 2003).

The Edges Marine Reserve – All fishing is prohibited in this area (390 nm^2 or 1,338 km^2) from January through April and possession of any fish species is prohibited, except for such possession aboard a vessel in transit with fishing gear stowed as specified. The provisions of this do not apply to highly migratory species (GMFMC 2008).

Tortugas North and South Marine Reserves – No-take marine reserves (185 nm^2) cooperatively implemented by the state of Florida, National Ocean Service, the Gulf of Mexico Fishery Management Council (Council), and the National Park Service in Generic Amendment 2 Establishing the Tortugas Marine Reserves (GMFMC 2001).

Reef and bank areas designated as Habitat Areas of Particular Concern (HAPCs) in the northwestern Gulf include – East and West Flower Garden Banks, Stetson Bank, Sonnier Bank, MacNeil Bank, 29 Fathom, Rankin Bright Bank, Geyer Bank, McGrail Bank, Bouma Bank, Rezak Sidner Bank, Alderice Bank, and Jakkula Bank – pristine coral areas protected by preventing the use of some fishing gear that interacts with the bottom and prohibited use of anchors (totaling 263.2 nm^2 or 487.4 km^2). Subsequently, three of these areas were established as marine sanctuaries (i.e., East and West Flower Garden Banks and Stetson Bank). Bottom anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots on coral reefs are prohibited in the East and West Flower Garden Banks, McGrail Bank, and on significant coral resources on Stetson Bank (GMFMC 2005). A weak link in the tickler chain of bottom trawls on all habitats throughout the EEZ is required. A weak link is defined as a length or section of the tickler chain that has a breaking strength less than the chain itself and is easily seen as such when visually inspected. An education program for the protection of coral reefs

when using various fishing gears in coral reef areas for recreational and commercial fishermen was also developed.

Florida Middle Grounds HAPC - Pristine soft coral area (348 nm^2 or 644.5 km^2) that is protected by prohibiting the following gear types: bottom longlines, trawls, dredges, pots and traps (GMFMC and SAFMC 1982).

Pulley Ridge HAPC - A portion of the HAPC (2,300 nm^2 or 4,259 km^2) where deepwater hermatypic coral reefs are found is closed to anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots (GMFMC 2005).

Alabama Special Management Zone – For vessels operating as a charter vessel or headboat, a vessel that does not have a commercial permit for Gulf reef fish, or a vessel with such a permit fishing for Gulf reef fish, fishing is limited to hook-and-line gear with no more than three hooks. Nonconforming gear is restricted to recreational bag limits, or for reef fish without a bag limit, to 5% by weight of all fish aboard.

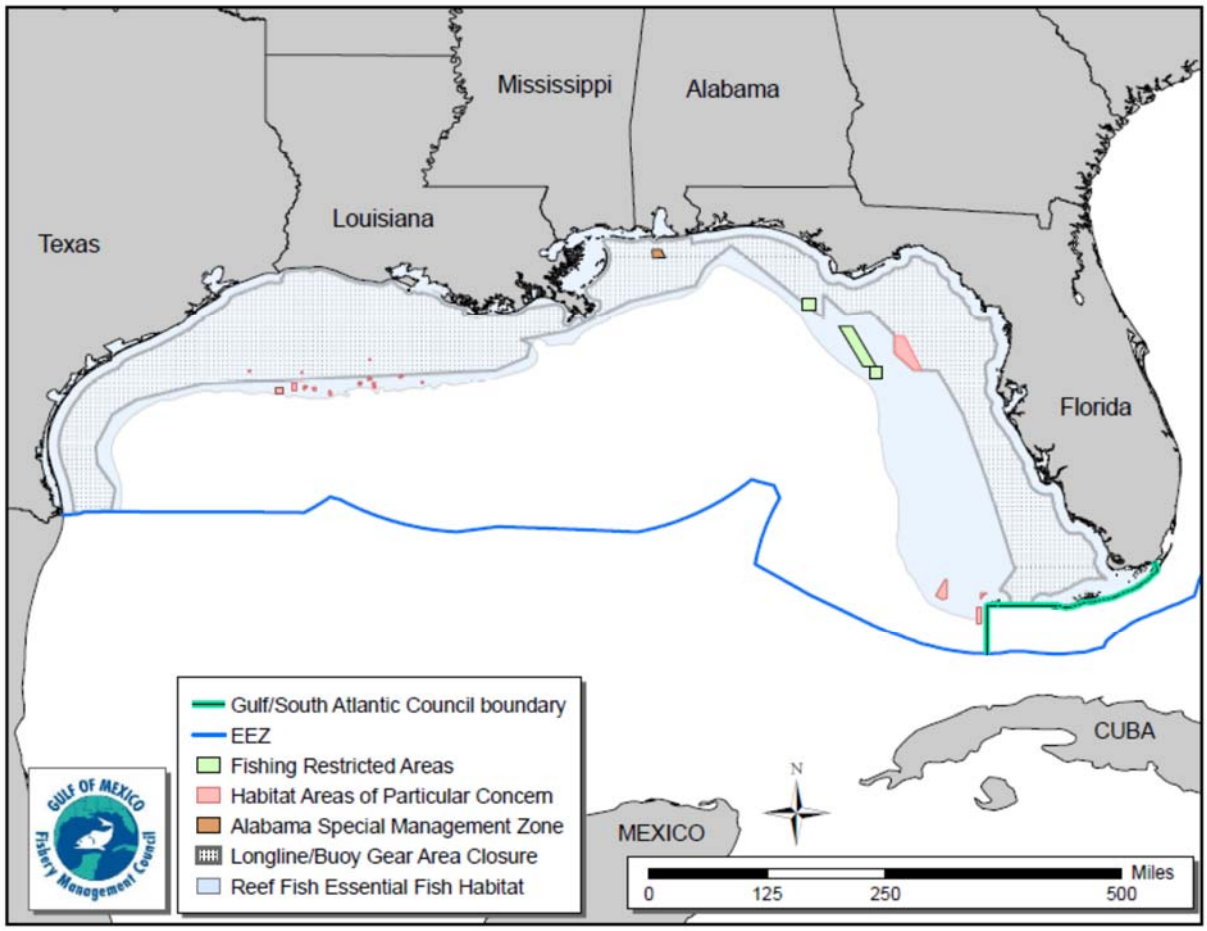

Figure 3.1.2. Map of most fishery management closed areas in the Gulf.

Deepwater Horizon MC252

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 were 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.

Surface or submerged oil during the Deepwater Horizon MC252 event could have restricted the normal processes of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column, thus affecting the long-standing hypoxic zone located west of the Mississippi River on the Louisiana continental shelf. In addition, microbes in the water that break down oil and dispersant also consume oxygen, which could lead to further oxygen depletion. Zooplankton that feed on algae could also be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow.

3.2 Description of the Biological/Ecological Environment

Greater Amberjack Life History and Biology

Recent studies conducted in the south Atlantic have consistently estimated that greater amberjack peak spawning occurs in April and May (Sedberry et al. 2006; Harris et al. 2007); whereas, studies conducted in the Gulf have consistently estimated that peak spawning occurs a month earlier during March and April (Wells and Rooker 2002; Murie and Parkyn 2008).

Early studies on greater amberjack conducted in south Florida indicated that maximum gonad development occurred in the spring months (Burch 1979). Studies in the 1990s on greater amberjack in the Gulf estimated the spawning season off Louisiana peaked in April-June based on increased gonad weight (Beasley 1993) and in May and June by Thompson et al. (1991). Wells and Rooker (2002) conducted studies in the northwestern Gulf on larval and juvenile fish associated with floating *Sargassum* spp. Based on the size and season larvae and juvenile greater amberjack were captured, peak spawning season occurred in March and April.

Sedberry et al. (2006) documented greater amberjack spawning in the south Atlantic on both the middle and outer shelf as well as on upper-slope reefs from 49 - 709 ft (15 - 216 m) depth, but spawning females were found at deeper depths from 148 - 400 ft (45 - 122 m). They collected spawning females from January to June, and estimated peak spawning occurred in April and May. Harris et al. (2007) completed a fishery-dependent and fishery-independent study on greater amberjack reproductive biology in the southeastern U.S. Atlantic from 2000 - 2004. Greater amberjack in spawning condition were captured from North Carolina to the Florida Keys; however, spawning was concentrated in areas off south Florida and the Florida Keys.

Harris et al. (2007) documented evidence of spawning from January - June with peak spawning during April and May. Female greater amberjack were significantly larger than males (Harris 2004; Harris et al. 2007). For males, the size at which 50% of individuals were mature was 25 inches fork length (FL) (644 mm FL) and for females was 29 inches FL (733 mm FL). They estimated a spawning season of approximately 73 days off south Florida, with a spawning period of 5 days, estimating that an individual female could spawn as frequently as 14 times during the season. Female fecundity increased with size, but was essentially constant throughout the spawning season. Greater amberjack are extremely fecund releasing 18 to 59 million eggs per female in a single spawning season (Harris et al. 2007).

Murie and Parkyn (2008) completed a recent study on reproductive biology of greater amberjack throughout the Gulf using fishery-dependent as well as fishery-independent data from 1989 - 2008. They also found females were significantly larger than males but that peak spawning occurred during March and April, and by May, they documented low gonad weights indicating spawning was ending. For females, 50% of individuals were mature at 35 inches FL (900 mm FL), larger than what Harris et al. (2007) documented off south Florida (Burch 1979).

Harris et al. (2007) suggested that there are known spawning aggregations of greater amberjack targeted by fishers in the south Atlantic, however, no direct evidence of this was presented. Observations by SCUBA divers in Belize documented greater amberjack in pair courtship when they were in a school of approximately 120 fish (Graham and Castellanos 2005). However, no aggregation or indication of spawning aggregations was discussed by the Murie and Parkyn (2008) Gulf study or in any other earlier Gulf studies.

After spawning, eggs and larvae of greater amberjack are pelagic. Smaller juvenile greater amberjack less than 1 inch standard length (SL) (20 mm SL) were found associated with pelagic *Sargassum* spp. mats (Bortone et al. 1977; Wells and Rooker 2004). Juveniles then shift to demersal habitats (5 - 6 months), where they congregate around reefs, rocky outcrops, and wrecks (GMFMC 2004a). Greater amberjack are only seasonally abundant in certain parts of their range, thus they likely utilize a variety of habitats and/or areas each year throughout their range. Greater amberjack have been documented on artificial structures as well as natural reefs (Ingram and Patterson 2001). Greater amberjack in the Gulf have been reported to live as long as 15 years and commonly reach sizes greater than 40 inches FL (1,016 mm FL) (Manooch and Potts 1997).

Status of the Greater Amberjack Stock

See Section 1.1 under the Introduction.

General Information on Reef Fish Species

The National Ocean Service (NOS) collaborated with the National Marine Fisheries Service (NMFS) and the Gulf of Mexico Fishery Management Council (Council) to develop distributions of reef fish (and other species) in the Gulf (SEA 1998). The NOS staff obtained fishery-independent data sets for the Gulf, including 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 (highly abundant, abundant, common, rare, not found, and no data) for a series of estuaries, by five life stages (adult, spawning, egg, larvae, and juvenile) and month for five seasonal salinity zones (0-0.5, 0.5-5, 5-15, 15-25, and >25 parts per million). The NOS staff analyzed these 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.

In general, reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. Habitat types and life history stages are summarized in Table 3.2.1 and can be found in more detail in GMFMC (2004a). In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Exceptions to these generalizations include gray triggerfish that lay their eggs in depressions in the sandy bottom, and gray snapper where larvae are found around submerged aquatic vegetation (SAV). Juvenile and adult reef fish are typically demersal, and are usually associated with bottom topographies on the continental shelf less than 328 ft (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. Juvenile red snapper are common on mud bottoms in the northern Gulf, particularly off Texas through Alabama. Also, some juvenile snappers (e.g. mutton, gray, red, 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).

Table 3.2.1. Summary of habitat use by life history stage for species in the FMP for Reef Fish Resources of the Gulf. This table was adapted from Table 3.2.7 in the final draft of the Council's Generic EFH Amendment (GMFMC 2004a) and consolidated in this amendment.

Common name	Eggs	Larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Red snapper	Pelagic	Pelagic	Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Reefs	Sand/ shell bottoms
Queen snapper	Pelagic	Pelagic	Unknown	Unknown	Hard bottoms	
Mutton snapper	Reefs	Reefs	Mangroves, Reefs, SAV, Emergent marshes	Mangroves, Reefs, SAV, Emergent marshes	Reefs, SAV	Shoals/ Banks, Shelf edge/slope
Blackfin snapper	Pelagic		Hard bottoms	Hard bottoms	Hard bottoms, Shelf edge/slope	Hard bottoms, Shelf edge/slope
Cubera snapper	Pelagic		Mangroves, Emergent marshes, SAV	Mangroves, Emergent marshes, SAV	Mangroves, Reefs	Reefs
Gray snapper	Pelagic, Reefs	Pelagic, Reefs	Mangroves, Emergent marshes, Seagrasses	Mangroves, Emergent marshes, SAV	Emergent marshes, Hard bottoms, Reefs, Sand/ shell bottoms, Soft bottoms	
Lane snapper	Pelagic		Mangroves, Reefs, Sand/ shell bottoms, SAV, Soft bottoms	Mangroves, Reefs, Sand/ shell bottoms, SAV, Soft bottoms	Reefs, Sand/ shell bottoms, Shoals/ Banks	Shelf edge/slope
Silk snapper	Unknown	Unknown	Unknown	Unknown	Shelf edge	
Yellowtail snapper	Pelagic		Mangroves, SAV, Soft bottoms	Reefs	Hard bottoms, Reefs, Shoals/ Banks	
Wenchman	Pelagic	Pelagic			Hard bottoms, Shelf edge/slope	Shelf edge/slope

Common name	Eggs	Larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Vermilion snapper	Pelagic		Hard bottoms, Reefs	Hard bottoms, Reefs	Hard bottoms, Reefs	
Gray triggerfish	Reefs	Drift algae, *Sargassum*	Drift algae, *Sargassum*	Drift algae, Reefs, *Sargassum*	Reefs, Sand/ shell bottoms	Reefs, Sand/ shell bottoms
Greater amberjack	Pelagic	Pelagic	Drift algae	Drift algae	Pelagic, Reefs	Pelagic
Lesser amberjack			Drift algae	Drift algae	Hard bottoms	Hard bottoms
Almaco jack	Pelagic		Drift algae	Drift algae	Pelagic	Pelagic
Banded rudderfish		Pelagic	Drift algae	Drift algae	Pelagic	Pelagic
Hogfish			SAV	SAV	Hard bottoms, Reefs	Reefs
Blueline tilefish	Pelagic	Pelagic			Hard bottoms, Sand/ shell bottoms, Shelf edge/slope, Soft bottoms	
Tilefish (golden)	Pelagic, Shelf edge/ slope	Pelagic	Hard bottoms, Shelf edge/slope, Soft bottoms	Hard bottoms, Shelf edge/slope, Soft bottoms	Hard bottoms, Shelf edge/slope, Soft bottoms	
Goldface tilefish	Unknown					
Speckled hind	Pelagic	Pelagic			Hard bottoms, Reefs	Shelf edge/slope
Yellowedge grouper	Pelagic	Pelagic		Hard bottoms	Hard bottoms	
Goliath grouper	Pelagic	Pelagic	Mangroves, Reefs, SAV	Hard bottoms, Mangroves, Reefs, SAV	Hard bottoms, Shoals/ Banks, Reefs	Reefs, Hard bottoms

Common name	Eggs	Larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Red grouper	Pelagic	Pelagic	Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	Hard bottoms, Reefs	
Warsaw grouper	Pelagic	Pelagic		Reefs	Hard bottoms, Shelf edge/slope	
Snowy grouper	Pelagic	Pelagic	Reefs	Reefs	Hard bottoms, Reefs, Shelf edge/slope	
Black grouper	Pelagic	Pelagic	SAV	Hard bottoms, Reefs	Hard bottoms, Mangroves, Reefs	
Yellowmouth grouper	Pelagic	Pelagic	Mangroves	Mangroves, Reefs	Hard bottoms, Reefs	
Gag	Pelagic	Pelagic	SAV	Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	
Scamp	Pelagic	Pelagic	Hard bottoms, Mangroves, Reefs	Hard bottoms, Mangroves, Reefs	Hard bottoms, Reefs	Reefs, Shelf edge/slope
Yellowfin grouper			SAV	Hard bottoms, SAV	Hard bottoms, Reefs	Hard bottoms

Status of Reef Fish Stocks

The Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) currently encompasses 31 species (Table 3.2.2). Eleven other species were removed from the Reef Fish FMP in 2012 by the Council in their Generic ACL/AM Amendment. Stock assessments and stock assessment reviews may be found on the Council (www.gulfcouncil.org) and SEDAR (http://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 2011b; SEDAR Update 2014)
- yellowtail snapper (Muller et al. 2003; SEDAR 3 2003)
- mutton snapper (SEDAR 15A 2008)
- gray triggerfish (Valle et al. 2001; SEDAR 9 2006b; SEDAR 9 Update 2011c and 2014)
- greater amberjack (Turner et al. 2000; SEDAR 9 2006c; SEDAR 9 Update 2010, SEDAR 33 2014)
- hogfish (Ault et al. 2003; SEDAR 6 2004a, SEDAR 37 2013)
- 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 2014)
- black grouper (SEDAR 19 2010)
- yellowedge grouper (Cass-Calay and Bahnick 2002; SEDAR 22 2011a)
- tilefish (golden) (SEDAR 22 2011b)
- goliath grouper (Porch et al. 2003; SEDAR 6 2004b; SEDAR 23 2011)

Utilizing the most current stock assessment information, the Gulf of Mexico fourth quarter report of the 2014 Status of U.S. Fisheries (http://www.nmfs.noaa.gov/sfa/statusoffisheries/2011/fourth/Q4%202011%20FSSI%20and%20nonFSSI%20StockStatus.pdf) classifies the 13 species as follows:

Overfished and Experiencing Overfishing:

- greater amberjack
- gray triggerfish

Not Overfished or Experiencing Overfishing:

- red snapper – most current stock assessment (SEDAR 31 2013)
- yellowtail snapper
- yellowedge grouper
- vermilion snapper
- black grouper
- red grouper
- gag grouper
- mutton snapper– not reflected in the 2011 Status of the Stocks
- hogfish – may be experiencing growth overfishing

Unknown:

- goliath grouper – benchmarks do not reflect appropriate stock dynamics
- snowy grouper
- speckled hind
- warsaw grouper
- yellowfin grouper
- SCAMP
- yellowmouth grouper
- cubera snapper
- gray snapper
- lane snapper
- queen snapper
- blackfin snapper
- silk snapper
- wenchman
- jacks complex (lesser amberjack, banded rudderfish)
- tilefish (golden) – insufficient data

Table 3.2.2. Species of the Reef Fish FMP grouped by family.
**Note: Goliath grouper is a protected grouper.

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*	Not overfished, no overfishing
Family Malacanthidae – Tilefishes		
Tilefish (golden)	*Lopholatilus chamaeleonticeps*	Unknown
blueline tilefish	*Caulolatilus microps*	Unknown
goldface tilefish	*Caulolatilus chrysops*	Unknown
Family Serranidae – Groupers		
Gag	*Mycteroperca microlepis*	Overfished, overfishing
red grouper	*Epinephelus morio*	Not overfished, no overfishing
Scamp	*Mycteroperca phenax*	Unknown
black grouper	*Mycteroperca bonaci*	Not overfished, no overfishing
yellowedge grouper	*Epinephelus flavolimbatus*	Not overfished, no overfishing
snowy grouper	*Epinephelus niveatus*	Unknown
speckled hind	*Epinephelus drummondhayi*	Unknown
yellowmouth grouper	*Mycteroperca interstitialis*	Unknown
yellowfin grouper	*Mycteroperca venenosa*	Unknown
warsaw grouper	*Epinephelus nigritus*	Unknown
****goliath grouper**	*Epinephelus itajara*	Unknown, not overfishing
Family Lutjanidae – Snappers		
queen snapper	*Etelis oculatus*	Unknown
mutton snapper	*Lutjanus analis*	Unknown
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

Protected Species

There are 28 different species of marine mammals that can or are known to occur in the Gulf of Mexico. All 28 species are protected under the Marine Mammal Protection Act (MMPA) and six are also listed as endangered under the Endangered Species Act (ESA) (i.e., sperm, sei, fin, blue, humpback and North Atlantic right whales). Other species protected under the ESA occurring in the Gulf include five sea turtle species (Kemp's Ridley, loggerhead, green, leatherback, and hawksbill); two fish species (Gulf sturgeon and smalltooth sawfish), and two coral species (elkhorn coral and staghorn coral). Information on the distribution, biology, and abundance of these protected species in the Gulf is included in Generic EFH Amendment (GMFMC 2004a) and the February 2005, October 2009, and September 2011 ESA biological opinions on the reef fish fishery (NMFS 2005; NMFS 2009; NMFS 2011). Marine Mammal Stock Assessment Reports and additional information are also available on the NMFS Office of Protected Species website: http://www.nmfs.noaa.gov/pr/species/.

The MMPA 2015 Proposed List of Fisheries (79 FR 14418) considers vertical line gear and longline gear as Category III gears. These gears are the dominant gear used in the Gulf reef fish fishery - vertical line (90%) and longline (5.4%) gear. 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 prey upon on the bait, catch, and/or released discards of fish from the reef fish fishery. They are also a common predator around reef fish vessels, feeding on the discards.

All five species of sea turtles are adversely affected by the Gulf reef fish fishery. Incidental captures are relatively infrequent, but occur in all commercial and recreational hook-and-line components of the reef fishery. Loggerhead sea turtles are by far the most frequently incidentally caught sea turtles. Captured sea turtles can be released alive or can be found dead upon retrieval of the gear as a result of forced submergence. 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, entangling, 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) to evaluate potential effects from the Gulf reef fish fishery on species and critical habitats protected under the ESA. On September 30, 2011, the Protected Resources Division released a biological opinion (Opinion), which concluded that the continued operation of the Gulf reef fish fishery is not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish (NMFS 2011a). The Opinion also concluded that other ESA-listed species are not likely to be adversely affected by the Reef Fish FMP. 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. The Council addressed further measures to reduce take in the reef fish fishery's longline component in Amendment 31 (GMFMC 2009).

Subsequent to the completion of the biological opinion, NMFS published final rules listing 20 new coral species (September 10, 2014), and designating critical habitat for the Northwest Atlantic Ocean distinct population segment of loggerhead sea turtles (July 10, 2014). NMFS addressed these changes in a series of consultation memoranda. In a consultation memorandum dated October 7, 2014, NMFS assessed the continued operation of the Gulf reef fish fishery's potential impact on the newly-listed coral species occurring in the Gulf (3 species of *Orbicella* and *Mycetophyllia ferox*) and concluded the fishery is not likely to adversely affect any of the protected coral species. Similarly, in a consultation memorandum dated September 16, 2014, NMFS assessed the continued authorization of South Atlantic and Gulf of Mexico fisheries' potential impacts on loggerhead critical habitat and concluded the Gulf reef fish fishery is not likely to adversely affect the newly designated critical habitat.

Smalltooth sawfish also interact with the Gulf reef fish fishery, but to a much lesser extent. Smalltooth sawfish primarily occur in the Gulf of Mexico off peninsular Florida. Incidental captures in the commercial and recreational hook-and-line components of the reef fish fishery are rare events, with only eight smalltooth sawfish estimated to be incidentally caught every three years, and none are expected to result in mortality (NMFS 2011). Fishermen in this fishery are required to follow smalltooth sawfish safe handling guidelines. The long, toothed rostrum of the smalltooth sawfish causes this species to be particularly vulnerable to entanglement in fishing gear.

3.3 Description of the Economic Environment

A description of the greater amberjack stock is provided in Section 1.1. Additional details on the fishery for greater amberjack are provided in Amendment 30A to the Reef Fish FMP (GMFMC 2008) and Regulatory Framework Action to the Reef Fish FMP (Greater Amberjack Recreational Fishing Closure) (GMFMC 2011), and are incorporated herein by reference. The following section contains updated information on the economic environment of the greater amberjack fishery.

3.3.1 Economic Description of the Commercial Sector

The major source of data summarized in this description is the Federal Logbook System (FLS), supplemented by average prices calculated from the NMFS Accumulated Landings System (ALS) and price indices taken from the Bureau of Labor Statistics. Inflation adjusted revenues and prices are reported in real[NC1] 2013 dollars. Landings are expressed in gutted weight to match the method for collecting ex-vessel price information. The gutted to whole weight conversion rate is 1.04.

Landings, Value, and Effort

The number of vessels that landed greater amberjack each year decreased rapidly from 2009 through 2012 and increased modestly in 2013 (Table 3.3.1). The number of trips on which greater amberjack was landed, as well as landings of greater amberjack and landings of other species jointly caught with greater amberjack, exhibited similar trends during this time period. The number of non-greater amberjack trips taken by vessels that landed at least one pound of greater amberjack during the year, as well as landings on those trips, fluctuated from 2009 through 2013. On average (2009 through 2013), vessels that landed greater amberjack took 4.6 times as many non-greater amberjack trips as greater amberjack trips. Greater amberjack landings for those vessels accounted for only 4.7% of all species landings from all trips.

Table 3.3.1. Number of vessels, number of trips and landings by year.

Year	Number of vessels that caught GOM greater amberjack (> 0 lbs)	Number of trips that caught GOM greater amberjack	GOM greater amberjack landings (lbs gutted wt)	Other species' landings jointly caught with GOM greater amberjack (lbs gutted wt)	Number of GOM trips that only caught other species	Other species' landings on GOM trips without greater amberjack (lbs gutted wt)
2009	320	1,148	477,778	3,064,904	3,909	7,975,844
2010	222	634	472,090	1,617,077	2,379	5,484,925
2011	191	524	445,027	1,155,942	3,030	6,686,227
2012	142	314	270,223	692,299	2,458	5,698,505
2013	179	489	346,442	1,146,752	2,593	6,984,252
Average	211	622	402,312	1,535,395	2,874	6,565,951

Source: NMFS SEFSC Coastal Fisheries Logbook.

Ex-vessel revenues by year for greater amberjack and non-greater amberjack species are presented in Table 3.3.2. On average (2009 through 2013), greater amberjack revenues accounted for about 1.9% of total revenues earned by vessels that landed at least one pound of greater amberjack. On trips in which greater amberjack was harvested (2009 through 2013), species other than greater amberjack accounted for the majority of revenues on average. Total dockside revenue for vessels that landed greater amberjack fluctuated from 2009 through 2013 but did not change that much overall, whereas average total dockside revenue per vessel increased steadily.

Table 3.3.2. Number of vessels and ex-vessel revenues by year (2013 dollars)*.

Year	Number of vessels that caught GOM greater amberjack (> 0 lbs)	Dockside revenue from GOM greater amberjack only	Dockside revenue from 'other species' jointly caught with GOM greater amberjack only	Dockside revenue from 'other species' caught on GOM trips without greater amberjack	Total dockside revenue	Average total dockside revenue per vessel
2009	320	$599,315	$8,680,032	$22,974,684	$32,254,031	$100,794
2010	222	$545,065	$5,121,735	$17,469,806	$23,136,606	$104,219
2011	191	$559,961	$3,599,690	$20,876,537	$25,036,187	$131,080
2012	142	$337,302	$2,141,370	$18,128,951	$20,607,623	$145,124
2013	179	$510,558	$4,128,833	$25,410,189	$30,049,580	$167,875
Average	211	$510,440	$4,734,332	$20,972,033	$26,216,806	$129,818

Source: NMFS SEFSC Coastal Fisheries Logbook for landings and NMFS Accumulated Landings System for prices.
*Revenues converted to 2013 dollars using the 2013 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS).

Given the only commercial management measure being considered in this framework action is a trip limit, it's useful to analyze the amount of recent effort and the number of vessels that would have been non-compliant had each proposed trip limit Alternative been in place historically. This provides empirical estimates of the proportion of total effort and vessels likely to be affected by the commercial trip limits if the revised trip limit is implemented. Table 3.3.3 presents the average number of trips with landings in excess of each trip limit Alternative and average number of vessels that took such trips (2009-2013)[1]. About 14% of greater amberjack trips on average had landings in excess of the 1,500-lb trip limit. 28% of those trips had greater amberjack landings in excess of the 500-lb trip limit Alternative from 2009 through 2013. Fifteen percent of greater amberjack vessels reported landings in excess of the 1,500-lb trip limit

[1] The status quo 2,000-lb trip limit implemented in 2013 is excluded from this table since averaging across years with non-consistent trip limits could be misleading and since it does not provide additional information in terms of potential displaced effort. About 11% of GAJ vessels, however, did report trip-level landings in excess of the 2000-lb trip limit in 2013. These trips accounted for 8% of all GAJ trips taken in 2013. Anecdotal evidence suggests many fishermen misinterpreted the trip limit as being in gutted weight rather than whole weight. The data supports this as well, showing a large drop in non-compliant vessels and trips when gutted weight is substituted for whole weight (19 vessels to 8 vessels and 38 trips to 10 trips respectively). NMFS released a bulletin on July 29, 2014 that reminded commercial reef fish fishermen that the trip limit is in whole weight and provided the gutted weight conversion.

Alternative and 31% of greater amberjack vessels reported landings in excess of the 500-lb trip limit on average (2009-2013). Lower trip limits may reduce profits and the severity of such impacts will be based on the overall dependence a vessel has on greater amberjack and the vessel's ability to substitute other species revenue. On average (2009-2013), there were three (3) or fewer vessels that both derived the majority of their revenues from greater amberjack and took a trip with landings in excess of each trip limit Alternative. It seems likely that these vessels would be the most severely impacted by a reduction in trip limits, though it is not possible to quantify the magnitude of such impacts given the uncertainty of future revenues, costs and behavioral responses of the fishermen. If trip limits successfully extend the greater amberjack season, some vessels, especially those that do not experience large reductions in their trip-level landings, may benefit from the opportunity to take additional trips. Other vessels may experience a decline in trip-level revenues to the point where it is no longer profitable to fish for greater amberjack.

Table 3.3.3. Number of trips with landings in excess of each trip limit Alternative and number of vessels that took such trips (2009-2013 Average).

	Trip Limit (lbs, ww)		
	500	**1,000**	**1,500**
Number of trips with greater amberjack landings in excess of each trip limit Alternative	176	115	87
(percent of total greater amberjack trips)	(28%)	(18%)	(14%)
Number of vessels that took a trip with greater amberjack landings in excess of each trip limit Alternative	66	41	32
(percent of total greater amberjack vessels)	(31%)	(20%)	(15%)

Source: NMFS SEFSC Coastal Fisheries Logbook.

Imports

Imports of seafood products compete in the domestic seafood market and have in fact dominated many segments of the seafood market. Imports aid in determining the price for domestic seafood products and tend to set the price in the dominant market segments.. Seafood imports have downstream effects on the local fish market. At the harvest level for reef fish in general and greater amberjack in particular, imports affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production of reef fish, including greater amberjack, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings. The following describes the imports of fish products which directly compete with domestic harvest of reef fish, including greater amberjack.

Imports[2] of fresh snapper ranged from 21.5 million pounds product weight (pw) in 2009 to 23.2 million pounds pw in 2013 with minor fluctuations in between. Total revenue from fresh snapper imports increased steadily from $53.6 million (2013 dollars[3]) in 2009 to a five-year high of $67.9 million in 2013. Imports of fresh snappers primarily originated in Mexico, Central America, or South America, and entered the U.S. through the port of Miami. Imports of fresh snapper were highest on average (2009 through 2013) during the months March through May.

Imports of frozen snapper were substantially less than imports of fresh snapper from 2009 through 2013. The annual value of frozen snapper imports ranged from $17.2 million (2013 dollars) to $26.7 million during the time period, with a peak in 2011. Imports of frozen snapper primarily originated in South America (especially Brazil), Indonesia, and Mexico. The majority of frozen snapper imports entered the U.S. through the ports of Miami and New York. Imports of frozen snappers tended to be lowest during March, April and May when fresh snapper imports were the highest.

Imports of fresh grouper ranged from 8.3 million pounds pw worth $23.7 million (2013 dollars) in 2009 to 10 million pounds pw worth $36.2 million in 2013 with minor fluctuations in between. The bulk of fresh grouper imports originated in Mexico and entered the U.S. through Miami. From 2009 through 2013 fresh grouper imports were lowest on average during the month of March and higher the rest of the year, with a peak in July.

Imports of frozen grouper were minimal and stable from 2009 through 2013, ranging from 1 million pounds pw worth $2.1 million (2013 dollars) to 2 million pounds pw worth $3.5 million. Frozen grouper imports generally originated in Mexico and to a lesser extent, Asia and entered the U.S. through Miami and Tampa. There was an inverse relationship in monthly landings between frozen and fresh groupers, with average imports being the highest in March for frozen grouper and lower during other months.

Business Activity

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

[2] NOAA Fisheries Service purchases fisheries trade data from the Foreign Trade Division of the U.S. Census Bureau. Data are available for download at http://www.st.nmfs.noaa.gov/st1/trade/index.html.
[3] Converted to 2013 dollars using the 2013 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS).

Estimates of the U.S. average annual business activity associated with the commercial harvest of greater amberjack, and all species harvested by the vessels that harvested these greater amberjack, were derived using the model developed for and applied in NMFS (2011) and are provided in Table 3.3.4. This business activity is characterized as full-time equivalent jobs, income impacts (wages, salaries, and self-employed income), and output (sales) impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting. It should be noted that the results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models to address individual species are not available. For example, the results provided here apply to a general reef fish category rather than just greater amberjack, and a harvester job is "generated" for approximately every $44,000 in ex-vessel revenue. These results contrast with the information provided in Section 3.3.1. which shows an average of 211 harvesters (vessels) with recorded landings of greater amberjack.

Table 3.3.4. Average annual business activity (2009 through 2013) associated with the commercial harvest of greater amberjack and the harvest of all species by vessels that landed greater amberjack. All monetary estimates are in 2013 dollars.

Species	Average Ex-vessel Value ($ thousands)	Total Jobs	Harvester Jobs	Output (Sales) Impacts ($ thousands)	Income Impacts ($ thousands)
Greater amberjack	$510	89	12	$6,721	$2,864
All species on all trips made by vessels that landed greater than one pound of greater amberjack in a year.	$26,217	4,566	596	$345,184	$147,114

3.3.2 Economic Description of the Recreational Sector

The Gulf recreational sector is comprised of the private and for-hire modes. The private mode includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire mode is composed of charter boats and headboats (also called partyboats). Charter boats generally carry fewer passengers and charge a fee on an entire vessel basis, whereas headboats carry more passengers and payment is per person. The type of service, from a vessel- or passenger-size perspective, affects the flexibility to search different fishing locations during the course of a trip and target different species since larger concentrations of fish are required to satisfy larger groups of anglers.

Landings

The recreational sector has been allocated 73% of the greater amberjack stock ACL each year since the implementation of Amendment 30A in August 2008 (GMFMC 2008). Recreational harvests of greater amberjack declined from 2009 through 2011 and increased from 2011 to a five-year high in 2013 (Table 3.3.5.).

Table 3.3.5. Recreational landings (lbs ww) and percent distribution of greater amberjack and reef fish, 2009 - 2013.

	Greater Amberjack (pounds ww)	Reef Fish (pounds ww)	Percent of Reef Fish*
2009	1,480,306	12,866,823	11.5%
2010	1,225,222	8,472,155	14.5%
2011	949,999	9,938,318	9.6%
2012	1,238,719	13,099,518	9.5%
2013	1,616,629	20,379,130	7.9%
Average	1,302,175	12,951,189	10.1%

Source: SEFSC MRIP ACL datasets (Aug 2014).
* Species managed under the Reef Fish FMP; see http://www.gulfcouncil.org/.

From 2009 through 2013, recreational landings of greater amberjack in west Florida were consistently higher than landings in any other state, accounting for over 75% of total Gulf-wide landings on average (Table 3.3.2. 2). Yearly landings fluctuated for all states.

Table 3.3.6. Recreational landings (lbs ww) and percent distribution of greater amberjack across all modes, by state, 2009 - 2013.

	AL	AL/FLW*	FLW	LA	LA/MS**	MS	TX
	Landings (pounds ww)						
2009	43,661	57,566	950,852	359,595	27,246	20,344	21,043
2010	85,833	33,860	1,002,601	78,238	2,485	0	22,205
2011	64,394	39,201	810,525	9,253	7,986	0	18,640
2012	58,005	66,054	924,292	151,875	10,390	0	28,103
2013	216,865	0	1,172,107	178,308	7,262	12,358	29,729
Avg	93,752	39,336	972,075	155,454	11,074	6,540	23,944
	Percent Distributions						
2009	2.9%	3.9%	64.2%	24.3%	1.8%	1.4%	1.4%
2010	7.0%	2.8%	81.8%	6.4%	0.2%	0.0%	1.8%
2011	6.8%	4.1%	85.3%	1.0%	0.8%	0.0%	2.0%
2012	4.7%	5.3%	74.6%	12.3%	0.8%	0.0%	2.3%
2013	13.4%	0.0%	72.5%	11.0%	0.4%	0.8%	1.8%
Avg	7.0%	3.2%	75.7%	11.0%	0.8%	0.4%	1.9%

Source: SEFSC MRIP ACL datasets (Aug 2014).
* Headboat landings are estimated jointly for west Florida and Alabama through 2012.
** Heaboat landings data from Louisiana and Mississippi are combined for confidentiality purposes.

The majority of recreational greater amberjack landings (93.9%) from 2009 through 2013 were reported by the private and charter vessel modes (Table 3.3.7). During this time period, average landings were about 15% higher for private vessels than charter vessels. Charter landings were, however, almost double those of the private mode in 2011. Headboat landings were consistently much lower than both charter and private modes, accounting for only 6.1% on average (2009 through 2013). There were no landings reported from shore for greater amberjack.

Table 3.3.7. Recreational landings (lbs ww) and percent distribution of greater amberjack across all states, by mode, 2009 - 2013.

	Landings (pounds ww)				Percent Distribution			
	Charter boat	**Headboat**	**Private**	**Shore**	**Charter boat**	**Headboat**	**Private**	**Shore**
2009	653,160	103,191	723,955	0	44.1%	7.0%	48.9%	0.0%
2010	460,740	53,203	711,279	0	37.6%	4.3%	58.1%	0.0%
2011	583,813	62,835	303,351	0	61.5%	6.6%	31.9%	0.0%
2012	546,086	99,680	592,952	0	44.1%	8.0%	47.9%	0.0%
2013	604,626	73,246	938,757	0	37.4%	4.5%	58.1%	0.0%
Avg	569,685	78,431	654,059	0	44.9%	6.1%	49.0%	0.0%

Source: SEFSC MRIP ACL datasets (Aug 2014).

As seen in Table 3.3.8, over the period 2009-2013, greater amberjack recreational landings generally started low at the beginning of each year, peaked in May through August, then tapered back down till the end of the year. Prior to the implementation of the June through July seasonal closure beginning in 2011, the majority of landings occurred during May through August. Following the implementation of the seasonal closure in 2011, the distribution of monthly landings changed somewhat, with a higher average percentage of annual landings occurring in March, April, September, and October.

Table 3.3.8. Recreational landings (lbs ww) and percent distribution of greater amberjack, by month, 2009-2013.

	Jan	Feb	Mar	Apr	May	Jun*	Jul*	Aug	Sep	Oct	Nov	Dec
	Landings (pounds ww)											
2009	95,126	85,920	40,854	39,536	339,464	328,513	230,162	230,162	44,466	45,948	77	79
2010	36,884	33,314	139,968	135,452	268,592	259,928	44,175	44,175	96,715	99,938	32,123	33,194
2011	32,421	29,283	52,927	51,220	196,240	-	-	247,109	144,619	149,440	22,987	23,753
2012	63,811	59,694	197,159	190,799	236,256	-	-	165,023	97,960	101,225	62,356	64,435
2013	15,284	13,805	199,921	193,472	293,793	-	-	404,001	225,802	233,328	18,306	18,916
Avg	48,705	44,403	126,166	122,096	266,869	NA**	NA**	218,094	121,912	125,976	27,170	28,075
	Percent Distribution											
2009	6.4%	5.8%	2.8%	2.7%	22.9%	22.2%	15.5%	15.5%	3.0%	3.1%	0.0%	0.0%
2010	3.0%	2.7%	11.4%	11.1%	21.9%	21.2%	3.6%	3.6%	7.9%	8.2%	2.6%	2.7%
2011	3.4%	3.1%	5.6%	5.4%	20.7%	-	-	26.0%	15.2%	15.7%	2.4%	2.5%
2012	5.2%	4.8%	15.9%	15.4%	19.1%	-	-	13.3%	7.9%	8.2%	5.0%	5.2%
2013	0.9%	0.9%	12.4%	12.0%	18.2%	-	-	25.0%	14.0%	14.4%	1.1%	1.2%
Avg	3.8%	3.5%	9.6%	9.3%	20.6%	NA**	NA**	16.7%	9.6%	9.9%	2.2%	2.3%

Source: SEFSC MRIP ACL datasets (Aug 2014).
Note: Landings in each wave are assumed uniformly distributed across open months.
*A June 1st through July 31 closure was implemented in 2011.
** Averages for June and July are not applicable due to the closures. The average percent distribution row will not sum to 100% as a result.

Angler Effort

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

- Target effort - The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or the second primary target for the trip. The species did not have to be caught.

- Catch effort - The number of individual angler trips, regardless of duration and target intent, where the individual species or a species in the species group was caught. The fish did not have to be kept.
- Total recreational trips - The total estimated number of recreational trips in the Gulf, regardless of target intent or catch success.

A target trip may be considered an angler's revealed preference for a certain species, and thus may carry more relevant information when assessing the economic effects of regulations on the subject species than the other two measures of recreational effort. Given the subject nature of this amendment, the following discussion focuses on target trips for greater amberjack.

On average, greater amberjack target trips[4] accounted for 3.3% of target reef fish trips and target reef fish trips accounted for 5.6% of total angler trips for the years 2009 through 2013 in the Gulf (Table 3.3.9). This excludes headboat trips and trips from Texas, for which target data is unavailable. Both greater amberjack and reef fish target trips were at five-year highs in 2013 following a period of reduced effort starting in 2010. The reduction in effort in 2010 could be due in part to the Deepwater Horizon oil spill and associated closures (see Section 3.2.1). There is a subtle downward trend from 2009 through 2013 in the percent of reef fish target trips made up of greater amberjack target trips.

Table 3.3.9. Target trips for greater amberjack and reef fish, 2009 -2013.

	Greater Amberjack Target Trips*		**Reef Fish Target Trips***	
	Trips	**Percent[1]**	**Trips**	**Percent[2]**
2009	48,972	3.6%	1,351,092	6.0%
2010	31,195	3.4%	906,060	4.4%
2011	36,208	3.8%	958,092	4.3%
2012	35,222	3.2%	1,112,276	4.9%
2013	50,719	2.5%	2,053,975	8.2%
Average	40,463	3.3%	1,276,299	5.6%

Source: MRIP database, NOAA Fisheries, NMFS, SERO.
* Target data for headboats and the state of Texas are unavailable and are not included.
[1]Percent of reef fish target trips. [2]Percent of total angler trips.

On average, the highest number of estimated greater amberjack target trips for the Gulf occurred in Florida (81.3%), followed by Alabama (10.7%) and Louisiana (7.7%) (Table 3.3.10). Mississippi recorded greater amberjack target effort in 2009, but not in subsequent years. The number of target trips in Florida decreased substantially in 2010, increased gradually from 2010

[4] Monroe County, FL is excluded from all target effort metrics to be consistent with greater amberjack landings post-stratification. This potentially underestimates total reef fish target effort in the Gulf, since not all species in the reef fish complex require post-stratification.

through 2012 and then rose quickly in 2013 to a five-year high. Target effort in Alabama fluctuated with a peak in 2011. The number of target trips in Louisiana dropped drastically in 2010 and 2011, then increased heavily in 2012 and 2013, but did not return to 2009 levels. As discussed earlier, it may be likely that the severe declines in target effort in Louisiana during 2010 and 2011 were due in part to the 2010 oil spill. The potential impact of the oil spill is not, however, apparent for Alabama, which experienced increases in the number of estimated target trips in 2010 and 2011.

Table 3.3.10. Greater amberjack target trips and percent distribution across all modes by state, 2009 - 2013.

	Greater Amberjack Target Trips*				Percent Distribution			
	AL	FLW	LA	MS	AL	FLW	LA	MS
2009	1,838	38,053	8,437	644	3.8%	77.7%	17.2%	1.3%
2010	3,758	26,466	970	-	12.0%	84.8%	3.1%	0.0%
2011	7,874	28,148	186	-	21.7%	77.7%	0.5%	0.0%
2012	2,341	30,229	2,652	-	6.6%	85.8%	7.5%	0.0%
2013	4,748	40,820	5,152	-	9.4%	80.5%	10.2%	0.0%
Average	4,112	32,743	3,479	129	10.7%	81.3%	7.7%	0.3%

Source: MRIP database, NOAA Fisheries, NMFS, SERO.
* Target data for headboats and the state of Texas are unavailable and are not included.

On average, approximately 75% of the estimated target trips for greater amberjack were recorded by anglers in private boats and the rest, by charter vessels (Table 3.3.11). No greater amberjack target trips were recorded by the shore-mode anglers. The number of private angler target trips decreased annually to a five-year low in 2011, then increased annually through 2013, almost returning to 2009 levels. The estimated number of target trips for charter anglers fluctuated with a peak in 2011.

Table 3.3.11. Greater amberjack target trips and percent distribution across all states, 2009 - 2013.

	Greater Amberjack Target Trips*			Percent Distribution		
	Shore	Charter	Private	Shore	Charter	Private
2009	0	8,294	40,679	0.0%	16.9%	83.1%
2010	0	5,534	25,661	0.0%	17.7%	82.3%
2011	0	15,165	21,043	0.0%	41.9%	58.1%
2012	0	9,427	25,795	0.0%	26.8%	73.2%
2013	0	11,168	39,551	0.0%	22.0%	78.0%
Average	0	9,918	30,546	0.0%	25.1%	74.9%

Source: MRIP database, NOAA Fisheries, NMFS, SERO.
* Target data for headboats and the state of Texas are unavailable and are not included.

On average, target effort for greater amberjack was concentrated most heavily in the months March through May and August through September (Table 3.3.12). Target effort was low or

zero in June and July following the implementation of the seasonal closure in 2011. The monthly distribution of target effort generally coincided with the monthly distribution of landings.

Table 3.3.12. Greater amberjack target trips and percent distribution across all modes and states, by month, 2009 - 2013.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Greater Amberjack Target Trips*											
2009	772	7,062	809	7,275	4,584	19,461	4,819	2,165	1445	0	580	0
2010	0	1810	5,437	150	9,974	342	2,007	888	3,214	3,653	3,721	0
2011	0	0	1,737	2,785	5,501	0	0	14,653	7447	1409	0	2,675
2012	1,851	262	5,107	9,337	3,032	441	0	8,205	1,862	1,103	1309	2712
2013	50	3,363	13,497	0	11,986	0	1,348	9,263	6,683	1,478	1,241	1,811
Avg	535	2,499	5,317	3,909	7,015	4,049	1,635	7,035	4,130	1,529	1,370	1,440
	Percent Distribution											
2009	1.6%	14.4%	1.7%	14.9%	9.4%	39.7%	9.8%	4.4%	3.0%	0.0%	1.2%	0.0%
2010	0.0%	5.8%	17.4%	0.5%	32.0%	1.1%	6.4%	2.8%	10.3%	11.7%	11.9%	0.0%
2011	0.0%	0.0%	4.8%	7.7%	15.2%	0.0%	0.0%	40.5%	20.6%	3.9%	0.0%	7.4%
2012	5.3%	0.7%	14.5%	26.5%	8.6%	1.3%	0.0%	23.3%	5.3%	3.1%	3.7%	7.7%
2013	0.1%	6.6%	26.6%	0.0%	23.6%	0.0%	2.7%	18.3%	13.2%	2.9%	2.4%	3.6%
Avg	1.4%	5.5%	13.0%	9.9%	17.8%	8.4%	3.8%	17.9%	10.5%	4.3%	3.9%	3.7%

Source: MRIP database, NOAA Fisheries, NMFS, SERO.
* Target data for headboats and the state of Texas are unavailable and are not included.
Note: There are some target trips shown during the June through July closure implemented in 2011. This is likely due to a small number of intercepted angler trips with high sample weights that either targeted greater amberjack for catch and release purposes or mistakenly reported greater amberjack as one of their primary targets.

Similar analysis of recreational effort is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the number of standardized 12-hour fishing days that account for the different half-, three-quarter-, and full-day fishing trips by headboats. The stationary "fishing for demersal species" nature of headboat fishing, as opposed to trolling, suggests that most, if not all, headboat trips and, hence, angler days, are demersal or reef fish trips by intent. In a study of the for-hire fishing industry in the Gulf, Sutton et al. (1999) found that the mean percentage of

time spent targeting greater amberjack for the entire year for all party boat (headboat) operators in the Gulf was 5.10%[5].

The distribution of headboat effort (angler days) by geographic area is presented in Table 3.3.13. For purposes of data collection, the headboat data collection program divides the Gulf into several areas. In Table 3.3.13, FLW refers to areas in Florida from the Dry Tortugas through the Florida Middle Grounds, FL-AL covers northwest Florida and Alabama, MS refers to the entire coastline of Mississippi, LA refers to the entire coastline of Louisiana, and TX includes areas in Texas from Sabine Pass-Freeport south to Port Isabel. On average, the area from the Dry Tortugas through the Florida Middle Grounds accounted for 40.2% of total headboat angler days in the Gulf, followed by northwest Florida through Alabama (33.2%), Texas (25.2%), Louisiana (<1%) and Mississippi (<1%). Western Florida, Northwest Florida through Alabama, and Texas all experienced declines in angler days in 2010, but then saw steady increases to five-year highs in 2013. In Louisiana, the number of headboat angler days dropped precipitously in 2010, increased in 2011, but then decreased again in 2012 and 2013. In Mississippi, the number of angler days increased substantially in 2011 and then remained mostly stable through 2013.

Table 3.3.13. Headboat angler days and percent distribution, by state, 2009 - 2013.

	Angler Days					Percent Distribution				
	FLW	**FL-AL***	**LA**	**TX**	**MS****	**FLW**	**FL-AL**	**LA**	**TX**	**MS**
2009	76,815	65,623	3268	50,737	-	39.1%	33.4%	1.7%	25.8%	-
2010	70,424	40,594	217	47,154	498	44.3%	25.5%	0.1%	29.7%	0.3%
2011	79,722	77,303	1,886	47,284	1,771	38.3%	37.2%	0.9%	22.7%	0.9%
2012	84,205	77,770	1,839	51,776	1,841	38.7%	35.8%	0.8%	23.8%	0.8%
2013	94,752	80,048	1,579	55,749	1,827	40.5%	34.2%	0.7%	23.8%	0.8%
Average	81,184	68,268	1,758	50,540	1,484	40.2%	33.2%	0.8%	25.2%	0.7%

Source: NMFS Southeast Region Headboat Survey (SRHS).
*For 2013, SRHS data was reported separately for NW Florida and Alabama, but has been combined here for consistency with previous years.
** No headboats in Mississippi were included in the SRHS in 2009.

Headboat effort in terms of angler days for the entire Gulf was concentrated most heavily during the summer months of June through August on average (2009 through 2013) (Table 3.3.14). The monthly trend in angler days was very similar across years, building gradually from January through May, rising sharply to a peak in June and July, dropping rapidly through September, increasing slightly in October, then tapering through December.

[5] No newer studies have been identified which discuss greater amberjack targeting behavior of headboats in the Gulf.

Table 3.3.14. Headboat angler days and percent distribution, by month, 2009 - 2013.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Headboat Angler Days											
2009	7,611	8,525	14,444	15,513	17,089	36,749	38,955	25,060	9,201	9,745	6,889	6,662
2010	4,962	5,709	13,186	18,077	14,029	26,495	22,616	14,378	8,759	16,328	9,488	4,860
2011	5,242	9,174	16,378	17,626	16,148	39,775	42,089	22,513	10,766	12,609	8,514	7,132
2012	7,924	9,364	18,326	16,404	17,708	39,662	46,468	21,440	12,629	13,281	7,135	7,090
2013	8,630	9,576	16,759	16,426	17,150	47,791	38,304	27,610	12,697	21,256	8,654	9,102
Avg	6,874	8,470	15,819	16,809	16,425	38,094	37,686	22,200	10,810	14,644	8,136	6,969
	Percent Distribution											
2009	3.9%	4.3%	7.4%	7.9%	8.7%	18.7%	19.8%	12.8%	4.7%	5.0%	3.5%	3.4%
2010	3.1%	3.6%	8.3%	11.4%	8.8%	16.7%	14.2%	9.0%	5.5%	10.3%	6.0%	3.1%
2011	2.5%	4.4%	7.9%	8.5%	7.8%	19.1%	20.2%	10.8%	5.2%	6.1%	4.1%	3.4%
2012	3.6%	4.3%	8.4%	7.5%	8.1%	18.2%	21.4%	9.9%	5.8%	6.1%	3.3%	3.3%
2013	3.7%	4.1%	7.2%	7.0%	7.3%	20.4%	16.4%	11.8%	5.4%	9.1%	3.7%	3.9%
Avg	3.4%	4.1%	7.8%	8.5%	8.2%	18.6%	18.4%	10.9%	5.3%	7.3%	4.1%	3.4%

Source: NMFS Southeast Region Headboat Survey (SRHS).

Permits

For-hire vessels are required to have a Charter/Headboat for Reef Fish permit (for-hire permit) to fish for or possess reef fish species in the Gulf EEZ (a similar, but separate, permit is required for coastal migratory pelagic species). This sector is currently under a permit limitation program since June, 2006. On September 22, 2014, there were 1,195 valid (non-expired) or renewable[6] Gulf for-hire permits.

For 2009 through 2013, an average of 1,364 for-hire vessels were permitted to harvest reef fish in the Gulf (Table 3.3.15). Florida, with an average of 819 permitted vessels, was the foremost homeport state of for-hire vessels, followed by Texas (222), Alabama (147), Louisiana (111), and Mississippi (48). An average of 17 vessels had homeports in states outside the Gulf.

[6] A renewable permit is an expired permit that may not be actively fished, but is renewable for up to one year after expiration.

The total number of Gulf reef fish for-hire permits steadily declined from 2009 through 2013 (Table 3.3.15). Florida was the driving force behind this trend, though there were similar trends in Mississippi, Texas, and all non-Gulf states combined. Alabama and Louisiana saw modest increases in the number of for-hire permitted vessels during the time period.

Table 3.3.15. Number of vessels with a Gulf for-hire permit by homeport state, 2009- 2013.

	FL	AL	MS	LA	TX	OTHERS	TOTAL
2009	871	143	50	103	232	18	1,417
2010	840	142	50	103	229	21	1,385
2011	810	143	48	116	219	17	1,353
2012	792	151	46	116	214	17	1,336
2013	783	155	45	115	215	14	1,327
Average	819	147	48	111	222	17	1364

Source: Southeast Permits Database, NOAA Fisheries, SERO.

Based on permits data alone, it is not possible to distinguish headboats from charter boats, but the 2013 headboat survey program included 70 headboats in the Gulf. The majority of headboats were located in Florida (37), followed by Texas (16), Alabama (9), Mississippi (5), and Louisiana (3) (K. Brennen, NMFS SEFSC, pers. comm.)[7].

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

Economic Value

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The monetary value of this satisfaction is referred to as consumer surplus (CS). The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips. Haab et al. (2012) estimated the CS (willingness to pay (WTP) per fish) for snapper in the Southeastern U.S. using four separate econometric modeling techniques. The finite mixture model, which takes into account variation in the preferences of fishermen, had the best prediction rates of the four models and as such was selected for this analysis[8]. The WTP

[7] Sixty-seven vessels were registered in the SHRS as of April 8, 2014.

[8] Haab et al. (2012) did not explicitly account for endogenous stratification and avidity bias in the MRFSS data which could potentially inflate the estimates. The WTP estimates from the four models used in their study ranged from $9-$25 (2000 dollars) and the one that was selected for use here was at the bottom of the range, so the bias may not be that big of an issue. In addition, given its popularity as a sport fish, greater amberjack may be more valuable to anglers than many of the other snapper species included in the model.

per snapper estimated by this model is $12.18 (2013 dollars)[9]. Although this estimate is not specific to greater amberjack, their study did include the amberjack genus as part of the snapper group. This value may seem low and may be strongly influenced by the pooling effect inherent to the model in which it was estimated. For comparison purposes, the estimated value of the consumer surplus for catching and keeping a second grouper on an angler trip is approximately $102 (values updated to 2013 dollars), and decreases thereafter (approximately $68 for a third grouper, $50 for a fourth grouper, and $39 for a fifth grouper) (Carter and Liese 2012). Values by specific grouper species are not available.

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

While anglers receive economic value as measured by the CS associated with fishing, for-hire businesses receive value from the services they provide. Producer surplus (PS) is the measure of the economic value these operations receive. The PS is the difference between the revenue a business receives for a good or service, such as a charter or headboat trip, and the cost the business incurs to provide that good or service. Estimates of the PS associated with for-hire trips are not available. However, proxy values in the form of net operating revenues (NOR)[10] were generated for the charter and headboat operations. The estimated NOR values are $158.06 (2013 dollars) per charter angler trip and $51.96 (2013 dollars) per headboat angler trip (D. Carter and C. Liese, NMFS SEFSC, pers. comm.) [11].

Business Activity

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

Estimates of the business activity (economic impacts) associated with recreational angling for greater amberjack were derived using average impact coefficients for recreational angling for all species, as derived from an add-on survey to the MRFSS to collect economic expenditure information, as described and utilized in NMFS (2011). Estimates of the average expenditures

[9] Converted to 2013 dollars using the 2013 annual Consumer Price Index (CPI) for all US urban consumers provided by the Bureau of Labor and Statistics (BLS).
[10] Net operating revenues are trip revenues minus trip-based variable costs and do not include fixed costs. These represent the total returns used to pay all labor wages, returns to capital, and owner profits.
[11] Estimates were converted to 2013 dollars using the 2013 June CPI for all US urban consumers provided by the BLS.

by recreational anglers are also provided in NMFS (2011) and are incorporated herein by reference.

Recreational fishing generates business activity (economic impacts). Business activity for the recreational sector is characterized in the form of full-time equivalent jobs, output (sales) impacts (gross business sales), and value-added impacts (difference between the value of goods and the cost of materials or supplies). Estimates of the average greater amberjack target effort (2009-2013) and associated business activity (2013 dollars) are provided in Table 3.3.16. The average impact coefficients, or multipliers, used in the model are invariant to the "type" of effort and can therefore be directly used to measure the impact of other effort measures such as greater amberjack catch trips. To calculate the multipliers from Table 3.3.16, simply divide the desired impact measure (output impact, value-added impact, or jobs) associated with a given state and mode by the number of target trips for that state and mode.

The estimates provided in Table 3.3.16 only apply at the state-level. These numbers should not be added across the region. Addition of the state-level estimates to produce a regional (or national) total could either under- or over-estimate the actual amount of total business activity because of the complex relationship between different jurisdictions and the expenditure/impact multipliers. Neither regional nor national estimates are available at this time.

Florida clearly received the greatest level of economic impact from greater amberjack in comparison to the other Gulf states, which is not surprising given the majority of greater amberjack target trips are estimated to be taken by Florida anglers (Table 3.3.16). Although not shown in Table 3.3.16, Florida also had the highest multipliers for all impact measures associated with the charter mode. Louisiana had the highest multipliers for output impact and value-added impact for the private angler mode and was tied with Alabama for the highest jobs impact multiplier for the private angler mode.

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

Table 3.3.16. Summary of greater amberjack target trips (2009-2013 average) and associated business activity (2013 dollars). Output and value added impacts are not additive.

	Alabama	West Florida	Louisiana	Mississippi	Texas
	Shore Mode				
Target Trips	0	0	0	0	*
Output Impact	$0	$0	$0	$0	*
Value Added Impact	$0	$0	$0	$0	*
Jobs	0	0	0	0	*
	Private/Rental Mode				
Target Trips	3,098	24,401	2,918	129	*
Output Impact	$167,403	$1,319,539	$220,547	$4,533	*
Value Added Impact	$90,593	$747,195	$105,982	$2,306	*
Jobs	2	11	2	0	*
	Charter Mode				
Target Trips	1,014	8,342	561	0	*
Output Impact	$648,122	$6,117,419	$271,425	$0	*
Value Added Impact	$443,540	$4,089,823	$186,638	$0	*
Jobs	6	54	2	0	*
	All Modes				
Target Trips	4,112	32,743	3,479	129	*
Output Impact	$815,525	$7,436,958	$491,972	$4,533	*
Value Added Impact	$534,133	$4,837,018	$292,619	$2,306	*
Jobs	8	65	4	0	*

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

3.4 Description of the Social Environment

A description of the social environment including analysis of communities engaged in reef fish fishing, was provided in Amendment 35 (GMFMC 2012) and is incorporated here by reference. This section provides a summary of that information and is updated where possible.

Greater amberjack is fished throughout the Gulf although landings are greatest in Florida. The majority of greater amberjack is landed by the recreational sector (72.4% from 2002 – 2013 with a range of 59.6% to 80.1%) and 27.6% is landed by the commercial sector (range of 19.9% to 40.4% from 2002 - 2013, Table 1.1.1). For the purpose of setting quotas, the Council selected an interim allocation at 73% recreational: 27% commercial in Amendment 30A (GMFMC 2008). The low commercial value and one fish recreational bag limit likely restricts greater amberjack from being a directed fishery. Rather than directed fishing trips, greater amberjack is an important component to a multi-species fishery for both commercial and recreational fishermen. Because of this multi-species fishing practice, it is difficult to discuss greater amberjack fishing separate from its broader context within commercial and recreational fishing for reef fish.

3.4.1 Fishing Communities

Recreational Fishing Communities

The available information concerning targeted trips within the recreational sector (private and for-hire vessels) shows that only a small proportion of recreational trips target greater amberjack. Excluding headboats and Texas, for which target data are not available, on average, 3.3% of all reef fish trips target greater amberjack, and on average, 5.6% of all private angler trips target reef fish, generally (Table 3.3.9). The low proportion of trips directed at catching greater amberjack is due in part to the one fish bag limit and 30 inch fork length minimum size limit. Because of their large size, greater amberjack is often a trip's trophy catch, making it an important part to a multi-species fishing trip. Greater amberjack is also an important component in recreational tournaments.

By state, the majority of greater amberjack caught by recreational anglers is landed in Florida, followed by Louisiana, Alabama, Texas, and Mississippi (Table 3.3.6). By mode, anglers fishing from private vessels represent on average 49% of the recreational landings, followed closely by charter boats (44.9%); headboats represent on average 6.1% of the recreational landings (Table 3.3.7). Landings for the recreational sector are not available by species at the community level; therefore, it is difficult to identify communities as dependent on recreational fishing for greater amberjack.

Because limited data are available concerning how recreational fishing communities are engaged and reliant on specific species, a set of indices were created using secondary data from permit and infrastructure information for the southeast recreational fishing sector at the community level (Jepson and Colburn 2013; Jacob et al. 2013). Using a principal component and single solution factor analysis, each community receives a factor score for each index to compare to other communities. With a selected group of communities that may have greater amberjack fishing activity, factor scores of both engagement and reliance were plotted onto bar graphs. Factor

scores are denoted by colored bars and are standardized, therefore the mean is zero. Two thresholds of one and ½ standard deviation above the mean are plotted onto the graphs to help determine a threshold for significance. Figure 3.4.1 identifies the recreational communities that are engaged and reliant upon fishing in general. Using thresholds of fishing dependence of ½ standard deviation and one standard deviation, Figure 3.4.1 suggests that several communities are substantially engaged in recreational fishing. Because the analysis used discrete geo-political boundaries, Panama City and Panama City Beach had separate values for the associated variables. Calculated independently, each still ranked high enough to appear in the top 16 list suggesting a greater importance for recreational fishing in that area.

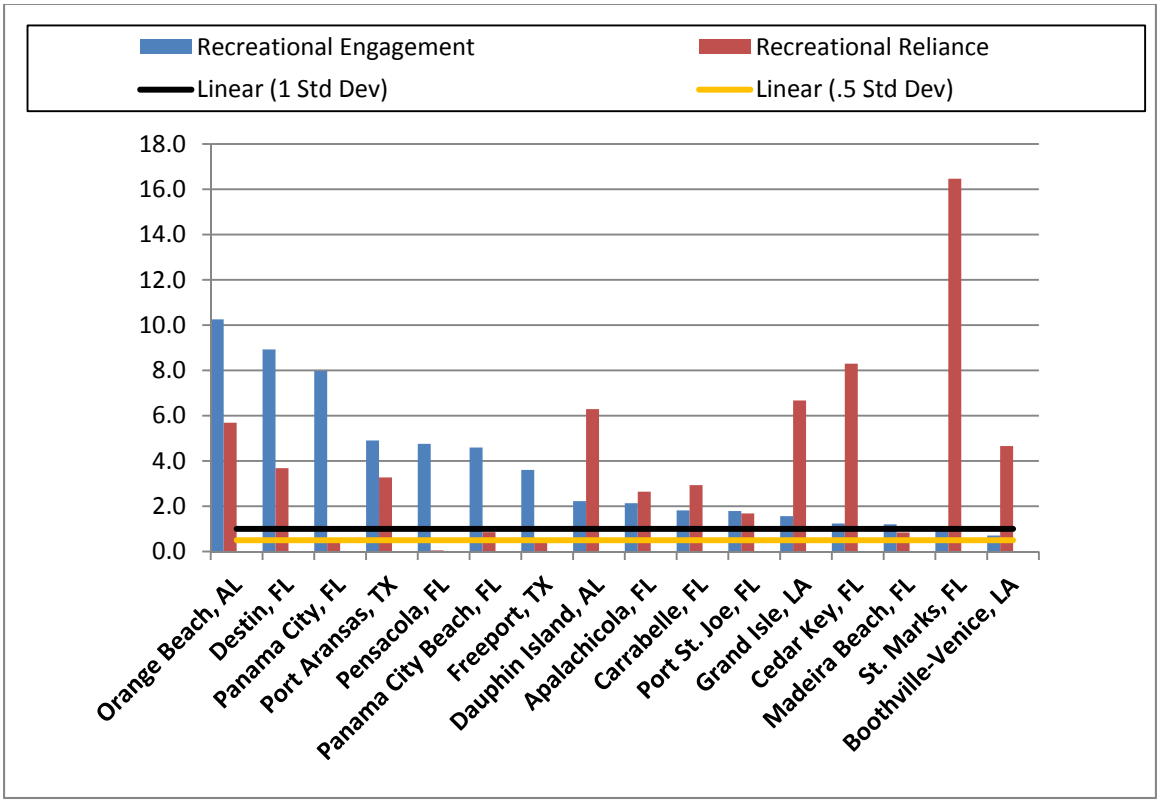

Figure 3.4.1. Top 16 recreational fishing communities' engagement and reliance. Source: SERO Social indicators database (2012).

Commercial Fishing

Most commercially landed greater amberjack is caught using vertical line alongside other target species, as opposed to being the primary target species. This is partly due to its relatively low economic value (approximately $1/pound) and large minimum size limit (36 inch fork length). A small percentage of commercial vessels direct trips toward greater amberjack and may land thousands of pounds in a single trip. Other commercial vessels may direct effort toward greater amberjack during part of a multi-day trip.

The communities in which the majority of commercial greater amberjack landings are made has remained relatively unchanged since Amendment 35 (GMFMC 2008), with the exception of a

decline in landings now made in Texas. Average landings from 2001-2010 showed landings concentrated in fewer communities in the Houston-Galveston area of Texas, Louisiana, and the Florida Panhandle, and numerous separate communities concentrated together, each with smaller amounts of landings along the west central coast of Florida. This suggests a different social organization of commercial fishing infrastructure between Florida and Texas (GMFMC 2008).

Figure 3.4.2 shows the communities with the most landings of greater amberjack in 2012 in the Gulf. These data are reported by dealers, the address for which may not correspond to the actual landing site or vessel homeport. Furthermore, Panama City and Destin, both in the Florida Panhandle, rank within the top 10 communities. Although place is one way of defining a community, a community is not defined by discrete geo-political boundaries alone. Social relationships, information exchanges, and economic interactions reflect shared interests that overlap place-based boundaries.

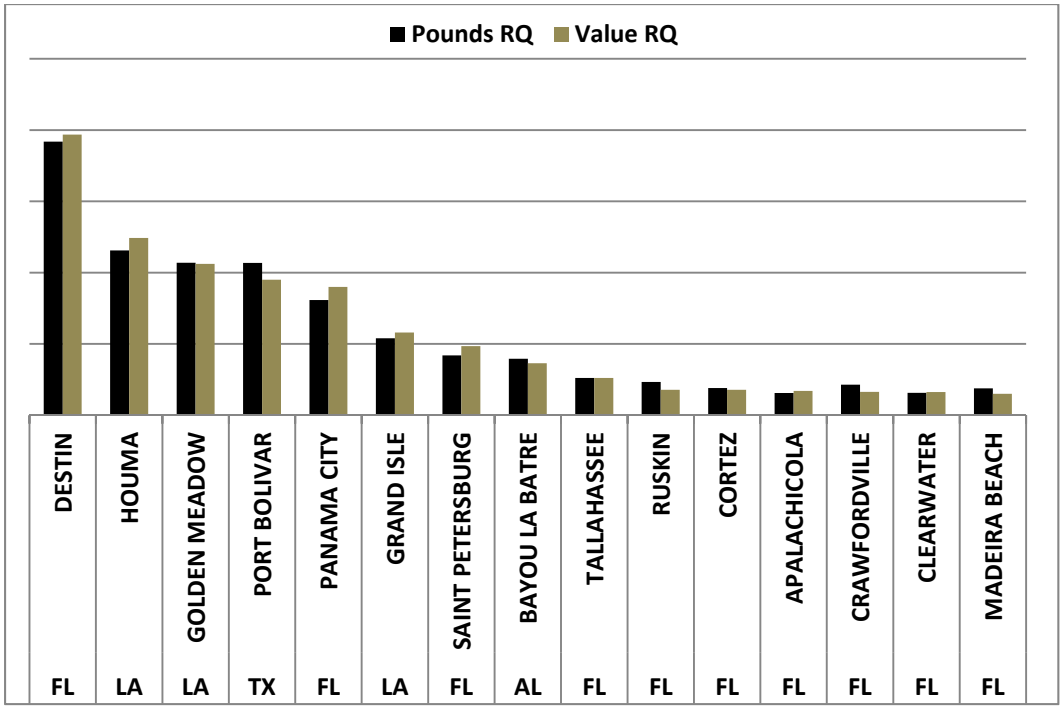

Figure 3.4.2. Proportion of greater amberjack commercial landings (value and pounds) for 15 Gulf communities out of total pounds and landings of greater amberjack in the Gulf (2012). Source: Accumulated landings system (ALS) dealer reports.

Importance of Greater Amberjack to Communities

Figure 3.4.1 identifies the top Gulf communities engaged and reliant on recreational fishing generally (i.e., not specific to greater amberjack). Figure 3.4.2 identifies the Gulf communities with the greatest amount of commercial greater amberjack. While these communities had the most greater amberjack landed by pounds, this does not necessarily reflect the importance of greater amberjack in relation to other landed species in those communities. No data are available for the proportion of recreational landings of greater amberjack by community, but these data are

available for the commercial sector. Commercial landings include many species that may not be caught by the recreational sector such as shrimp and tilefish, while recreational landings would include other species such as red drum and spotted sea trout. Therefore, it cannot be assumed that the proportion of commercial greater amberjack landings among other species in a community would be similar to its proportion among recreational landings within the same community. These data should also be considered in terms of the difference between the commercial and recreational sectors' interim allocation of the quota.

Comparing the communities of recreational importance and those with greater amounts of greater amberjack commercial landings, Destin and Panama City, Florida rank high for both. Collectively, these communities represented approximately 28% of the commercial greater amberjack landings in the Gulf in 2009 (GMFMC 2008). But within each community, greater amberjack represents a very small proportion of total commercial landings (Figure 3.4.3).

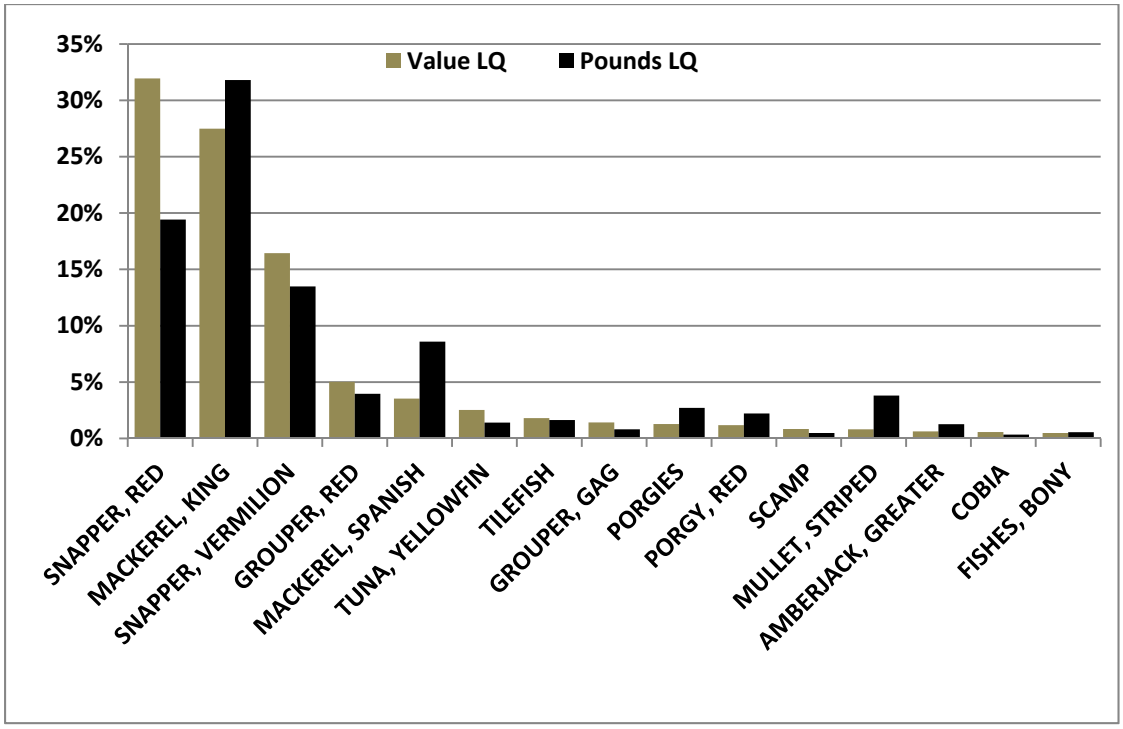

Figure 3.4.3. Proportion (local quotient, lq) of commercial landings and value for top 15 species in 2012 out of total landings and value for all commercial species landed in Destin, FL. Source: ALS dealer reports 2012.

In 2009, Destin ranked fifth for commercial greater amberjack landings with 12% of the total value and 10% of the total pounds Gulf-wide. Yet among all commercially landed species in Destin that year, greater amberjack represented less than 5% of all commercial landings. King and cero mackerels (37%), vermilion snapper (22%), and red snapper (9%) represented the top three commercial species by weight landed in Destin in 2009. In 2012, Destin ranked first Gulf-wide for commercial greater amberjack landings, yet greater amberjack represented approximately 1% of the total weight and value among all commercial landings. The top three

species landed in Destin remained unchanged since 2009, although their proportion by weight and value compared to all other landed species has increased (Figure 3.4.3).

Individually, Panama City and Panama City Beach each ranked among the top 10 recreational fishing communities based on the fishing involvement analysis provided above suggesting a higher level of involvement across geo-political boundaries. Panama City ranked third in 2009 for highest landings Gulf-wide, and fifth in 2012. Following a similar pattern for greater amberjack, it makes up a very small proportion of total commercial landings in the community; less than 5% in 2009 (GMFMC 2012), and 1% in 2012. Vermilion snapper, yellowfin tuna, and red snapper represent the top three commercial species by weight landed in Panama City (ALS 2012). Gulf-wide, Houma ranked second in terms of commercial greater amberjack landings in 2012, with a large increase in its proportion of landings since 2009, when Houma ranked eighth with 3.5% of the total weight and value. Within Houma, greater amberjack represents about 1% of all commercial landings, which are dominated by oysters, with 65% of total value.

For both sectors it is difficult to speak of community reliance on greater amberjack; rather, greater amberjack is an important component to commercial reef fish fishing. Although the communities described ranked among the top communities for commercial landings of greater amberjack throughout the Gulf, greater amberjack represents a small proportion of total landings within each community. Regulatory effort constraints play a part tight restrictions, and additional restrictions are proposed in this amendment to further reduce harvest, to comply with a revised rebuilding plan. Nevertheless, while landings are proportionally low compared with other species in each community, greater amberjack consistently ranks within the top 15 species in commercial communities.[12] This supports its status as an important component in the reef fish complex, rather than a primary target species. Rather than engaging in directed trips, greater amberjack is generally targeted during trips along with other species. It is an important trophy and meat fish, prized for both its size and fighting behavior, making for a thrilling fishing experience.

Landings at the commuity level are not available for the recreational sector, thus a comparable analysis is not possible. Recreational landings information is needed at the community level to evaluate these communities' engagement and reliance with greater amberjack compared with other landed species.

3.4.2 Environmental Justice Considerations

The proposed actions could be expected to affect fishermen and associated industries in numerous communities along the Gulf coast. Persons employed in greater amberjack fishing and associated businesses and communities along the Gulf coast would be expected to be affected by this proposed action. However, information on the race and income status for groups at the different participation levels (vessel owners, crew, dealers, processors, employees, employees of associated support industries, etc.) is not available. Although information is available concerning communities overall status with regard to minorities and poverty (e.g., census data), such information is not available specific to fishermen and those involved in the industries and

[12] Except for Apalachicola, Florida, which ranks among the communities with the most landings, but within the community, it represents less than 1% of landings by weight and value.

activities, themselves. To help assess whether any environmental justice concerns arise from the actions in this framework, a suite of indices were created to examine the social vulnerability of coastal communities. The three indices are poverty, population composition, and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to a community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and households with children under the age of five, disruptions such as higher separation rates, higher crime rates, and unemployment all are signs of populations experiencing vulnerabilities. Again, for those communities that exceed the threshold it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change.

As depicted in Figure 3.4.4, several commercial fishing communities of exceed the threshold of ½ standard deviation above the mean for at least one of the social vulnerability indices: Bayou La Batre, Alabama; Apalachicola, Panama City, and Ruskin, Florida; Golden Meadow, Grand Isle, and Houma, Louisiana. It would be expected that these communities may exhibit vulnerabilities to social or economic disruption because of regulatory change, including those proposed in this framework action. Those communities that exhibit several index scores exceeding the threshold would be the most vulnerable. These include Bayou La Batre, Alabama; Apalachicola and Ruskin, Florida; and Golden Meadow, Louisiana. Social effects resulting from action taken in this plan amendment are likely to be greatest in these communities.

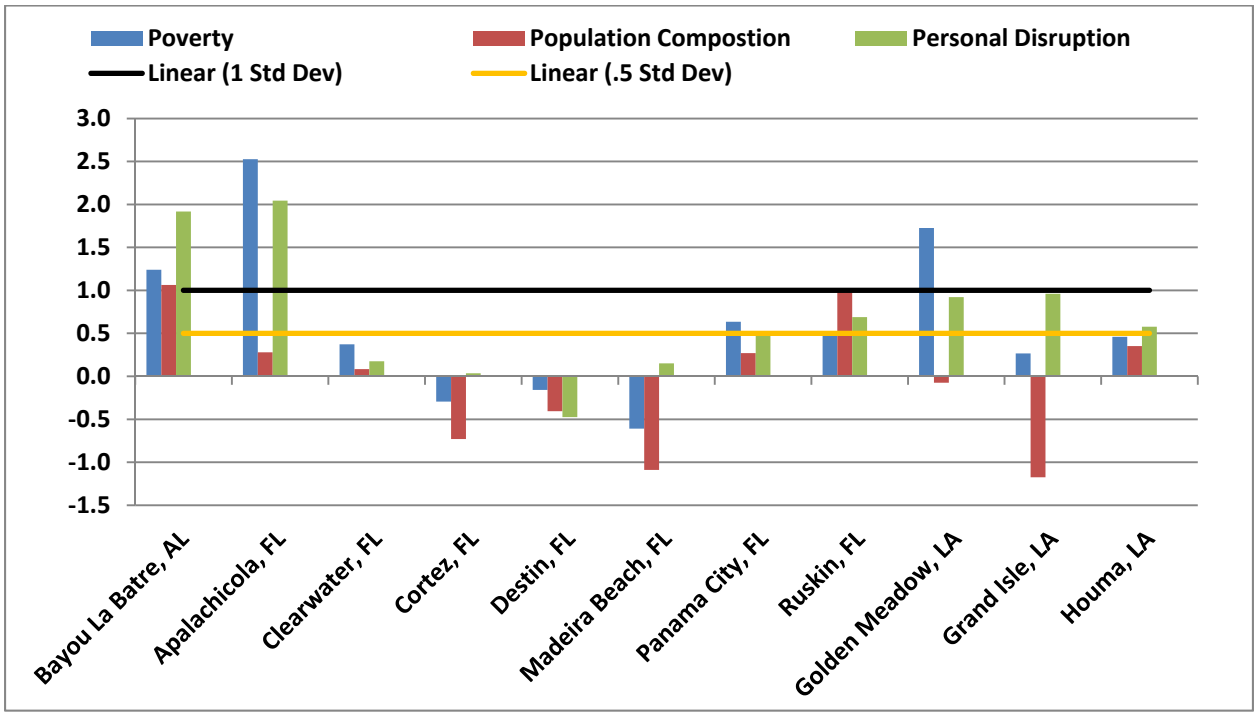

Figure 3.4.4. Social vulnerability indices for selected greater amberjack commercial fishing communities. Source: Southeast Regional Office, Social indicators database (2012).

Figure 3.4.5 provides the social vulnerability of recreationally engaged communities in terms of the same three indices: poverty, population composition, and personal disruptions. Again, for those communities that exceed the thresholds it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might result from regulatory change. Three communities exceed the threshold of one standard deviation above the mean for two of the indices (Freeport, Texas; Apalachicola and Carrabelle, Florida), and would be the communities most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

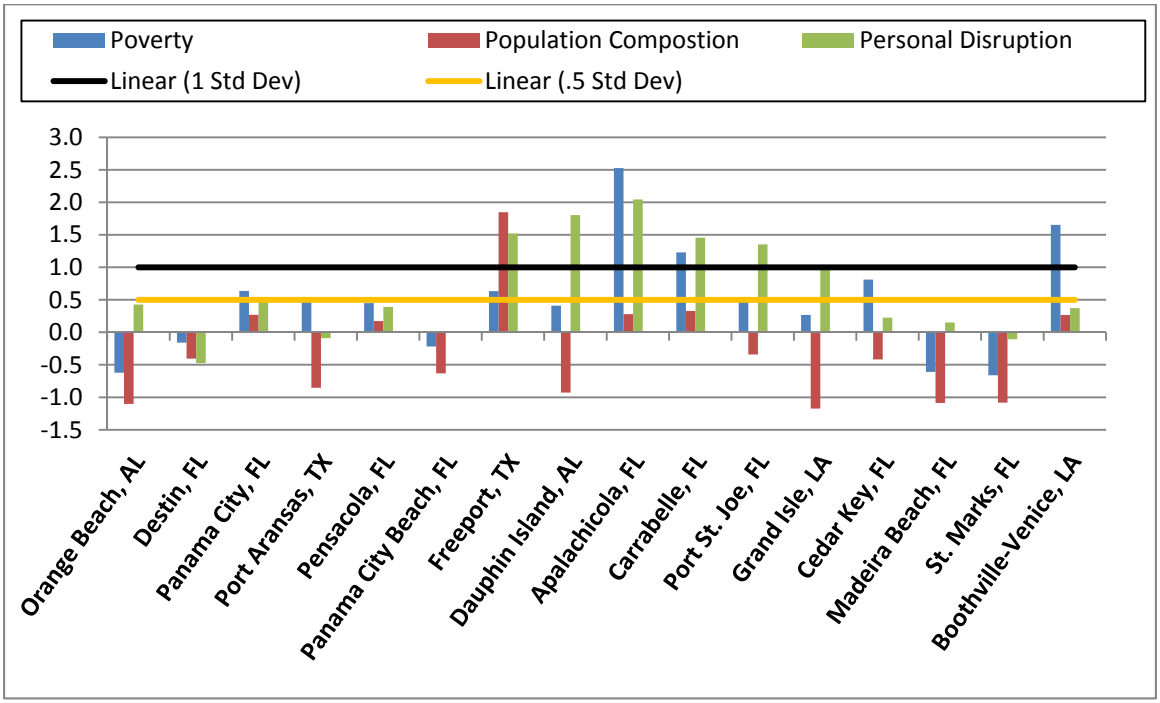

Figure 3.4.5. Social vulnerability indices for recreational fishing communities.
Source: Southeast Regional Office, Social indicators database (2012).

People in these communities may be affected by fishing regulations in two ways: participation and employment. Although these communities may have the greatest potential for EJ concerns, no data are available on the race and income status for those involved in the local fishing industry (employment), or for their dependence on greater amberjack specifically (participation). The fishery is primarily recreational (73%) and requires boat access. Greater amberjack does not represent a substantial proportion of landings in the primary fishing communities, thus no EJ concerns are expected to arise in these communities as a result of the actions in this amendment. There are no known claims for customary usage or subsistence consumption of greater amberjack by any Gulf population including tribes or indigenous groups. Although no EJ issues have been identified, the absence of potential EJ concerns cannot be assumed.

The proposed actions would decrease the amount of greater amberjack available for harvest by both the commercial and recreational sectors, and would adopt additional restrictions on both sectors to constrain the harvest of greater amberjack. The effects resulting from these actions are addressed in the sections discussing social effects in Sections 4.1, 4.2, and 4.3.

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 EEZ. The EEZ is defined as an area extending 200 nautical miles from the seaward boundary of each of the coastal states. The Magnuson-Stevens Act also claims authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between 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 Section 10. In most cases, the Secretary has delegated this authority to NOAA Fisheries Service.

The Council is responsible for fishery resources in federal waters of the Gulf of Mexico. 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 of Mexico 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 NOAA Fisheries Service. The public is also involved in the fishery management process through participation on advisory panels and through publically open Council meetings, with some exceptions for discussing internal administrative matters. 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 NOAA's Office of Law Enforcement, the U.S. 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 have developed a two year "Gulf Cooperative Law Enforcement Strategic Plan – 2011 - 2012."

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 of Mexico states exercises legislative and regulatory authority over their states' 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 - Modifications to the Greater Amberjack Annual Catch Limits and Annual Catch Targets

Direct and Indirect Effects on the Physical Environment

Impacts of these alternatives on the physical environment would depend on the resulting reduction in the level of fishing effort by the commercial and recreational sectors. The commercial sector is currently allocated 27% of the stock annual catch limit (ACL) and the recreational sector is currently allocated 73% of the stock ACL. Using greater amberjack landings history from 2001 - 2010, commercial longlines landed 10% of the greater amberjack and vertical lines (i.e., electric reel, bandit rig, hook and line, and trolling) landed 68% of the greater amberjack, while 22% of the landings were from unclassified gear types and dive gears (SEFSC Commercial ACL Data Set July 2014). Landings by trolling and diving with a spear were low and infrequent compared to hand and electric vertical lines in the commercial sector. The recreational sector (headboat, charter, and private modes) primarily uses hand lines sometimes electric reels to fish for reef fish including greater amberjack. When recreational fishers are targeting greater amberjack they often use large live baits and the attached weights and hooks may or may not touch the bottom depending on the structure type and fisher experience level. Recreational fishers also harvest greater amberjack with spear and powerhead gear.

Longlines

Longline gear is deployed over hard bottom habitats using weights to keep the gear in direct contact with the bottom. The potential for this gear to adversely impact the bottom depends on the type of habitat it is set on, the presence or absence of currents and the behavior of fish after being hooked. In addition, this gear upon retrieval can abrade, snag, and dislodge smaller rocks, corals, and sessile invertebrates (Hamilton 2000; Barnette 2001). Direct underwater observations of longline gear in the Pacific halibut fishery by High (1998) noted that the gear could sweep across the bottom. A study that directly observed deployed longline gear (Atlantic tilefish fishery) found there was no evidence that the gear shifted significantly, even when set in currents. Lack of gear shifting even in strong currents was attributed to setting anchors at either end of the longline to prevent movement (Grimes et al. 1982). Based on the direct observations, it is logical to assume that bottom longline gear would have a minor impact on sandy or muddy habitat areas. However, due to the vertical relief that hardbottom and coral reef habitats provide, it would be expected that bottom longline gear may become entangled, resulting in potential negative impacts to habitat (Barnette 2001).

Vertical lines

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 lines known as bandit gear, handlines, and

rod-and-reels. Vertical-line gear is less likely to contact the bottom than longlines, but still has the potential to snag and entangle bottom structures and cause attached organism such as soft corals and sponges to tear off or be abraded (Barnette 2001). In using bandit gear, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). The gear is in direct contact with the bottom for only a short period of time. Barnette (2001) suggests that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers).

Anchor damage is also associated with vertical-line fishing vessels, particularly by the recreational sector where fishermen may repeatedly visit well marked or known fishing locations. Hamilton (2000) points out that "favorite" fishing areas such as reefs are targeted and revisited multiple times, particularly with the advent of global positioning technology. The cumulative effects of repeated anchoring could damage the hard bottom areas where fishing for greater amberjack and other reef fish occurs. The for-hire sector and commercial sector that uses vertical line gear are typically known to anchor more frequently over the reef sites.

Spear and Powerhead

Spearguns are used by both the recreational and commercial sector to harvest greater amberjack, but represent a relatively minor component of both. Barnette (2001) summarizes a previous study that concluded spearfishing on reef habitat may result in some coral breakage. In addition, there could be some impacts from divers touching coral with hands or from re-suspension of sediment by fins (Barnette 2001).

Alternative 4 would not allow harvest of greater amberjack until another stock assessment has been completed and would provide the greatest benefit to the physical environment. However, it is unknown how much closing greater amberjack harvest would reduce the number of non-targeted recreational fishing trips (i.e., fishers leaving the dock to harvest other reef fish) and resulting effort. Target trips (i.e., fishers leaving the dock with the intent to target greater amberjack for harvest) would be eliminated, but it can only be speculated as by how much during a complete closure. Further, fishing for other reef fish will occur even if greater amberjack is closed. It is expected that under **Alternative 4** would impact the physical environment less than no action.

Alternative 3 is expected to provide greater positive benefits to the physical environment compared to **Alternative 1** (no action) and **Alternative 2**, because it sets a constant ABC, ACL and ACT beginning in 2015. **Alternative 3, Option b.** is expected to provide greater positive benefits to the physical environment compared to **Option a**., due to the 20% reduction in the stock ACT compared a 15% commercial buffer and 13% recreational buffer in **Option a**.

Direct and Indirect Effects on the Biological/Ecological Environment

Management actions that directly impact the biological and ecological environment include fishing mortality and the resulting population size, life history characteristics, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size and reproductive potential. **Alternative 4** would allow zero harvest of

greater amberjack until another stock assessment has been completed and would provide the greatest benefit to the biological environment. However, it is unknown how much closing greater amberjack harvest would reduce the number of non-targeted recreational fishing trips (i.e., fishers leaving the dock to harvest other reef fish) and resulting effort. Target trips (i.e., fishers leaving the dock with the intent to target greater amberjack for harvest) are expected to be reduced, but it can only be speculated as by how much during a complete closure. Further the commercial sector would still fish for other reef fish even if greater amberjack is closed. It is expected that under **Alternative 4** the commercial sector would impact that physical environment less than or similarly to no action.

Alternative 3 is expected to provide greater positive benefits to the biological environment compared to **Alternative 1** (no action) and **Alternative 2**, because it sets a constant ABC, ACL and ACT beginning in 2015. **Alternative 3**, **Option a,** is expected to provide greater positive benefits to the biological environment compared to **Option b**, due to the 20% reduction in the stock ACT compared to a 15% commercial buffer and 13% recreational buffer in **Option a**.

Direct and Indirect Effects on the Economic Environment

Modifications to greater amberjack stock ACLs and associated sector specific ACLs and ACTs (commercial and recreational) considered in this framework action would be expected to result in short and longer term effects on the economic environment. In general, although smaller ACLs and associated ACTs are expected to result in diminished economic benefits in the short run, they would be expected to result in faster rebuilding of the greater amberjack stock, thereby resulting in greater economic benefits in the longer term. Conversely, larger ACLs and associated ACTs would be expected to result in increased economic benefits in the short run but could result in smaller long term economic benefits due to slower rebuilding of the stock. Estimates of expected effects on the economic environment provided in this section are based on sector specific decision tools developed by NMFS (SERO, 2015). The assumptions, data and methods used to derive these estimates are detailed in SERO (2015). For the commercial and recreational sectors, it is not noted that, due to data and model limitations, the decision tools only provide estimated effects on the economic environment for 2015. For subsequent years, a qualitative discussion of the economic effects expected to result from the management alternatives is provided.

Alternative 1, which would maintain the current greater amberjack stock ACL and associated commercial and recreational ACLs and ACTs. **Alternative 1** (no action) is not expected to affect recreational or commercial fishing for greater amberjack and would therefore not be expected to result in effects to the economic environment.

Alternative 2 would base the greater amberjack stock ACL on the schedule recommended by the SSC for the 2015-2018 time interval. Relative to the no action alternative (**Alternative 1**), **Alternative 2** would reduce the stock ACL by 60,000 lbs ww in 2015 but gradually increase the stock ACL in subsequent years. Between 2015 and 2018, the greater amberjack stock ACL would increase from 1.72 mp ww in 2015 to 2.62 mp ww in 2018. To set the commercial and recreational ACTs, **Alternative 2-Option a** would apply a 15% buffer to the commercial ACL and a 13% buffer to the recreational ACL, respectively.

Alternative 2-Option b would set the commercial and recreational ACTs by applying a 20% buffer to the respective ACLs.

The 2015 commercial greater amberjack season is estimated at 79 days and 75 days for **Alternative 2-Option a** and **Alternative 2-Option b**, respectively (Table 2.3.2). For **Alternative 2-Option a** and **Alternative 2-Option b**, expected economic losses, as proxied by decreases in ex-vessel value relative to status quo, are estimated at approximately $26,174 and $61,073 (in 2013 dollars), respectively. Economic effects expected to result from **Alternative 2** beyond 2015 cannot be quantified due to data and model limitations. However, based on planned increases in stock ACLs and associated commercial ACLs and ACTs, it is expected that economic benefits expected to result from ACL increases between 2016 and 2018 would more than offset economic losses estimated for 2015. Therefore, net economic effects under **Alternative 2** are expected to be positive. Furthermore, based on a longer estimated season in 2015 and smaller estimated economic loss, it is expected that **Alternative 2-Option a** would yield greater net economic benefits than **Alternative 2-Option b**.

The 2015 recreational greater amberjack season is estimated at 179 days and 172 days for **Alternative 2-Option a** and **Alternative 2-Option b**, respectively (Table 2.2.2). For **Alternative 2-Option a** and **Alternative 2-Option b**, losses in consumer surplus to anglers are estimated at approximately $19,679 and $65,597 (in 2013 dollars), respectively. If it is assumed that, in response to the shortening of the recreational greater amberjack season expected to result from decreases in the recreational greater amberjack ACL and associated ACT, some charter trips targeting greater amberjack are eliminated, charter for-hire operators would be adversely impacted. Negative economic effects would stem from losses in producer surplus to charter for-hire operators. For **Alternative 2-Option a** and **Alternative 2-Option b**, losses in producer surplus (approximated by net operating revenues) are estimated at $47,552 and $158,507 (in 2013 dollars), respectively. Therefore, total losses in economic value to the recreational sector expected to result in 2015 from **Alternative 2-Option a** and **Alternative 2-Option b** would range for $19,679 to $67,231 and from $65,597 to 224,104 (in 2013 dollars), respectively. Economic effects expected to result from **Alternative 2** beyond 2015 cannot be quantified due to data and model limitations. However, based on proposed increases in recreational ACLs and ACTs, and resultant additional recreational fishing days it is expected that increases in economic value expected to result from ACL increases between 2016 and 2018 would outweigh economic losses estimated for 2015. Therefore, net economic effects under **Alternative 2** are expected to be positive relative to **Alternative 1** (status quo). Furthermore, based on a longer estimated recreational season in 2015 and smaller estimated economic loss, it is expected that **Alternative 2-Option a** would yield greater net economic benefits than **Alternative 2-Option b**.

Alternative 3 would set constant greater amberjack stock ACL and associated recreational and commercial ACLs and ACTs for 2015 and subsequent years. To determine the commercial and recreational ACTs, **Alternative 3-Option a** would apply a 15% buffer to the commercial ACL and a 13% buffer to the recreational ACL, respectively. **Alternative 3-Option b** would apply a 20% buffer to the commercial and recreational ACLs to determine the commercial and recreational ACTs, respectively. Economic losses to the commercial and recreational sectors expected to result in 2015 from **Alternative 3** would be similar to 2015 losses in ex-vessel revenues to the commercial sector and losses in economic value to the recreational sector estimated under

Alternative 2. Beyond 2015, although unquantifiable due to data and model limitations, additional losses in ex-vessel value to the commercial sector and in economic value to the recreational sector would be expected to occur due to the decreases in stock and sector specific ACLs, commercial and recreational ACTs, and resultant decreases in commercial and recreational season lengths relative to **Alternative 1** (status quo). Compared to **Alternative 3-Option a,** aforementioned decreases are expected to be greater under **Alternative 3-Option b**. Therefore, for the 2015-2018 time interval, **Alternative 3-Option b** would be expected to result in greater economic losses than **Alternative 3-Option a**.

Alternative 4 would set the greater amberjack stock ACL at zero and therefore would not allow any greater amberjack landings between 2015 and 2018. Although unquantifiable for the 2015-2018 time interval, **Alternative 4** would be expected to result in losses in ex-vessel revenues to the commercial sector, losses in consumer surplus to anglers and in producer surplus to for-hire operators relative to **Alternative 1**. Among the alternative modifications to the greater amberjack ACLs and ACTs, **Alternative 4**, which would eliminate most economic activities associated with the greater amberjack segment of the reef fish fishery would be the worst from an economics standpoint. The recreational sector may still gain some limited benefits from catch and release activities. The commercial sector would forgo all profits derivable from this segment of the reef fish fishery. The remaining alternatives could be ranked from most to least beneficial as follows: **Alternative 2** then **Alternative 1,** and **Alternative 3**.

Following the discussion relative to the effects on the economic environment expected to result from modifications to the recreational closed season (Section 4.2.2), the expected combined economic effects of recreational measures proposed in this framework action are discussed. Similarly, a discussion of combined effects of commercial measures considered is provided following the discussion relative to commercial trip limit changes (Section 4.3.3).

Direct and Indirect Effects on the Social Environment

This action will affect the human environment relevant to how much the quotas are lowered from the current quotas (**Alternative 1**, no action). **Alternatives 2-4** propose quota reductions from **Alternative 1** for the years 2015-2018. In general, social impacts can be expected in proportion to the decrease in quotas as fishing behavior and resource usage is restricted from current levels of fishing activity. The selection of **Alternative 1** conflicts with the requirement of the Magnuson-Stevens Act to revise the rebuilding plan. Although **Alternative 1**, would result in the least negative social effects by not reducing the quotas, this alternative would allow a level of fishing producing a yield above what the new rebuilding plan will allow.

Alternative 2 and **Alternative 3** would modify the rebuilding plan using different approaches to configuring the quota. The method used to determine the quota does not result in social effects; rather, negative social effects would arise from (and be in proportion to) the reduction in how much people are allowed to catch. During a season, when the quota is met, retention of greater amberjack is prohibited for the rest of the year. Further, in the event landings exceed the stock ACL, the following season's sector ACLs are reduced for a sector that exceeded its quota, by the amount of its sector overage. This measure would result in negative social effects in the subsequent fishing season. Thus, maximum social benefits would result at the point that the total

catch comes closest to meeting but not exceeding the quota (the ACL, which triggers the overage adjustment).

For the year 2015, the proposed quota is the same for both **Alternative 2** and **Alternative 3**, which is 60,000 lbs lower than the stock ACL of **Alternative 1**. By sector, this would reduce the commercial ACL by 16,600 lbs, and the recreational ACL by 43,400 lbs. Subsequently, the increasing annual yields under **Alternative 2** would allow a greater total harvest (2016-2018) compared with **Alternative 3**, which maintains the 2015 quota. The decrease to the commercial sector could be nearly filled by eight vessels making a full trip limit. Although those trips may not be made in a single day, in-season closures may not be effective at adjusting the season to account for the small decrease in allowable harvest. For the recreational sector, the 43,400-lb reduction represents 3.34% of the sector's ACL. The proposed quota increases subsequent to 2015 (**Alternative 2**) would increase the quota above the current quota, which is also **Alternative 1**. Thus, although both **Alternative 2** and **3** propose small decreases to the 2015 quota resulting in some minimal negative effects, however, the quota increases in subsequent years proposed in **Alternative 2** would result in greater social benefits than either **Alternative 1** or **Alternative 3**.

The same **Options a and b** are provided under both **Alternative 2** and **3**, which propose different buffers for setting the ACT. **Options a** propose a 15% buffer for the commercial sector's ACL and a 13% buffer on the recreational sector's ACL and are equivalent to the sectors' buffers to the ACL in **Alternative 1**. The management target (the ACT) is used to project the length of the fishing season, which will be closed when the ACT is projected to be reached. The buffer reduces the likeliness that the ACL will be exceeded, which would reduce the following year's quota. For the commercial sector, the 15% buffer does not appear to have been successful, with the effects compounded by the quota overage adjustment. For the recreational sector, landings have exceeded the sector's ACL twice, in 2009 (prior to the use of an ACT) and 2013.

Options b would increase the buffer for setting each sector's ACT to 20%, an increase of 7% to the recreational buffer and 5% to the commercial buffer. **Options b** propose larger buffers for both sectors than **Options a**, and while they are intended to avoid the long-term negative effects from quota overage adjustments, selecting the most conservative harvest target would require corresponding management measures to be more conservative. This would result in undesirable management measures contributing to broad negative social effects.

The complete closure of the harvest of greater amberjack (**Alternative 4**), would result in the greatest negative social impacts. Although these impacts might be ameliorated in the long-term if the stock were to rebuild faster, the rebuilding projections do not support that result. Further, for the majority of fishermen of both sectors, greater amberjack is caught alongside other species, rather than targeted on directed trips. This means that a complete closure is not likely to affect effort greatly as the majority of trips would still occur. Even under a complete closure, a substantial amount would still be caught and discarded on non-targeted trips, still contributing to mortality. Social effects would also result from a further erosion of trust in federal fishery management if such an extreme reduction to the catch limit were to be adopted. By prohibiting all landings by both the commercial and recreational sector, **Alternative 4** would result in the

greatest social impacts among the alternatives and is the least desirable for the social environment.

Direct and Indirect Effects on the Administrative Environment

Alternative 1 maintains the current commercial and recreational ACLs and ACTs at the 2014 level, or until the next stock assessment is completed and is not expected to alter the administrative burden. **Alternatives 2a** and **2b,** would set the commercial and recreational ACLs using the ACL/ACT Control buffer recommended by the SSC for 2015-2018. **Alternative 2a and 2b** would be expected to have more administrative burden than that of **Alternatives 3a** and **3b**, due to the annual ACLs and ACTs fluctuating in **Alternative 2a** and **2b**. **Alternative 3, Option a and b,** would set the commercial and recreational ACLs using the ACL/ACT Control Rule buffer recommended by the SSC from the constant rate for 2015. **Alternative 4** would set the stock ACL at zero and would be expected to have more administrative burden than **Alternative 1**, the status quo.

4.2 Action 2 - Recreational Management Measures

4.2.1 Action 2.1 - Modifications to the Recreational Minimum Size Limit for Greater Amberjack

Direct and Indirect Effects on the Physical Environment

Adjusting the minimum size limit could have indirect effects on the physical environment. Increasing the minimum size limit for greater amberjack could result in recreational fishers staying on a particular reef site for a longer period of time to catch a legal sized greater amberjack, thus potentially increasing gear interactions with the substrate. However, recreational fisher behavior is largely unknown based on management changes to greater amberjack minimum size limits. Therefore, no difference in impacts to the physical environment is expected from **Alternative 1** compared to **Alternatives 2**, **3**, and **4**. [NS2]

Direct and Indirect Effects on the Biological/Ecological Environment

There are several management strategies the Council can use to meet the goals necessary to reduce landings to keep harvest levels less than the stock ACL. One recreational measure they are considering is increasing the recreational minimum size limit (**Action 2.1**). **Action 2.1, Alternative 1** would maintain the 30 inch fork length (FL) minimum size limit. Based on theoretical analysis comparing yield-per-recruit (YPR) and spawning potential ratio (SPR) it was estimated that increasing the minimum size limit will provide greater spawning potential; whereas, maintaining the 30 inch FL minimum size limit would result in higher yield. **Action 2.1** alternatives consider increasing the minimum size limit by as much as 6 inches. The biological consequences of increasing the minimum size limit by various amounts were evaluated relative to changes in YPR, SPR, and bycatch. Change in YPR and SPR were summarized in Appendix 12.4.3 of Amendment 35 to the Reef Fish FMP (GMFMC 2012). Reproductive studies by Murie

and Parkyn (2008) estimated at the 30 inch FL minimum size limit (**Alternative 1**), less than 11% of the female greater amberjack in the population have reached sexual maturity. **Alternative 2** would modify the minimum size limit for greater amberjack to 32 inches FL. At 32 inches FL 45% of females are reproductively mature. **Alternative 3** would modify the minimum size limit for greater amberjack to 34 inches FL. At 34 inches FL 85% of females are reproductively mature. **Alternative 4** would modify the minimum size limit for greater amberjack to 36 inches FL. At 36 inches FL 97% of females are reproductively mature. **Alternative 4** is expected to provide the greatest biological benefits to the resource, because a majority of female greater amberjack would be reproductively mature at this size. **Alternative 4** would also be consistent with the commercial sector's minimum size limit. **Alternative 3** would increase the minimum size limit to 34 inches FL and **Alternative 2** would increase the minimum size limit to 32 inches FL. These alternatives are expected to provide greater biological benefits to the resource than **Alternative 1;** however, benefits may diminish if release mortality increases with increases in fish size.

As minimum size limits increase from 30 inches FL, dead discards are estimated to increase and subsequent estimates of changes in harvest and dead discards for various minimum size limits could be calculated. Dead discard mortality is estimated at 20% and would be used to estimate increases in total dead discards with various minimum size limits consistent with SEDAR 33 (2014) and the SEDAR 9 Update (2010).

The Council and Reef Fish Advisory Panel have stated concerns about bycatch mortality of greater amberjack if the minimum size limit is increased. There were also concerns about whether or not the minimum size limit would sufficiently slow the rate of harvest and increase bycatch. To address these concerns, the decision model (SERO-LAPP 2015-01) was used to evaluate how the rate of harvest and dead discards would change with increases to the minimum size limit. **Alternative 1** is expected to result in the lowest level of dead discards followed (in ascending order) by **Alternatives 2**, **3**, and **4**, respectively.

The YPR and SPR analyses summarized in Figure 2.2.3 and Figure 2.2.4 evaluated minimum size limits ranging from 30 to 36 inches FL. These analyses showed YPR was maximized at 30 inches FL (Figure 2.2.4). Spawning potential was maximized at 36 inches FL and increasing the minimum size limit from 30 to 36 inches increases SPR (**Alternative 4**). The YPR/SPR analysis results revealed a tradeoff between fishery performance yield and spawning potential. Although increasing the minimum size limit appears to provide biological benefits other management measures (e.g., seasonal closures, constraining harvest to the sector ACL) could also control the rate of fishing mortality in order to achieve higher SPR and YPR. The Council discussed over multiple meetings the biological trade-offs of increasing the minimum size limit on bycatch, YPR, and SPR.

Direct and Indirect Effects on the Economic Environment

This action considers increases in the recreational size limit for greater amberjack. **Alternatives 2, 3,** and **4** would increase the size limit to 32, 34, and 36 inches FL, respectively. **Alternative 1** (no action), which would maintain the current 30 inch size limit is not expected to affect recreational fishing for greater amberjack and would therefore not be expected to result in effects

to the economic environment. Effects on the economic environment, measured in changes in economic value to the recreational sector were derived from the recreational decision tool developed by SERO (2015). As discussed in Section 3.3.2, changes in consumer surplus are determined based on a consumer surplus of $12.18 (2013 dollars) per greater amberjack. Changes in producer surplus were based on net operating revenues of $158.06 (2013 dollars) per charter angler trip. The changes in economic value, i.e., changes in consumer surplus and producer surplus, would stem from changes in season length resulting from alternative size limits. It is noted that the decision tool used to estimated changes in economic value to the recreational sector does not account for potential changes in the quality of recreational trips due to size limit modifications. Table 4.2.1.1 provides estimated season length in 2015 and associated changes in consumer surplus, producer surplus and economic value for alternative greater amberjack recreational size limits.

Table 4.2.1.1. Estimated 2015 season length, changes in consumer surplus (CS), producer surplus (PS) and economic value (EV) for alternative greater amberjack recreational size limits. Season length in days; CS, PS and EV in 2013 dollars; size limits in inches.

	Size Limit	Season Length	Changes in		
			CS	PS	EV
Alternative 1	30	182	---	---	---
Alternative 2	32	196	$2,224.35	$10,457.77	$12,682.12
Alternative 3	34	215	$5,289.48	$24,650.46	$29,939.94
Alternative 4	36	258	$9,498.14	$93,782.73	$103,280.87

Source: SERO-LAPP 2015-01

In general, relative to the status quo size limit, a greater size limit would be expected to result in a longer recreational greater amberjack fishing season. **Alternative 4**, which would increase the size limit the most relative to status quo, would be expected to result in the longest recreational greater amberjack fishing season followed by **Alternative 3** then **Alternative 2**. This ordinal ranking of the alternatives would be expected to hold when comparing changes in consumer surplus and in producer surplus (assuming that additional charter for-hire trips targeting greater amberjack are created). As expected, greatest changes in consumer surplus and in producer surplus would be expected to result from **Alternative 4**. Although the recreational decision tool cannot estimate season length and changes in consumer surplus, producer surplus and economic value, greater size limits would be expected to result in longer recreational seasons and greater changes in economic value beyond 2015. Therefore, the ordinal ranking of the alternatives would be expected to hold beyond 2015. Following the discussion relative to the effects on the economic environment expected to result from modifications to the recreational closed season (Section 4.2.2), the expected combined economic effects of recreational measures proposed in this framework action are discussed.

Direct and Indirect Effects on the Social Environment

Impacts can be expected from increasing the recreational minimum size limit if fishermen find it difficult to land a legal size fish, making the fishing experience less satisfying. Additional effects are not expected from maintaining the 30-inch FL minimum size (**Alterative 1**). Among landings in 2009-2010, the most frequently landed greater amberjack was 31 inches FL. In general, fewer fish are caught of the largest sizes (Figure 2.2.1). Short-term impacts can be expected from an increase in the minimum size limit due to a reduction in harvest and the impacts would correspond in severity with the estimated harvest reduction. Discarding fish due to regulations can negatively affect the fishing experience especially if the fish appears unable to survive. Figure 2.2.1 provides the frequency at which different sizes of greater amberjack are landed. The most frequently caught greater amberjack in 2012-2013 was 34 inches FL (Figure 2.2.1). Increasing the minimum size to 32 inches FL (**Alternative 2**) is estimated to reduce harvest the least among **Alternatives 2-4**, but would also affect the fewest anglers by allowing the retention of a smaller size fish. Increasing the minimum size to 34 inches FL (**Alternative 3**) would reduce harvest more than Alternative 2, but would allow anglers to retain the most frequently landed size of greater amberjack. An increase to 36 inches FL (**Alternative 4**) could reduce harvest the most and also impact the most fishing trips. Thus, fishermen would be most impacted by an increase in the minimum size limit to 36 inches FL (**Alternative 4**). Furthermore, increases in harvest reductions would coincide with increases in dead discards. Throwing back dead fish is perceived as wasteful and is frustrating for fishermen.

On the other hand, social benefits are expected to accrue in the long term if a larger minimum size helps to rebuild the stock. Of 30-inch FL females, 11% are estimated to have achieved reproductive maturity. Thus, an increase in the minimum size limit would mean fewer removals of fish that have not reached reproductive maturity, benefitting the stock by increasing the spawning potential ratio. If the larger minimum size limit aids in rebuilding the stock and the quota is increased then it would be expected to benefit the fishermen, businesses, and fishing communities that harvest greater amberjack. Increasing the size limit to 34 inches FL (**Alternative 3**) or 36 inches FL (**Alternative 4**) could reduce the length of the season closure needed to reduce harvest (Table 2.2.2), allowing fishermen to harvest larger greater amberjack year-round. Furthermore, many recreational fishermen support and often encourage management measures designed to protect the biological needs of a species, including closed seasons during spawning times, and size limits that maximize reproductive potential. It should be noted that an increase to 36 inches FL would make the minimum size limit consistent with that of the commercial sector.

Direct and Indirect Effects on the Administrative Environment

The alternatives in Action 2.1 are expected to have positive impacts to the biological environment with minimal impacts to the administrative environment compared to no action. **Alternative 1** the status quo would have the least impact on the administrative environment, because the current minimum size limit is 30 inches FL for the recreational sector. **Alternatives 2**, **3**, and **4** are expected to have similar impacts on the administrative environment because they would be modified from no action.

Any change to the regulations would create the additional burden on the administrative environment in the beginning; however, after the regulations are in effect **Alternatives 2**, **3**, and **4** are not expected to have additional impacts on the administrative environment.

4.2.2 Action 2.2 - Modifications to the Recreational Closed Season for Greater Amberjack

Direct and Indirect Effects on the Physical Environment

It is unknown how many recreational anglers leave the dock intending to target greater amberjack, or how fishing behavior would change based on the various alternatives for closed seasons. The following comparison of alternatives is based on the number of available fishing days under each alternative. This comparison does not take into account fishing during the closed season or effort shifting outside of the closed season. The impacts to the physical environment may be underestimated in this analysis if there is increased effort shifting outside the closed season. Physical impacts to the environment could occur when gear such as weights, hooks, and anchors hit and damage the substrate and surrounding habitat. Recreational fishers typically use rod and reel or spears to harvest greater amberjack; see Chapter 4.1.1.1 for a comparison of gear types and impacts to the physical environment. The four Alternatives for the Action 2.2 the recreational closed season are dependent upon the ACL buffer that is selected as the preferred. **Alternative 4** has proposed closure dates of January 1 - May 31, and a November - December closure. **Alternative 4** would likely have the greatest positive impacts on the physical environment because the recreational season is the shortest under this alternative with 91-108 open fishing days, depending upon the buffer selected. **Alternative 1** would likely result in a 172-182 day fishing season, **Alternative 2** would likely result in a 181-190 day fishing season, and **Alternative 3** would likely result in a 135-145 day fishing season. The following alternatives are listed in order from greatest positive benefits to least expected positive benefits to the physical environment; **Alternative 4**, **3**, **1**, **2**. The analysis for the various closed seasons and their associated buffers can be found on Table 2.2.2.

Direct and Indirect Effects on the Biological/Ecological Environment

Action 2.2 would modify the recreational closed season for greater amberjack. As the greater amberjack stock rebuilds **Alternative 1,** the status quo may not constrain harvest enough to prevent an in-season recreational fishing closure. **Alternative 1** and **Alternative 2** would be expected to have the greatest negative biological impact to the greater amberjack stock as the harvest during the spawning season would remain open. **Alternatives 3** and **4** have the peak spawning season closure (March-May) and would have less impact to the stock than **Alternatives 1** and **2** with respect to the spawning season. However, **Alternatives 3** and **4** would be open during peak recreational harvest which increases the likelihood of the ACL being harvested or exceeded. In Amendment 35 (GMFMC 2012) the Council determined that restricting landings by the additional amount projected for **Alternative 1** (June-July) provides greater biological benefit to rebuilding the stock than by providing a spawning season closure, which has unquantified benefits. **Alternative 3** allows a greater quantity of fish to be caught, increasing the likelihood of exceeding the recreational quota.

Based on spawning season for greater amberjack **Alternatives 3** and **4** may provide the greatest benefits to the resource and biological environment (Murie and Parkyn 2008). Both alternatives would close the recreational fishing season during peak spawning (March - May). Closing

recreational fishing during the months of March - May would be consistent with the current commercial fixed closed season. However, little information exists to suggest that closing the greater amberjack recreational sector during the spawning period would provide greater biological benefits to the stock compared to closing them during months of peak recreational fishing effort (May - August), which reduces harvest to a greater extent than a March – May closure (**Alternative 3**). Similarly, it is unknown if greater amberjack are more susceptible to fishing mortality during the spawning season. A study by Harris et al. (2007) suggested spawning aggregations of greater amberjack were targeted by fishers in the South Atlantic, but no evidence of this was presented. Diver observations in Belize documented greater amberjack in pair courtship while in schools of 120 fish (Graham and Castellanos 2005). It is unknown if fishers target these schools or aggregations of greater amberjack more heavily during spawning than at other times of the year; therefore, **Alternatives 3** and **4** are expected to provide positive benefits to the resource by protecting them during spawning if they are being targeted more heavily.

Direct and Indirect Effects on the Economic Environment

This action considers alternatives to the current June 1 to July 31 annual recreational greater amberjack closure. **Alternative 2** would eliminate the closed season and open the greater amberjack recreational fishing season January 1 until the ACT is reached. **Alternatives 3** and **4** would modify the closure to March 1-May 31 and to January 1-May 31 and November 1-December 31, respectively. **Alternative 1** (no action), which would maintain the current June 1 to July 31 annual recreational greater amberjack closure is not expected to affect recreational fishing for greater amberjack and would therefore not be expected to result in effects to the economic environment. Effects on the economic environment, measured in changes in economic value to the recreational sector were derived from the recreational decision tool developed by SERO (2015). The changes in economic value, i.e., changes in consumer surplus and producer surplus, would stem from changes in season length resulting from alternative closed season size limits. Modifying the seasonal closure would alter the distribution of harvests (and possibly total harvests) and associated economic values. It is noted that the decision tool used to estimated changes in economic value to the recreational sector does not account for potential effort shifts during the open months. Table 4.2.2.1 provides estimated season length in 2015 and associated changes in consumer surplus, producer surplus and economic value for alternative greater amberjack recreational closed seasons.

Table 4.2.2.1. Estimated 2015 season length, changes in consumer surplus (CS), producer surplus (PS) and economic value (EV) for alternative greater amberjack recreational season closures. Season length in days; CS, PS and EV in 2013 dollars.

	Closed Seasons	Season Length	Changes in		
			CS	PS	EV
Alternative 1	6/1-7/31	182	---	---	---
Alternative 2	None	190	-$3,433.62	$191,190.91	$187,757.29
Alternative 3	3/1-5/31	145	$19,088.62	-$10,970.76	$8,117.86
Alternative 4	1/1-5/31 and 11/1-12/31	97	$20,831.96	$7,928.47	$28,760.43

Source: SERO-LAPP 2015-01

Relative to **Alternative 1** (no action), **Alternative 2,** which would result in the longest recreational season in 2015, would be expected to result in the greatest changes in economic value, i.e., the sum of the changes in consumer surplus and producer surplus. **Alternative 2** would not set a closed season but would let the season run until the recreational ACT is met. **Alternative 3**, which would establish a March 1 to May 32 closed season would be expected to result in the smallest change in economic value. Although the decision tool does not allow to quantify changes in economic value due to season closures beyond 2015, it is assumed that positive net economic effects would continue to result from all proposed season closures.

Combined effects of recreational measures (changes in ACL and ACT, in size limit and season closures

For 2015, recreational season lengths, changes in economic value to the recreational sector that would be expected to result from the modifications to the recreational greater amberjack ACL and ACT (Action 1), modifications to the minimum recreational size limit (Action 2.1) and changes to the seasonal closures (Action 2.2) are provided in Table 4.2.2.2 and Table 4.2.2.3, respectively.

Table 4.2.2.2 Recreational season lengths by recreational ACT and size limit. Season lengths in days; size limits in inches

Closed Seasons	Size Limit	Modifications to ACL and ACT		
		ACT Alt 1	ACT Alt 2	
			13% buffer	20% buffer
June 1 - July 31	**30**	182	179	172
none	**30**	190	187	181
March 1 to May 31	**30**	145	142	135
January 1 – May 31 and Nov 1 – Dec 31	**30**	97	92	85
June 1 - July 31	**32**	196	191	180
none	**32**	199	195	188
March 1 to May 31	**32**	152	149	142
January 1 – May 31 and Nov 1 – Dec 31	**32**	108	102	91
June 1 - July 31	**34**	215	209	196
none	**34**	211	208	200
March 1 to May 31	**34**	168	162	150
January 1 – May 31 and Nov 1 – Dec 31	**34**	123	118	104
June 1 - July 31	**36**	258	237	222
none	**36**	227	224	215
March 1 to May 31	**36**	192	185	170
January 1 – May 31 and Nov 1 – Dec 31	**36**	147	140	125

Source: SERO-LAPP 2015-01

Table 4.2.2.3: Estimated 2015 changes in economic value for alternative greater amberjack recreational season closures and recreational ACTs. Size limit in inches, economic values in 2013 dollars.

Closed Seasons	Size Limit	Modifications to ACL and ACT		
		ACT Alt 1	ACT Alt 2	
			13% buffer	20% buffer
June 1 - July 31	**30**	------	-$67,231.30	-$224,104.32
none	**30**	$187,757.29	$120,133.86	-$15,113.01
March 1 to May 31	**30**	$8,117.86	-$59,113.43	-$215,986.45
January 1 – May 31 and Nov 1 – Dec 31	**30**	$28,760.43	$6,412.66	-$150,460.36
June 1 - July 31	**32**	$12,682.12	-$8,755.41	-$91,280.53
none	**32**	$338,109.33	$249,687.09	$94,948.16
March 1 to May 31	**32**	$100,495.42	$34,589.09	-$119,192.33
January 1 – May 31 and Nov 1 – Dec 31	**32**	$36,792.10	$11,067.05	-$53,776.79
June 1 - July 31	**34**	$29,939.94	$5,135.22	-$47,551.16
none	**34**	$528,823.57	$464,154.66	$291,704.23
March 1 to May 31	**34**	$113,972.70	$89,655.91	$6,174.69
January 1 – May 31 and Nov 1 – Dec 31	**34**	$45,323.27	$24,896.63	-$31,842.55
June 1 - July 31	**36**	$103,280.87	$29,615.21	-$25,865.76
none	**36**	$782,951.66	$720,491.19	$533,109.76
March 1 to May 31	**36**	$132,222.84	$106,331.72	$51,956.07
January 1 – May 31 and Nov 1 – Dec 31	**36**	$66,521.16	$40,630.04	-$14,850.92

Source: SERO-LAPP 2015-01

As previously discussed, reductions in recreational ACLs and ACTs would be expected to result in adverse economic effects to the recreational sector. Conversely, larger minimum size limits would be expected to result in longer fishing seasons and increased economic value. Finally, alternative closed season may be expected to result in increased or decreased economic value based on the temporal distribution of harvests and the total amount harvested by the recreational sector. For 2015, the net economic effects expected to result from recreational ACL and ACT changes (Action 1), size limit changes (Action 2.1) and season closure modifications (Action 2.2) would depend of the relative magnitude of the economic effects on the recreational sector of the proposed alternatives. Noting that Action 1- Alternative 1 is not a viable alternative because it would exceed

the recommended stock ACL, the combination that would be expected to result in the greatest net economic benefits in 2015 would set a 13% buffer on the recreational ACL (Action 1-Alternatives 2 or 3 – Option a), eliminate the closed season (Action 2.1-Alternative 2) and establish a 36 inch minimum size limit (Action 2.2-Alternative 2). Conversely, the combination that would be expected to result in the greatest loss in economic value to the recreational sector would set a 20% buffer on the recreational ACL (Action 1-Alternatives 2 or 3-Option b), maintain the current June 1-July 31 closed season (Action 2.1-Alternative 1) and the current 30-inch minimum recreational size limit.

Direct and Indirect Effects on the Social Environment

The fixed closed season for greater amberjack during the months of June and July (also **Alternative 1**) was intended to avoid in-season closures and allow for fishing this large trophy fish when red snapper harvest is closed. Modifications to the recreational closed season for greater amberjack were evaluated and not adopted in Amendment 35 (GMFMC 2012). The issue is being evaluated again as the rebuilding plan goals have not been met, requiring further reductions to harvests.

The June through July closed season (**Alternative 1**) was originally implemented (GMFMC 2008) to reduce fishing effort for greater amberjack and avoid in-season closures. A fixed closed season allows private recreational fishermen and for-hire operators the ability to schedule fishing trips with more certainty. An in-season closure is disruptive to planning fishing trips because the date of the closure is not known in advance. Impacts would arise from in-season closures if planned fishing trips must be cancelled. Also, at the time, this fixed closed season would allow greater amberjack to remain open when red snapper fishing is closed. Thus, at the time of Amendment 35 (GMFMC 2012), the red snapper season was 47 days long; for 77% of the fixed greater amberjack closure, the red snapper season was open. This is a benefit for recreational fishermen who prefer to have one of the two trophy fish open throughout the year. The length of the federal red snapper season has since become progressively shorter, such that for most of June and all of July 2014, fishing for both red snapper and greater amberjack was closed in federal waters. Although the Council recommended an increase to the red snapper quota for 2015, projections for the recreational red snapper season lengths are not yet available.

Eliminating the fixed closed season (**Alternative 2)** would open the recreational sector from January 1 until the ACT is filled. This alternative could negatively affect both for-hire operators, their angler passengers, and private recreational fishermen as the closure date for the sector would be announced with little notice. Without a fixed closed season, the ACT under **Alternative 2 or 3**, **Option a** (13% buffer) is expected to be met in approximately 187 days. This makes it probable that the greater amberjack and red snapper seasons would close at approximately the same time and neither greater amberjack nor red snapper would be open throughout the fall.

Alternative 3 would modify the recreational season closure for greater amberjack to March 1 through May 31 which coincides with the peak spawning season and the commercial sector's closed season. Closing the season at this time could provide benefits to the stock thereby benefiting fishermen in the long term. Among the management tools that constrain effort,

anglers generally support closed seasons during spawning times, recognizing the resulting conservation benefits. However, red snapper is also closed at this time meaning that negative impacts may accrue to fishermen by prohibiting access to one of the trophy species or the other on a year-round basis. On the other hand, as with the benefits described for **Alternative 1**, a fixed closed season reduces the likelihood of an in-season closure and enables the scheduling of fishing trips. **Alternative 3** is not expected to reduce effort sufficiently to avoid an in-season closure. Depending on the alternative and option selected in Action 1, the season length will likely be between 142 and 170 days, meaning the closure proposed in **Alternative 3** will be insufficient to prevent a closing before the end of the year. **Alternative 3** could provide benefits to anglers who prefer to have red snapper and greater amberjack open at the same time. Some anglers may prefer to take fewer fishing trips due to the costs (e.g., fuel) of multiple trips to target species at different times of the year. However, since recreational fishermen often target multiple species at one time, this may not include as much of a benefit unless private anglers are interested in targeting greater amberjack and red snapper specifically.

Alternative 4 would modify the recreational seasonal closure so that the season is open from June 1 - October 31, five months in duration. As with **Alternative 1** and **Alternative 3,** benefits could accrue to fishermen by establishing a fixed closure that enables the scheduling of fishing trips and avoids the likelihood of an in-season closure. The season would also be open throughout the summer and into early fall when fishing participation (effort) is greatest. As with **Alternatives 2** and **3,** the red snapper recreational season in federal waters would coincide with this alternative, meaning both trophy species would be open at the same time. This would be expected to provide benefits to those fishermen who prefer to target both species on summer trips. This is not as desirable for for-hire operators who have expressed support for having one of the two trophy species open when the other is closed. Thus, there was no consensus among the recreational sector concerning the best time for the season closure. Conversely, this alternative could provide long term benefits because part of the closure would occur during the peak spawning time of March through April, improving protection for spawning greater amberjack which could help toward meeting the rebuilding plan goals.

Direct and Indirect Effects on the Administrative Environment

The alternatives in **Action 2.2** are expected to have positive biological and physical impacts on their respective environments and create nominal differences in the direct and indirect impacts on the administrative environment. **Alternative 1** would have the least impact on the administrative environment, because the current fixed closed season June 1 - July 31 is already established for the recreational sector (GMFMC 2011b). **Alternatives 2**, **3**, and **4** are expected to have similar impacts on the administrative environment because they would be modified from no action. **Alternative 2** is expected to create the greatest burden on the administrative environment because all fixed closed seasons would be removed. Landings for the recreational sector would need to be closely monitored and enforced when the quota was projected to be reached so that it is not exceeded. Managing the recreational sector without a fixed closed season has resulted in overages in the past. An additional, level of public information and broadcasts by radio and press releases may be necessary to inform stakeholders when the fishery is closed, because it could be a different month and day each year based on natural changes in the resource and shifts in effort.

4.3 Action 3 - Commercial Management Measures

Direct and Indirect Effects on the Physical Environment

Direct effects to the physical environment resulting from commercial fishing include physical damage to habitat associated with anchoring, longline snags on the bottom, and hook-and-line abrading the bottom and potentially tearing off attached organisms as discussed in Section 4.1.1. Sixty-eight percent of the greater amberjack commercial landings from 2004 - 2013 were caught using vertical line gear including bandit gear, electric reels, and trolling (SEFSC Commercial ACL Data Set 2014).

Greater amberjack are primarily caught in the water column above structure. During greater amberjack commercial fishing the hook and line gear is unlikely to contact bottom habitat or cause any damage. However, anchoring over wrecks or other structure to fish for greater amberjack may have a negative effect on those structures and surrounding benthic habitat. Commercial longline vessels captured 10% of the total commercial greater amberjack landed from 2001 - 2010. However, bottom longlines are not used to target greater amberjack and typically catch the fish while setting and retrieving the gear so effort with this gear type should not be affected by a reduction in the sector ACL. Additionally, to use longline gear, an endorsement is required as implemented in Amendment 31 (GMFMC 2009). Spearfishing and other unclassified gear, including unclassified diving gear, accounted for an estimated 22% of the commercial harvest from 2004 - 2013. There are several existing habitat areas of particular concern, marine sanctuaries, and marine reserves in the Gulf of Mexico providing additional protection to greater amberjack habitat and help reduce impacts to the physical environment (see Section 3.1).

Action 3, Alternative 1, the no action alternative, would maintain the current 2,000 pound whole weight (lbs) trip limit. **Alternative 1** provides the commercial sector with a 75-82 day fishing season. A range of days are provided as the estimate is dependent upon the preferred alternative selected in **Action 1**. The in-season management measures developed to adhere to the sector ACL would be to close the sector when the ACT or quota has been reached. This closure is not expected to vary the fishing effort and would not have any additional direct or in-direct effects on the physical environment. The commercial sector uses similar gear to catch the different reef fish species including greater amberjack. Thus, fishing effort would continue even if greater amberjack is closed.

Alternative 2 would decrease the commercial trip limit to 1,500 lbs which is projected to provide a commercial fishing season between 83-91 days. **Alternative 3** would decrease the commercial trip limit to 1,000 lbs. and is projected to provide a commercial fishing season of 110-123 days. **Alternative 4** would decrease the commercial trip limit to 750 lbs and is projected to provide a commercial fishing season between 140-157 days. **Alternative 5** would decrease the commercial trip limit to 500 lbs which is projected to provide a commercial fishing season between 207-233 days. A lower the commercial trip limit is expected to provide a longer greater amberjack fishing season and is not anticipated to shift any fishing effort or methods because less than 5% of trips exclusively target greater amberjack (SEFSC Commercial Logbook 2011). Therefore, **Alternatives 2 - 5** would be beneficial but would only have minimal effects on the

physical environment relative to **Alternative 1**. Table 2.3.2 analysis the five alternatives depending on the ACL selected buffer. The difference among the five alternatives on direct and indirect effects to the environment is expected to be minimal.

Direct and Indirect Effects on the Biological/Ecological Environment

Management actions that directly impact the biological and ecological environment include fishing mortality and the resulting population size, life history characteristics, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size and reproductive potential. Benefits associated with ending overfishing and rebuilding the stock include: expanding the size- and age-structure, increasing stock abundance and biomass, and reducing mortality.

Alternative 1, the no action alternative is projected to provide the shortest fishing season but results in the highest number of discards after the season is closed. **Alternatives 2 - 5** would reduce will reduce the number of discards as compared to **Alternative 1** by not implementing the closed season, assuming the commercial sector is still harvesting other reef fish and may incidentally catch greater amberjack. The trip limits are expected to provide positive benefits to the biological and ecological environment by reducing the number of discards by slowing harvest and extending the fishing season. However, for multi-species fisheries, greater amberjack discards will increase after reaching the trip limit. **Alternative 5** would establish the smallest trip limit, but is expected to extend the fishing season the longest reducing discards that may occur during quota closures. Establishing a small trip limit such as (**Alternative 5**) would provide the greatest biological benefits to the resource by slowing harvest that should allow the stock to rebuild faster. It is possible a small trip limit could increase regulatory discards.

Direct and Indirect Effects on the Economic Environment

This action considers reductions to the commercial greater amberjack trip limit from the current 1,923 lbs gw. Reductions proposed would set the trip limit to 1,500 lbs gw (**Alternative 2**), 1,000 lbs gw (**Alternative 3**), 750 lbs (**Alternative 4**) or 500 lbs (**Alternative 5**). **Alternative 1**, the no action alternative, would not affect the commercial harvests of greater amberjack and would therefore not be expected to result in changes to the economic environment.

A reduction in the greater amberjack commercial trip limit would be expected to decrease the amount of harvest per trip. This would directly translate into reductions in ex-vessel revenues per trip and possibly profits assuming a relatively stable operating costs per trip. To the extent that the a trip limit reduction could postpone quota closures to a later date compared to status quo, some of the revenue losses from a trip limit could be recouped by undertaking more trips later in the year. These additional trips would also incur additional fishing costs so that profit per vessel as well as for the entire harvesting industry may remain the same, decrease, or increase. One favorable factor of a trip limit reduction is the possibility to lengthen the season and avoid concentrating landings over a short period of time which could depress prices. A longer fishing season would also afford those who target or catch greater amberjack on a seasonal basis additional opportunities to fish for the species. However, if the trip limit is too low, it may preclude fishermen from harvesting the entirety of the commercial quota, possibly resulting in revenue losses. Given

the limitations of current decision tool, the analysis presented focuses on changes in ex-vessel revenues. For 2015, estimated season lengths and associated changes in ex-vessel revenues relative to **Alternative 1** are provided for each alternative trip limit in Table 4.3.1. Changes in ex-vessel revenues were based on monthly average prices between 2009 and 2013.

Table 4.3.1. Estimated 2015 commercial greater amberjack season length and changes in ex-vessel value by trip limit. Trip limits in pounds gutted weight; season length in days; dollar values in 2013 dollars

	Trip Limit	Season Length	Changes in Ex-Vessel Value
Alternative 1	1,923	82	
Alternative 2	1,500	91	$3,599.38
Alternative 3	1,000	123	-$15,365.12
Alternative 4	750	157	-$32,731.67
Alternative 5	500	233	-$39,684.14

Source: SERO-LAPP 2015-01

If it is assumed that under status quo commercial fishermen have devised adequate fishing practices, e.g., catch composition, to optimize their fishing operations, sizeable reductions in trip limit would disrupt their customary practices and could be expected to adversely affect their revenues. However, smaller reductions in trip limit may not significantly affect fishing practices and may not adversely impact revenues. As previously noted, smaller trip limits could also reduce the amount of fish available and therefore have a positive effect on market prices. **Alternative 5**, which would establish the smallest trip limit, would be expected to result in the greatest adverse economic effect in 2015, followed by **Alternative 4**, then **Alternative 3**. It is estimated that the trip limit reduction that would be implemented under **Alternative 2** would not be large enough to adversely affect fishing practices and would offer opportunities to prosecute greater amberjack during a larger time period and result in positive economic effects for 2015. Changes in ex-vessel revenues estimated using the decision tool develop by SERO (2015) are expected to range from -$39, 684.11 (**Alternative 5**) to $3,599 (**Alternative 2**).

Combined commercial measures (ACL and ACT changes and trip limit reduction)

For 2015, commercial season lengths and net economic effects on the commercial sector that would be expected to result from the modifications to the commercial greater amberjack ACL and ACT (Action 1) and reductions in trip limit (Action 3) are provided in Tables 4.3.2 and 4.3.3, respectively.

Table 4.3.2 Commercial season lengths by commercial ACT and trip limit. Season length in days.

Trip Limit	Modifications to ACL and ACT		
	Alternative 1	Alternatives 2 and 3	
		Option a (15% buffer)	Option b (20% buffer)
Alternative 1	82	79	75
Alternative 2 (1,500 lbs)	91	87	83
Alternative 3 (1,000 lbs)	123	118	110
Alternative 4 (750 lbs)	157	151	140
Alternative 5 (500 lbs)	233	223	207

Source: SERO-LAPP 2015-01

Table 4.3.3: 2015 Changes in commercial greater amberjack ex-vessel values by trip limit and by commercial ACTs. Ex-vessel values in 2013 dollars

Trip Limit	Modifications to ACL and ACT		
	Alternative 1	Alternatives 2 and 3	
		Option a (15% buffer)	Option b (20% buffer)
Alternative 1	----	-$26,174.25	-$61,073.25
Alternative 2 (1,500 lbs)	$3,599.38	-$20,703.19	-$52,071.39
Alternative 3 (1,000 lbs)	-$15,365.12	-$30,831.43	-$57,007.06
Alternative 4 (750 lbs)	-$32,731.67	-$48,799.33	-$74,922.19
Alternative 5 (500 lbs)	-$39,684.14	-$59,739.48	-$89,210.90

Source: SERO-LAPP 2015-01

As previously discussed, larger trip limit reductions and decreases in ACT would be expected to result in greater adverse economic effects on the commercial sector. Therefore, for 2015, Action 1- Alternatives 2 or 3 (Option b) and Action 3-Alternative 3 would constitute the combination that would be expected to result in the greatest loss in ex-vessel revenues. Beyond 2015, combinations that include a trip limit reduction and ACL and ACT reductions would be expected to result in continued ex-vessel revenue losses. However, the sign and magnitude of economic effects expected to result from combinations that include a trip limit reduction and increases in commercial ACL and ACT are not known. The combined economic effects would be expected to be positive if the increases in commercial ACL and ACT more than offset the adverse economic

effects that would be expected to result from a reduction in trip limit beyond 1,500 lbs gw. Beyond 2015, the establishment of a 1,500 lb trip limit (Action 3-Alternative 3) in conjunction with increases in commercial ACL and ACTs would be expected to result in net positive economic effects because the trip limit reduction would not be large enough to disrupt fishing practices and prevent the commercial sector from harvesting its quota.

Direct and Indirect Effects on the Social Environment

Commercial trip limits in the range of 520 lbs to 2,000 lbs whole weight (ww) were evaluated as an alternative to eliminating the fixed closed season (March through May) in Amendment 35 (GMFMC 2012). A 2,000-lb w trip limit was adopted, which is now **Alternative 1**. With the addition of a 750-lb gw trip limit, the same alternatives are being re-evaluated here, [13] with the intent of improving progress under the new rebuilding plan. The commercial fixed closed season coincides with the peak spawning season of greater amberjack in the Gulf. The Council selected the largest trip limit (2,000 lbs) from among the alternatives. Although no additional social effects would be expected from maintaining the 2,000-lb trip limit (**Alternative 1**), the commercial sector is regularly exceeding its quota, reduced further each year as a result of prior overages, necessitating some reduction of the commercial harvest as part of the new rebuilding plan.

Modifying commercial trip limits would affect commercial fishermen depending on their existing fishing practice. Although few reef fish fishermen target greater amberjack regularly, those who do would be affected by a further reduction to the trip limit (**Alternatives 2-5**; Table 4.3.4). As discussed in Section 3.4, the majority of commercial fishermen land greater amberjack incidentally, alongside other reef fish as part of a multi-species fishing strategy. The 2,000 lb whole weight trip limit adopted in 2012 was projected to affect approximately 8% of vessels landing greater amberjack at some time during the year based on historical fishing behavior. The remaining alternatives propose to further reduce the trip limit. The number of vessels that make landings in excess of the threshold proposed by each alternative is shown in Table 4.3.4. For each of **Alternatives 2-5**, those involved with those vessels that make landings above each proposed trip limit would be the ones most affected by the alternative selected. The population affected would be the largest under the smallest trip limit (500 lbs; **Alternative 5**).

Table 4.3.4 contains the number of vessels per year that made greater amberjack landings in excess of each of the trip limits proposed by **Alternatives 2-5**. These data reflect the highest landings of each vessel at least once during the year and each vessel likely made numerous trips. The number of vessels with landings greater than each proposed trip limit is a subset of the previous column's maximum landing weight. For example, in 2009, 318 unique vessels landed at least one pound of greater amberjack during the year. Of those 318 vessels, 76 vessels landed more than 500 lbs on a single trip, on at least one trip during the year. The proportion of vessels that made at least a single landing greater than each of the proposed options is shown in Table 4.3.5. The table includes three time frames for comparison: the average number of vessels landing greater than each trip limit for 10 years, 5 years, and a single year (2013). Although the

[13] The trip limit alternatives in Amendment 35 (GMFMC 2012) were in pounds *whole weight*. Those proposed in this framework action are in pounds *gutted weight*. Alternative 1's, 2,000-lb trip limit equates to 1,923 lbs gutted weight.

number of vessels landing greater amberjack varies each year, the proportion of vessels with landings greater than each trip limit has remained consistent. These data facilitate consideration of the number of vessels that may be impacted by the adoption of each proposed trip limit.

Table 4.3.4. Number of vessels by year with greater amberjack landings greater than the proposed trip limits under Alternatives 2-5.

	Number of Vessels					
		Alt. 5	Alt. 4	Alt. 3	Alt. 2	Alt. 1
Year	1-499 lbs	>= 500 lbs	>=750 lbs	>=1000 lbs	>=1500 lbs	>=2000 lbs
1993	530	106	80	64	44	35
1994	566	134	94	66	45	36
1995	509	117	89	66	44	35
1996	509	134	94	74	46	35
1997	491	115	87	69	49	39
1998	446	97	68	52	28	24
1999	467	96	66	55	41	29
2000	464	101	76	60	44	30
2001	455	110	75	54	38	32
2002	465	100	75	57	38	31
2003	492	125	90	70	51	39
2004	468	108	84	65	46	37
2005	447	100	70	58	41	33
2006	360	86	61	48	34	30
2007	287	73	54	41	33	27
2008	314	79	56	41	24	19
2009	318	76	53	43	34	25
2010	222	59	46	36	27	23
2011	191	56	39	35	25	16
2012	143	47	40	37	28	21
2013	178	83	62	53	37	19

Source: Southeast Fisheries Science Center Commercial Logbook (Nov 2014).
Note: The columns contain the number of unique vessels landing greater amberjack. The first column (1-499 lbs) is the total number of vessels landing greater amberjack on at least one trip for the given year. Subsequent columns contain the number of vessels out of the total that landed more greater amberjack than each proposed trip limit on a single trip.

Table 4.3.5. Proportion of vessels with landings of greater amberjack that exceed each proposed trip limit option.

	Number of Vessels					
		Alt. 5	**Alt. 4**	**Alt. 3**	**Alt. 2**	**Alt. 1**
	1-499 lbs	**>= 500 lbs**	**>=750 lbs**	**>=1000 lbs**	**>=1500 lbs**	**>=2000 lbs**
2004-2013 (Average)	292.8	76.7	56.5	45.7	32.9	25
	100%	**26%**	**19%**	**16%**	**11%**	**9%**
2009-2013 (Average)	210.4	64.2	48	40.8	30.2	20.8
	100%	**31%**	**23%**	**19%**	**14%**	**10%**
2013	178	83	62	53	37	19
	100%	**47%**	**35%**	**30%**	**21%**	**11%**

Note: Although the number of vessels landing greater amberjack varies by year (see Table 4.3.4), the proportion of vessels with landings that exceed each trip limit option is fairly consistent.

Generally, greater amberjack is caught by vertical line alongside other reef fish species and makes up only a part of most vessels' landings per trip. On average over the last five years, 24% of vessels would be most impacted by the adoption of a 1,500-lb trip limit (**Alternative 2**); 43% would be impacted by a 1,000-lb trip limit (**Alternative 3**); 66% by a 750-lb trip limit (**Alternative 4);** and the most, 97% of vessels would have to modify their fishing strategy and behavior to avoid exceeding a 500-lb trip limit (**Alternative 5**).

Some vessels may target greater amberjack in a directed trip and land several thousands of pounds. Others conduct directed trips seasonally and yet others direct effort during part of a multi-day fishing trip, and would exceed 2,000 lbs on this day alone. However, it is more common for greater amberjack directed trips to be part of a flexible, multi-species strategy of a subset of vessels rather than a full-time dedicated fishery. It is not likely that any vessel targets greater amberjack full-time. In more recent years, a majority of vessels do not exceed 1,000 lbs on any trip during the year (Table 4.3.5). However, these examples of diversified fishing strategies represent examples of ways fishermen adapt to changing regulations and fishing conditions. Increasing the trip limit will narrow the available fishing options, negatively impacting fishing behavior and practice for some fishermen. Thus, increasing the trip limit is expected to affect a segment of participants in the reef fish fishery, rather than affecting all participants evenly. Vessels will likely continue to fish but their crew will switch effort in as yet unknown ways.

The smaller the trip limit, the longer the fishing season would be expected to remain open. In this way, there is a trade-off between the amount of greater amberjack that can be landed at one time, and the amount of time available to catch those fish. With a 2,000-lb trip limit (**Alternative 1)**, the season is expected to remain open for 75-92 days, depending on the buffer selected in Action 1. Smaller trip limits will impact more vessels, but allow the season to remain open longer. With a 1,500-lb trip limit, the season would be expected to be open 84-109 days (**Alternative 2)**; a 1,000-lb trip limit may provide a season of 113-148 days (**Alternative 3**); a 750-lb trip limit may provide a season of 145-156 days (**Alternative 4**), and the most restrictive

trip limit, 500 lbs (**Alternative 5**), would be expected to provide the longest fishing season, from 216-273 days. Thus, **Alternative 5** would provide the greatest benefits to fishermen who catch greater amberjack incidentally.

Direct and Indirect Effects on the Administrative Environment

Alternative 1 is not expected to impact the administrative environment because it would not change the current management measures. **Alternative 2 – 5** would be expected to have similar burden on the administrative environment due to the modification of the commercial trip limit. Therefore, **Alternative 1** would have the least adverse effect on the administrative environment.

4.4 Cumulative Effects

The cumulative effects from the greater amberjack rebuilding plan have been analyzed in Amendment 30A (GMFMC 2008a) and Amendment 35 (GMFMC 2012) cumulative effects to the reef fish fishery have been analyzed in Amendments 30B, and 31, and are incorporated here by reference (GMFMC 2008b; 2009). The effects of setting the ACL in this regulatory amendment are similar to the greater amberjack rebuilding plan in Amendment 35 (GMFMC 2012). This analysis found the effects on the biophysical and socioeconomic environments are positive in the long-term, because they would ultimately restore/maintain the stock at a level that allows the maximum benefits in yield and commercial and recreational fishing opportunities to be achieved. However, short-term negative impacts on the socioeconomic environment associated with greater amberjack fishing have occurred and are likely to continue due to the need to limit directed harvest and reduce bycatch mortality. These negative impacts can be minimized by selecting measures that would provide the least disruption to the greater amberjack component of the reef fish fishery while maintaining a stock ACL and sector quotas consistent with the adjusted rebuilding plan.

The cumulative effects from the Deepwater Horizon MC252 oil spill may not be known for several years. If there has been a reduction in spawning success in 2010, the impacts may not begin to manifest themselves until several years later when the fish that would have spawned in 2010 would have become large enough to enter the adult spawning population and be caught by greater amberjack fishers. For greater amberjack, in the recreational sector this occurs at approximately 2 years of age (~ 30 inches FL); whereas, in the commercial sector this occurs at approximately 4 years of age (~36 inches FL). Therefore, a year class failure in 2010 may not be felt by the spawning populations or by harvesters of greater amberjack until 2013 and 2014. The impacts would result in reduced fishing success and reduced spawning potential, and would need to be taken into consideration in the next SEDAR assessment.

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change web page provides basic background information on these and other measured or anticipated effects. In addition, Intergovernmental Panel on Climate Change has numerous reports addressing their assessments

of climate change (http://www.ipcc.ch/publications_and_data/publications_and_data.shtml). 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 include temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; changes in precipitation patterns and 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 influencing the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs (Kennedy et al. 2002). Modeling of climate change in relation to the northern Gulf of Mexico hypoxic zone may exacerbate attempts to reduce the area affected by these events (Justic et al. 2003). It is unclear how climate change would affect reef fishes, and likely would affect species differently. Climate change can affect factors such as migration, range, larval and juvenile survival, prey availability, and susceptibility to predators. In addition, 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. Climate change may significantly impact Gulf of Mexico reef fish species in the future, but the level of impacts cannot be quantified at this time, nor is the time frame known in which these impacts would occur. Actions from this amendment are not expected to significantly contribute to climate change through the increase or decrease the carbon footprint from fishing.

The effects of the proposed action are, and will continue to be, monitored through collection of landings data by NOAA Fisheries Service, 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 are collected through NOAA Fisheries Service Marine Recreational Information Program (MRIP), Head Boat Survey, and the Texas Marine Recreational Fishing Survey. Commercial data are collected through trip ticket programs, port samplers, and logbook programs, dealer reporting, as well as the individual fishing quota program (IFQ). Currently, a Update SEDAR assessment of Gulf of Mexico greater amberjack is scheduled for 2016.

There is the potential greater amberjack contaminated with oil from the Deepwater Horizon MC252 incident could be caught. However, federal and state governments have strong systems in place to test and monitor seafood safety and to prohibit harvesting from affected areas, keeping oiled products out of the market. The National Marine Fisheries Service (NMFS) is working closely with the U.S. Food and Drug Administration (FDA) and the States to ensure seafood safety. The first and most important preventive step in protecting the public from potentially contaminated seafood is from NMFS' actions to close fishing and shellfish harvesting areas in federal waters of the Gulf that have been or are likely to be exposed to oil from the spill. In addition, NOAA and FDA are monitoring fish caught just outside of closed areas, and testing them for petroleum compounds, to ensure that the closed areas are sufficiently large so as to prevent the harvest of contaminated fish. NOAA conducts a combination of both sensory analysis (of tissue) and chemical analysis (of water, sediment, and tissue) to determine if seafood is safe. If managers determine that seafood may be affected, the next step is to assess whether seafood is tainted or contaminated to levels that could pose a risk to human health through consumption. So far, fish and macrocrustacean flesh tested from outside the closure and from

closed areas that have subsequently been reopened have passed sensory and chemical analyses as described in Section 4.4.

CHAPTER 5. REGULATORY IMPACT REVIEW

CHAPTER 6. REGULATORY FLEXIBILITY ACT ANALYSIS

CHAPTER 7. LIST OF PREPARERS

Name	Expertise	Responsibility	Agency
John Froeschke	Fishery Biologist	Co-Team Lead – Amendment development, introduction, social analyses	GMFMC
Rich Malinowski	Biologist	Co-Team Lead – Amendment development, effects analysis, and cumulative effects	SERO
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Nick Farmer	Biologist	Data analysis	SERO
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Stephen Holliman	Economist	Reviewer	SERO
Assane Diagne	Economist	Economic effects analysis and Regulatory Impact Review	GMFMC
Nancie Cummings	Fishery Assessment Biologist	Reviewer	SEFSC

CHAPTER 8. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

The following have or will be consulted.

National Marine Fisheries Service
- Southeast Fisheries Science Center
- Southeast Regional Office
    - Protected Resources
    - Habitat Conservation
    - Sustainable Fisheries

NOAA General Counsel
U.S. Coast Guard

CHAPTER 9. REFERENCES

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APPENDIX A. CONSIDERED BUT REJECTED ALTERNATIVES

APPENDIX B. OTHER APPLICABLE LAW

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for management of stocks included in fishery management plans in federal waters of the exclusive economic zone. However, management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems that support those fisheries. Major laws affecting federal fishery management decision-making are summarized below.

Administrative Procedure Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the Act, the National Marine Fisheries Service (NMFS) is required to publish notification of proposed rules in the *Federal Register* and to solicit, consider, and respond to public comment on those rules before they are finalized. The Act also establishes a 30-day waiting period from the time a final rule is published until it takes effect.

Coastal Zone Management Act

Section 307(c)(1) of the federal Coastal Zone Management Act of 1972 (CZMA), as amended, requires federal activities that affect any land or water use or natural resource of a state's coastal zone be conducted in a manner consistent, to the maximum extent practicable, with approved state coastal management programs. The requirements for such a consistency determination are set forth in NOAA regulations at 15 CFR part 930, subpart C. According to these regulations and CZMA Section 307(c)(1), when taking an action that affects any land or water use or natural resource of a state's coastal zone, NMFS is required to provide a consistency determination to the relevant state agency at least 90 days before taking final action.

Upon submission to the Secretary of Commerce, NMFS will determine if this plan amendment is consistent with the Coastal Zone Management programs of the states of Alabama, Florida, Louisiana, Mississippi, and Texas to the maximum extent possible. Their determination will then be submitted to the responsible state agencies under Section 307 of the CZMA administering approved Coastal Zone Management programs for these states.

Data Quality Act

The Data Quality Act (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

Specifically, the Act directs the Office of Management and Budget to issue government wide guidelines that "provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." Such guidelines have been issued, directing all federal agencies to create and disseminate agency-specific standards to: (1) ensure information quality and develop a pre-dissemination review process; (2) establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and (3) report periodically to Office of Management and Budget on the number and nature of complaints received.

Scientific information and data are key components of fishery management plans (FMPs) and amendments and the use of best available information is the second national standard under the Magnuson-Stevens Act. To be consistent with the Act, FMPs and amendments must be based on the best information available. They should also properly reference all supporting materials and data, and be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data will also undergo quality control prior to being used by the agency and a pre-dissemination review.

Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, (16 U.S.C. Section 1531 et seq.) requires federal agencies use their authorities to conserve endangered and threatened species. The ESA requires NMFS, when proposing an action for managed stocks that "may affect" critical habitat or endangered or threatened species, to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service (USFWS) for all remaining species) to determine the potential impacts of the proposed action. Consultations are concluded informally when proposed actions may affect but are "not likely to adversely affect" endangered or threatened species or designated critical habitat. Formal consultations, including a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" endangered or threatened species or adversely modify designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives. NMFS, as part of the Secretarial review process, will make a determination regarding the potential impacts of the proposed actions.

On September 30, 2011, the Protected Resources Division released a biological opinion which, after analyzing best available data, the current status of the species, environmental baseline (including the impacts of the recent Deepwater Horizon MC 252 oil release event in the northern Gulf of Mexico), effects of the proposed action, and cumulative effects, concluded that the continued operation of the Gulf of Mexico reef fish fishery is also not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, nor the continued existence of smalltooth sawfish (NMFS 2011b).

On September 10, 2014, NMFS published a final rule listing as threatened 20 coral species under the Endangered Species Act. Four of the newly listed coral species are found in the Gulf of

Mexico. NMFS concurs with the effects determination that the continued authorization of the Gulf of Mexico Reef Fish Fishery Management Plan (Reef Fish FMP) is not likely to adversely affect the newly listed coral species. On September 10, 2014, NMFS published a final rule (79 FR 53852) listing as threatened 20 coral species under the Endangered Species Act. Four of the newly listed coral species are found in the Gulf of Mexico. In memos dated September 16, 2014, and October 7, 2014, NMFS determined that activities associated with the subject FMP will not adversely affect any of the newly listed coral species. In the October 7, 2014, memo NMFS also determined that although the September 10, 2014, Final Listing Rule provided some new information on the threats facing *Acropora*, none of the information suggested that the previous determinations were no longer valid.

Fish and Wildlife Coordination Act

Fish and Wildlife Coordination Act of 1934 (16 U.S.C. 661-667e) provides the basic authority for the USFWS's involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It also requires federal agencies that construct, license or permit water resource development projects to first consult with the Service (and NMFS in some instances) and State fish and wildlife agency regarding the impacts on fish and wildlife resources and measures to mitigate these impacts.

The fishery management actions in the Gulf of Mexico are not likely to affect wildlife resources pertaining to water resource development as the economic exclusive zone is from the state water boundary extending to 200 nm from shore.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, (Public Law 89-665; 16 U.S.C. 470 *et seq.*) is intended to preserve historical and archaeological sites in the United States of America. Section 106 of the NHPA requires federal agencies to evaluate the impact of all federally funded or permitted projects for sites on listed on, or eligible for listing on, the National Register of Historic Places and aims to minimize damage to such places.

Typically, fishery management actions in the Gulf of Mexico are not likely to affect historic places with exception of the *U.S.S. Hatteras*, located in federal waters off Texas, which is listed in the National Register of Historic Places. Greater Amberjack occur off Texas, however the proposed actions are not likely to increase fishing activity above previous years. Thus, no additional impacts to the *U.S.S. Hatteras* would be expected.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the United States. Under the MMPA, the Secretary of Commerce (authority delegated to NMFS) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The Secretary

of the Interior is responsible for walruses, sea and marine otters, polar bears, manatees, and dugongs.

Part of the responsibility that NMFS has under the MMPA involves monitoring populations of marine mammals to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted," and a conservation plan is developed to guide research and management actions to restore the population to healthy levels.

In 1994, Congress amended the MMPA, to govern the taking of marine mammals incidental to commercial fishing operations. This amendment required the preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction, development and implementation of take-reduction plans for stocks that may be reduced or are being maintained below their optimum sustainable population levels due to interactions with commercial fishing activities, and studies of pinniped-fishing activity interactions.

Under section 118 of the MMPA, NMFS must publish, at least annually, a List of Fisheries that places all U.S. commercial fishing activities into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishing activity. The categorization of a fishing activity in the List of Fisheries determines whether participants in that fishing activity may be required to comply with certain provisions of the MMPA, such as registration, observer coverage, and take reduction plan requirements.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (16 U.S.C. 703) protects migratory birds. The responsibilities of federal agencies to protect migratory birds are set forth in Executive Order 13186. The USFWS is the lead agency for migratory birds. The birds protected under this statute are many of our most common species, as well as birds listed as threatened or endangered. A memorandum of understanding (MOU) between NMFS and the USFWS, as required by Executive Order 13186 (66 FR 3853, January 17, 2001), is to promote the conservation of migratory bird populations. This MOU focuses on avoiding, or where impacts cannot be avoided, minimizing to the extent practicable, adverse impacts on migratory birds and strengthening migratory bird conservation through enhanced collaboration between NMFS and the USFWS by identifying general responsibilities of both agencies and specific areas of cooperation. Given NMFS' focus on marine resources and ecosystems, this MOU places an emphasis on seabirds, but does not exclude other taxonomic groups of migratory birds.

Typically, fishery management actions in the Gulf of Mexico are not likely to affect migratory birds. The proposed actions are not likely to change the way in which the fishery is prosecuted. Thus, no additional impacts are reasonably expected.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure the public is not overburdened with information requests, the federal government's information collection procedures are efficient, and federal

agencies adhere to appropriate rules governing the confidentiality of such information. The Act requires NMFS to obtain approval from the Office of Management and Budget before requesting most types of fishing activity information from the public. None of the alternatives in this amendment are expected to create additional paperwork burdens.

Prime Farmlands Protection and Policy Act

The Farmland Protection and Policy Act of 1981 (7 U.S.C. 4201) was enacted to minimize the loss of prime farmland and unique farmlands as a result of Federal actions by converting these lands to nonagricultural uses. It assures that federal programs are compatible with state and local governments, and private programs and policies to protect farmland.

The fishery management actions in the Gulf of Mexico are not likely to affect farmlands as the economic exclusive zone is from the state water boundary extending to 200 nm from shore.

National Wild and Scenic Rivers System

The National Wild and Scenic Rivers System of 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) preserves certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The Act safeguards the special character of these rivers, while also recognizing the potential for their appropriate use and development. It encourages river management that crosses political boundaries and promotes public participation in developing goals for river protection.

The fishery management actions in the Gulf of Mexico are not likely to affect wetland habitats as the economic exclusive zone is from the state water boundary extending to 200 nm from shore.

North American Wetlands Conservation Act

The North American Wetlands Conservation Act of 1989 (Public Law 101-233) established a wetlands habitat program, administered by the USFWS, to protect and manage wetland habitats for migratory birds and other wetland wildlife in the United States, Mexico, and Canada.

The fishery management actions in the Gulf of Mexico are not likely to affect wetland habitats as the economic exclusive zone is from the state water boundary extending to 200 nm from shore.

Executive Orders (E.O.)

E.O. 12630: Takings

The E.O. on Government Actions and Interference with Constitutionally Protected Property Rights that became effective March 18, 1988, requires each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication

Assessment. The NOAA Office of General Counsel will determine whether a Taking Implication Assessment is necessary for this amendment.

E.O. 12866: Regulatory Planning and Review

E.O. 12866: Regulatory Planning and Review, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. RIRs provide a comprehensive analysis of the costs and benefits to society of proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Analysis. A regulation is significant if it 1) Has an annual effect on the economy of $100 million or more or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments and communities; 2) creates a serious inconsistency or otherwise interferes with an action taken or planned by another agency; 3) materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or 4) raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

E.O. 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations

This E.O. mandates that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions.

E.O. 12962: Recreational Fisheries

This E.O. requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including, but not limited to, developing joint partnerships; promoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of federally-funded, permitted, or authorized actions on aquatic systems and recreational fisheries, and documenting those effects. Additionally, it establishes a seven-member National Recreational Fisheries Coordination Council (NRFCC) responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management

technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The NRFCC also is responsible for developing, in cooperation with federal agencies, States and Tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the E.O. requires NMFS and the USFWS to develop a joint agency policy for administering the ESA.

E.O. 13089: Coral Reef Protection

The E.O. on Coral Reef Protection requires federal agencies whose actions may affect U.S. coral reef ecosystems to identify those actions, utilize their programs and authorities to protect and enhance the conditions of such ecosystems, and, to the extent permitted by law, ensure actions that they authorize, fund, or carry out do not degrade the condition of that ecosystem. By definition, a U.S. coral reef ecosystem means those species, habitats, and other national resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States (e.g., federal, state, territorial, or commonwealth waters).

Regulations are already in place to limit or reduce habitat impacts within the Flower Garden Banks National Marine Sanctuary. Additionally, NMFS approved and implemented Generic Amendment 3 for Essential Fish Habitat (GMFMC 2005), which established additional habitat areas of particular concern (HAPCs) and gear restrictions to protect corals throughout the Gulf of Mexico. There are no implications to coral reefs by the actions proposed in this amendment.

E.O. 13132: Federalism

The E.O. on Federalism requires agencies in formulating and implementing policies, to be guided by the fundamental Federalism principles. The E.O. serves to guarantee the division of governmental responsibilities between the national government and the states that was intended by the framers of the Constitution. Federalism is rooted in the belief that issues not national in scope or significance are most appropriately addressed by the level of government closest to the people. This E.O. is relevant to FMPs and amendments given the overlapping authorities of NMFS, the states, and local authorities in managing coastal resources, including fisheries, and the need for a clear definition of responsibilities. It is important to recognize those components of the ecosystem over which fishery managers have no direct control and to develop strategies to address them in conjunction with appropriate state, tribes and local entities (international too).

No Federalism issues were identified relative to the action to modify the management of the recreational harvest of greater amberjack. Therefore, consultation with state officials under Executive Order 12612 was not necessary. Consequently, consultation with state officials under Executive Order 12612 remains unnecessary.

E.O. 13158: Marine Protected Areas

This E.O. requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. There are several marine protected areas, HAPCs, and gear-restricted

areas in the eastern and northwestern Gulf of Mexico. The existing areas are entirely within federal waters of the Gulf of Mexico. They do not affect any areas reserved by federal, state, territorial, tribal or local jurisdictions.

APPENDIX C. SUMMARIES OF PUBLIC COMMENTS RECEIVED

APPENDIX D. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

The Gulf of Mexico Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) §303(a) (11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable and in the following order: 1) Minimize bycatch, and 2) minimize the mortality of bycatch that cannot be avoided. The Magnuson-Stevens Act defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program" (Magnuson-Stevens Act §3(2)). Economic discards are fish that are discarded because they are undesirable to the harvester. This category of discards generally includes certain species, sizes, and/or sexes with low or no market value.

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

Guidance provided at 50 CFR 600.350(d)(3) identifies ten factors to consider in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable. These are:

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

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

The harvest of greater amberjack is currently regulated with size limits, bag limits, quotas, and seasonal closures. These measures are generally effective in limiting fishing mortality, the size of fish landed, the number of targeted fishing trips, and/or the time fishermen spend pursuing a species. However, these management tools may have the unavoidable adverse effect of creating regulatory discards, which reduces landings. Consequently, the Council is considering in this amendment the practicability of taking additional action to further minimize greater amberjack bycatch, by sector.

Greater Amberjack Release Mortality Rates

Commercial Discard Rates

Greater amberjack discard rates were calculated for the Gulf of Mexico vertical line fishery using both self-reported data (discard coastal logbook) and observer data (SEDAR 33 2014). Total Gulf of Mexico vertical line (handline and electric reel/bandit rig) effort was used along with the calculated discard rates to provide two estimates of total greater amberjack discards from the Gulf of Mexico vertical line fishery. Those calculated discards were also compared with discard estimates calculated for the 2006 greater amberjack assessment (SEDAR 9 2010). Vertical line discards, calculated using the self-reported data, are presented in Table 6.1. Calculation of discards followed the methods used in the 2014 Southeast Data, Assessment and Review (SEDAR) 33 data workshop (SEDAR 33 2014). In that analysis, results from generalized linear models indicated significant differences in discard rates across time period (January - July, August - December) and number of hooks per line fished (1-2, 3-9, >9 hooks). Mean discard rates were calculated for each year, by month, and hooks per line. Total effort was available from the coastal logbook data (a census of landings and effort data from vessels with federal fishing permits). Effort, defined as number of trips, was summed within each year/period/hooks per line. Total discards were calculated for each stratum as: Stratum mean discard rate per trip x the number of stratum total trips. Discards of all strata within a year were summed to provide total yearly discards. Confidence intervals (5% and 95%) were calculated for each stratum specific discard rate. The discard rates at the confidence intervals were also multiplied by total vertical line effort to provide a measure of uncertainty around the discard calculations. Discards were calculated as numbers of discarded fish and were converted to pounds by multiplying by 12.83 pounds, the mean weight of a discarded greater amberjack reported in observer data from years 2002 - 2009. Total weight of discards was also calculated for 20% and 40% discard mortality, following the methods of the SEDAR 33 (2014).

Amendment 1 to the Reef Fish Fishery Management Plan (FMP) implemented a 36-inch fork length commercial minimum size regulation in 1990, thus discarding can be expected for years

1990 and later. To calculate discards for the years 1990 - 2001, the mean discard rate across the years 2002 - 2009 was calculated for each hook per line stratum. Those discard rates were multiplied by total vertical line effort within each year/hooks per line stratum.

The Discard rate was calculated as number of fish discarded per hook-hour fished. Total effort in hook-hours was available from the coastal logbook data. Total discards per year during 2007 - 2009 were calculated as: yearly mean discard rate per hook-hour fished x total hook-hours fished. Yearly discards for the years 1990-2006 were calculated using the mean discard rate across all years, 2007 - 2009, multiplied by the yearly total effort in hook hours. Uncertainty around the yearly calculated discards was determined following the methods described above for self-reported discard analyses. Vertical line discards and the weight of dead discards with 20% and 40% discard mortality are calculated using the observer data are presented in SEDAR 9 (2006c) in Table (3.3.1.1b).

The SEDAR 9 (2006c) stock assessment provides a comparison of yearly total discards of greater amberjack from commercial vertical line vessels calculated using both self-reported discard data and observer data in Table 6.1 and 6.2. Total discards calculated using the same data set for the update assessment, but with the corrected code were less than 500,000 pounds per year. It is also noted that the self-reported discards may be unrealistically low due to a proportion of fishers, as many as 40% of all trips in a year, reporting “no discards” for a trip. Total discards calculated using the observer data, in contrast, were more similar to the SEDAR 9 (2006c) discards than to the 2010 self-reported discards. Commercial vertical line discards calculated using observer reported discard rates were much higher in 2008 than in other years. The 2Bertalanffy009 calculated discards, however, were the fewest of any year of the time series. That large variability between years may have resulted from the small number of hook-hours observed, which, by chance, had either much greater (2008) or lesser (2009) discard rates than both the 2007 rate and the mean rate (SEDAR 9 2006c; Table 3.3.2). During each year of available observer data, the sampling fraction (percent of total effort observed) was less than 1% of the total effort reported to the coastal logbook program. Variability in discards among years prior to 2007 was due to yearly differences in total effort because the mean discard rate was applied to yearly effort during that period.

Numbers of discards were calculated using the mean discard rate. Pounds of discards were calculated by applying the mean weight of a discarded fish to the number of discards. Number of discards assuming a 20% and 40% discard mortality were also calculated. Confidence intervals (CI) were the number of discards calculated by applying the discard rates at the 5% and 95% confidence intervals of the mean rate to total effort.

Table 6.1. Mean headboat, MRIP and TPWD charter and private, and commercial estimates of landings and discards in the U.S. Gulf of Mexico (2009-2013).

	HEADBOAT				MRIP CHARTER				MRIP PRIVATE				COMMERCIAL	
Species	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Landings (lbs)	Discards (N)
Almaco jack	2,048	2,005	43	2%	6,574	4,587	1,987	43%	6,720	5,100	1,619	32%	36,277	14
Banded rudderfish	7,160	6,094	1,066	17%	26,874	25,473	1,401	6%	36,731	5,606	31,125	555%	17,549	130
Black grouper	123	42	81	193%	48	5	44	963%	5,359	811	4,548	561%	46,855	7,119
Blackfin snapper	142	138	4	3%	0	0	0		0	0	0		4,698	0
Blueline tilefish	196	195	1	0%	43	43	0	0%	0	0	0		67,901	296
Cobia	1,163	933	231	25%	9,102	4,836	4,265	88%	84,797	28,360	56,437	199%	69,204	0
Cubera snapper	204	197	7	3%	32	11	21	185%	694	505	189	37%	1,307	0
Gag	50,769	7,241	43,528	601%	273,454	38,260	235,195	615%	1,511,705	141,368	1,370,337	969%	620,534	120,066
Golden tilefish	323,148	323,148	0	0%	266,716	260,021	6,694	3%	286,715	209,910	76,804	37%	376,649	2,320
Goldface tilefish	7	7	0	0%	0	0	0		0	0	0		9,056	0
Goliath grouper	3	0	3		0	0	0		0	0	0		0	300
Gray snapper	24,672	22,948	1,724	8%	315,349	159,145	156,204	98%	3,959,312	883,280	3,076,032	348%	155,194	14,093
Gray triggerfish	30,683	10,739	19,943	186%	108,470	36,955	71,514	194%	225,842	80,159	145,683	182%	74,997	7,533
Greater amberjack	7,460	3,554	3,906	110%	68,517	27,535	40,982	149%	196,374	30,965	165,409	534%	481,954	13,525
Hogfish	2,140	1,924	216	11%	8,701	8,262	439	5%	122,430	116,183	6,246	5%	36,203	23
King Mackerel	16,344	16,199	144	1%	112,602	95,477	17,124	18%	274,695	190,576	84,120	44%	3,604,244	39,579
Lane snapper	58,989	54,143	4,845	9%	49,927	37,495	12,432	33%	285,923	100,272	185,651	185%	23,923	1,947
Lesser amberjack	363	286	77	27%	142	142	0	0%	447	167	281	168%	21,190	239
Mutton snapper	418	409	9	2%	426	0	426		3,112	426	2,686	630%	77,736	68
Queen snapper	33	33	0	0%	33	0	33		0	0	0		12,427	0
Red grouper	136,517	8,928	127,589	1429%	557,223	70,392	486,830	692%	1,963,520	152,818	1,810,702	1185%	4,992,180	817,288

Species	HEADBOAT				MRIP CHARTER				MRIP PRIVATE				COMMERCIAL	
	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Catch (N)	Landings (N)	Discards (N)	Discards (%)	Landings (lbs)	Discards (N)
Red snapper	208,227	112,215	96,011	86%	530,186	166,736	363,451	218%	2,073,714	566,754	1,506,960	266%	3,773,741	226,966
Scamp	4,515	2,515	2,000	80%	15,618	11,832	3,787	32%	50,320	14,248	36,072	253%	246,538	1,126
Silk Snapper	53	53	0	0%	3,495	2,684	811	30%	22,834	22,834	0	0%	38,597	3
Snowy grouper	1,997	100	1,897	1905%	747	723	25	3%	6,358	5,896	462	8%	153,962	224
Spanish Mackerel	2,773	2,749	24	1%	294,725	201,510	93,214	46%	4,000,616	1,762,996	2,237,620	127%	1,506,135	222
Speckled Hind	133	77	56	73%	308	220	89	40%	870	330	539	163%	41,720	56
Vermilion snapper	10,084	0	10,084		0	0	0		0	0	0		2,581,867	5,973
Warsaw grouper	274	113	161	143%	186	176	10	6%	484	484	0	0%	97,402	8
Wenchman	0	0	0		0	0	0		0	0	0		30,465	0
Yellowedge grouper	46	45	1	1%	338	330	8	2%	273	273	0	0%	742,028	218
Yellowfin grouper	0	0	0	0%	19	19	0	0%	781	0	781		1,511	0
Yellowmouth grouper	22	22	1	3%	46	46	0	0%	125	0	125		421	0
Yellowtail snapper	3,787	2,837	950	33%	527	518	9	2%	6,569	3,780	2,789	74%	718,060	91,072

Source: SEFSC ACL Data Set (2014).

In the SEDAR 9 (2006c) evaluation of greater amberjack discard rates, estimates of discards were not made for longline gear. For the 2011 update assessment, this convention was carried forward. As summarized earlier in Section 3.2 (Commercial landings summary by gear), this species is not targeted by longline gear. Future assessments evaluations should continue to examine both the self-reported and observer data to better quantify the levels of greater amberjack discards from commercial longline gear.

Release mortality rate for greater amberjack in the Gulf of Mexico is unreported (SEDAR 9 2006c). Headboat and commercial handline observer studies off North Carolina estimated release mortality rate ranges from 8-9% for greater amberjack (Robert Dixon, pers. comm. in SEDAR 9 2006c); however, sample sizes were small for these studies. Release mortality rates were based on observations of greater amberjack at the surface after release (floating, swimming down etc). The SEDAR 9 (2006c) data workshop panel suggested a minimum release mortality rate for greater amberjack of 10% for vertical line, with actual release mortality potentially higher owing to fish dying after release that did not float at the surface. The SEDAR 9 (2006c) data workshop panel recommended using a range of release mortality rates to evaluate the sensitivity of the SEDAR 9 stock assessment to this parameter. Discard mortality rates of 0, 20, and 40% were used for the assessment, with 20% selected based on the information available.

Greater amberjack are also caught as bycatch in shrimp trawls. The SEDAR 9 (2006c) data workshop panel noted that greater amberjack, at that time, was not on the workup for the observer evaluation program. The Panel further noted that because their abundance in trawls is so low as supported by the average percent occurrence values with (99%) and without (8%) Bycatch Reduction Gear that reliable annual estimate would have been difficult with these statistical estimators, primarily due to the high frequency of zero observations, see SEDAR 9 (2006c Data Workshop Report, Section 3.4.2, page 24, and Table 3.5). In general, estimation results from all the methods where estimations were produced (modified Bayesian and Model 7) indicated large to enormous uncertainty and the SEDAR 9 2006c data workshop panel noted the results seemed unrealistic. Estimates from the Bayesian model were not successful. In addition, assigning size (or age) to estimates of shrimp trawl bycatch was not possible at the time of the SEDAR 9 (2006c) stock assessment, as only a very few observations from the observer study had been measured.

Recreational Discard Rates

Unlike the Marine Recreational Informational Program (MRIP), the SEFSC Headboat survey does not provide estimates of released fish. Because a proportion of the released fish are expected to die, the estimated number of releases is necessary to develop a complete time series of removals for use in subsequent population modeling analysis. Table 6.1 provides mean discard estimates (numbers of fish) from the MRIP survey.

The protocols adopted by the SEDAR 9 (2006c) data workshop panel to quantify discards for the headboat mode were continued for the SEDAR 33 (2014). There were two main recommendations made: 1) Estimate the ratio of headboat releases (B2) to the total catch (A+B1+B2) from MRFSS charterboat mode only (Table 5.3 and Table 5.4) and 2) use this

source (and sector) to estimate headboat releases. The SEDAR 9 (2006c) data workshop panel felt that charterboat and headboat fishing are most similar and the rate of released fish would be most alike. Private boat fishing likely would not be the same as the "for-hire" sector. New information on recreational discards available from self-reported logbooks and also from observer trips was also reviewed for the SEDAR 9 Update (2010).

As in the previous three greater amberjack stock evaluations discards were not estimated for Texas Parks and Wildlife Department source data.

Other Bycatch

Species incidentally encountered by the directed greater amberjack fishery include sea turtles, sea birds, and reef fishes. The primary gears of the Gulf reef fish fishery (longline and handline) are classified in the proposed List of Fisheries for 2015 (79 FR 50589, August 25, 2014) as Category III gear and is unchanged from the 2014 list. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent 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.

NMFS has conducted specific analyses ("Section 7 consultations") to evaluate potential effects from the Gulf reef fish fishery on species and critical habitats protected under the ESA. On September 30, 2011, the Protected Resources Division released a biological opinion (Opinion), which concluded that the continued operation of the Gulf reef fish fishery is not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish (NMFS 2011). The Opinion also concluded that other ESA-listed species are not likely to be adversely affected by the FMP. 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. The Council addressed further measures to reduce take in the reef fish fishery's longline component in Amendment 31 (GMFMC 2009).

Subsequent to the completion of the biological opinion, NMFS published final rules listing 20 new coral species (September 10, 2014), and designating critical habitat for the Northwest Atlantic Ocean distinct population segment of loggerhead sea turtles (July 10, 2014). NMFS addressed these changes in a series of consultation memoranda. In a consultation memorandum dated October 7, 2014, NMFS assessed the continued operation of the Gulf reef fish fishery's potential impact on the newly-listed coral species occurring in the Gulf and concluded the fishery is not likely to adversely affect any of the protected coral species. Similarly, in a consultation memorandum dated September 16, 2014, NMFS assessed the continued authorization of South Atlantic and Gulf of Mexico fisheries' potential impacts on loggerhead critical habitat and concluded the Gulf reef fish fishery is not likely to adversely affect the newly designated critical habitat.

Three primary orders of seabirds are represented in the Gulf, Procellariiformes (petrels, albatrosses, and shearwaters), Pelecaniformes (pelicans, gannets and boobies, cormorants, tropic birds, and frigate birds), and Charadriiformes (phalaropes, gulls, terns, noddies, and skimmers) (Clapp et al., 1982; Harrison, 1983) and several species, including: piping plover, least tern, and roseate tern are listed by the U.S. Fish and Wildlife Service as either endangered or threatened. Note the brown pelican and bald eagle had been listed as endangered or threatened, but have subsequently been delisted. Human disturbance of nesting colonies and mortalities from birds being caught on fishhooks and subsequently entangled in monofilament line are primary factors affecting sea birds. Oil or chemical spills, erosion, plant succession, hurricanes, storms, heavy tick infestations, and unpredictable food availability are other threats. There is no evidence that the directed greater amberjack fishery is adversely affecting seabirds. However, interactions, especially with brown pelicans consuming greater amberjack discards and fish before they are landed, are known to occur (SEDAR 7 2005).

Other species of reef fish are also incidentally caught when targeting greater amberjack. In the Gulf, almaco jack and vermilion snapper and some deep-water groupers are incidentally caught as bycatch when harvesting greater amberjack. Deep-water groupers are caught both in the eastern and western Gulf primarily with longline gear (> 80 percent). The deep-water grouper fishery was managed with a 1.207 million pound annual catch limit. From 2004 until the implementation of the grouper/tilefish IFQ program in 2010 (SERO 2012a), the fishery met their quota and closed no later than July 15 each year. Deep-water grouper closures during this time period may have resulted in some additional discards of grouper by longliners targeting greater amberjack. Since the IFQ program was implemented, deep-water grouper species are landed year-round by holders of IFQ allocation and the quota has not been exceeded. It is unknown how increases in closed season discards might have affected the status of reef fish stocks or the change to an IFQ managed sector.

Practicability of current management measures in the directed greater amberjack fishery relative to their impact on bycatch and bycatch mortality.

The harvest of commercial greater amberjack is managed with a 36-inch fork length (FL) minimum size limit, March through May seasonal closure, and gear restrictions. A 30-inch FL minimum size limit and one-fish bag limit are used to manage the recreational harvest of greater amberjack. The following discusses current and proposed management measures with respect to their relative impacts on bycatch.

Size limits

Minimum size limits is estimated to be the greatest source of regulatory discards for most reef fish species. In 1990, a 36-inch fork length (FL) commercial minimum size limit and a 28-inch FL recreational minimum size limit were implemented for greater amberjack. The recreational size limit was increased to a 30-inch FL minimum size limit in August 2008.

Size limits are typically established to reduce fishing mortality, increase yield-per-recruit, and prevent growth overfishing. A negative consequence of increasing the minimum size limit is potential increases in discards. A 1996 - 1999 tagging study of commercially caught greater amberjack in the South Atlantic indicated 41% of all greater amberjack caught were discarded (J. McGovern, Southeast Regional Office, pers. comm.). Reducing the commercial minimum size limit would reduce discards significantly (SERO 2007), but would increase harvest rates and therefore fishing mortality, unless further restrictions are imposed. Increasing the recreational minimum size limit is estimated to increase the proportion of dead discards to landings, but the overall magnitude of dead discards is estimated to be less for higher size limits relative to the status quo because of the reductions in harvest being considered in this amendment. Historical trends indicate dead discards increased after implementation of higher size limits, but quickly declined as the size distribution of greater amberjack adjusted to the new minimum size limit.

A yield-per-recruit analysis has recently been conducted to determine if the legal minimum size limit for greater amberjack is adequately protecting against growth overfishing (SEDAR 9 2006c; Appendix 12.4.3). Greater amberjack spawning conditions are described in Section 3.2 and are hereby incorporated by reference. Increasing the recreational minimum size limit could

potentially benefit spawning potential if the increase does not result in a significant amount of forgone yield due to losses associated with natural and release mortality. Yield-per-recruit analysis did increase for larger minimum size limits, but only when fishing mortality was greater than the fishing mortality rate corresponding to an equilibrium yield of MSY (Fmsy) (F=0.33 from SEDAR 9 Update 2010), but fishing at this rate would result in overfishing based on the estimates in the 2010 SEDAR 9 Update (Appendix 12.4.3). The yield-per-recruit and spawning potential ratio analysis (Appendix 12.4.3) should be used for theoretical purposes as methods the Council could use for management purposes. (http://gulfcouncil.org/resources/SSC_Reports.php).

This amendment includes alternatives to modify the current recreational minimum size limit of 30 inches FL to 32, 34, or 36 inches FL, respectively. Based upon the decision model (SERO-LAPP 2015-01), under the assumption of 20% release mortality, the estimated dead discards increase as the minimum size limit increases from 30 inches FL. However, if the minimum size limit is increased, harvest is estimated to slow, because fewer fish are landed so total removals do not increase proportionately. The Council is considering increasing the minimum size limit in Amendment 35 (GMFMC 2012) but opted against it, due to concerns about the quota being caught more quickly if the minimum size was modified (i.e., harvest would not be slowed) as well as potentially increasing bycatch mortality.

Closed Seasons

The March through May commercial greater amberjack season closure was implemented in January 1998. The commercial season closure corresponds to the peak period of spawning (Burch 1979; Thompson et al. 1991; Beasley 1993; Harris et al. 2004). Discards are thought to be minimal during the closed season because commercial fishermen can avoid targeting schools of greater amberjack. A June through July recreational fishing closure was implemented to prevent the quota from being exceeded in 2011. This amendment includes alternatives that would modify the existing June through July recreational closed season to the following: No fixed season closure (i.e., January 1 until the quota is reached), March through May, and a split season closure of January through May and November through December. Implementing a closed season would be expected to increase the number of discards, although the impacts on the stock would be substantially reduced if targeted trips for greater amberjack are eliminated during the closed season as recreational anglers choose to pursue retainable stocks (Reef Fish Amendment 35 Appendix 12.4.1, GMFMC 2012).

Bag Limits

A one-fish greater amberjack recreational bag limit has been in effect since 1997. A restrictive bag limit can encourage discards from high-grading once the bag limit is met. However, the minimum size limit likely plays a more significant role in determining the overall number of recreational discards. During 2003 - 2005, approximately 31% of MRFSS trips landing greater amberjack reported landing one or more greater amberjack per angler (A. Strelcheck, Southeast Regional Office, pers. comm.). This large percentage of trips indicates the potential for discards after the bag limit is met. However, no changes to the bag limit are currently proposed in this amendment for the recreational harvest of greater amberjack.

Allowable Gear

Vertical hook-and-line gear (bandit rigs, manual handlines) is the primary gear used to commercially harvest greater amberjack. Using greater amberjack landings history from 2004 - 2013, commercial vertical line gear (i.e., electric reel, bandit rig, hook and line, and trolling) accounted for 68% of the greater amberjack landings, longlines landed 10% of the greater amberjack and 22% of the landings were from unclassified gear types (SEFSC Commercial ACL Data 2011).

On average, longlines harvest larger greater amberjack than vertical-line gear. Trip Intercept Program data from 2003 - 2005 indicates the average size of greater amberjack caught on longlines was four inches greater than the average size caught on vertical-line gear (43.6 vs. 39.6 inches FL). The difference in size at harvest is evident in size limit analyses for greater amberjack, which indicate greater reductions in harvest occur for vertical-line gear than longlines when comparing similar minimum size limits (SERO 2007). Because the size of landed fish is greater, the number of discards is less on longlines than vertical-line gear because the gear selects for larger fish. McCarthy (2005) estimated vertical-line gear discards of greater amberjack by the commercial fishery during 1993 to 2004, but could not estimate longline discards because of the small number of trips reporting discards. Additionally, little is known on the release mortality rates associated with each of these gears. The SEDAR 33 (2014) assessment assumed a constant 20% release mortality rate for all gears and fisheries. More scientific information is needed to determine the magnitude and release mortality rates for various gears used to commercially harvest greater amberjack. For instance, for commercial red grouper longlines are assumed to have a 45% release mortality rate while vertical-line gear has a 10% release mortality rate. This difference in release mortality rate between gears can be important if one gear discards substantially more fish than the other, but kills a smaller percentage of the fish released.

Rod-and-reel is the primary gear used in the recreational sector. Circle hooks are used by some anglers when targeting greater amberjack. Some greater amberjack are also caught using spears, which do not affect discards or release mortality because all fish caught are killed. Only undersized fish mistakenly killed while spearfishing would contribute to discard mortality.

Recreational discards are primarily due to the recreational size limits and the one-fish greater amberjack bag limit; however, allowable gears can affect release mortality rates. Amendment 27 to the Reef Fish FMP summarizes various research studies examining the effects of circle hooks, hook sizes, venting tools, and dehooking devices on survival of reef fishes after release (GMFMC 2007).

Alternatives being considered to minimize bycatch

Reductions in dead discards can be accomplished either by reducing the number of greater amberjack discarded or reducing the release mortality rate of discards. To reduce the number of discards, management measures must limit fishing effort or change the selectivity of fishing gears in such a way that reduces the harvest of sub-legal fish. To reduce the discard mortality

rate of greater amberjack, sources of release mortality must first be identified (e.g., depth, length, hooking location, surface interval, temperature) and management measures must be imposed to reduce discard mortality rates.

This amendment considers several management measures to reduce greater amberjack mortality. However, discards and discard mortality are anticipated to increase in the management measures. Increasing the recreational minimum size limits and closed season is expected to increase the amount of greater amberjack discards. The commercial trip limit management measure is also expected to increase the amount of greater amberjack discards.

Practicability Analysis

Criterion 1: Population effects for the bycatch species

Bycatch of greater amberjack due to management measures such as fixed closed seasons, in-season closures, and minimum size limits could result in loss of yield. Based on theoretical analysis (Amendment 35, Appendix 13.4.1) increasing the minimum size limit based on current estimates of fishing mortality is expected to reduce yield-per-recruit. Any reductions in bycatch of greater amberjack from the directed fishery must be accounted for in stock assessments and when setting the ACL.

Criterion 2: Ecological effects due to changes in the bycatch of greater amberjack (on other species in the ecosystem)

Relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict. The Scientific and Statistical Committee accepted the projections from SEDAR 33 (2014) for the purposes of developing management advice. Greater amberjack are opportunistic predators that feed on benthic and pelagic fishes, squid and crustaceans (GMFMC 2004a). Greater amberjack eggs and larvae are pelagic and smaller juveniles (<1 inch standard length) are found associated with pelagic *Sargassum* spp. mats (Bortone et al. 1977; Wells and Rooker 2004). Juveniles then shift to demersal habitats (5 - 6 months), where they congregate around reefs, rocky outcrops, and wrecks (see Section 3.2). Reductions in bycatch and fishing mortality will allow the greater amberjack stock to increase in abundance, resulting in increased competition for prey with other predators. Consequently, it is possible that forage species and competitor species could decrease in abundance in response to an increase in greater amberjack abundance.

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

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. Fishermen can specifically target greater amberjack while they are schooling. Snappers, groupers, and other reef fishes are commonly caught in association with greater amberjack. Those most commonly caught include: almaco jack

vermilion and deep-water groupers. None of these species are currently undergoing overfishing or being overfished (NMFS 2014 Summary of Stock Status for FSSI) Regulatory discards significantly contribute to fishing mortality in all of these reef fish species, especially deep-water groupers.

Increasing the greater amberjack recreational minimum size limit will increase the proportion of dead discards to landings, but may result in an overall decrease in the magnitude of discards because of the reduction in landings considered in this amendment. Assuming anglers continue to target greater amberjack if the minimum size limits are increased, less effort will be directed at other species thereby providing a small net benefit to those species because of lower fishing mortality and less bycatch.

Criterion 4: Effects on marine mammals and birds

The effects of current management measures on marine mammals and birds are described above. Bycatch minimization measures evaluated in this amendment are not expected to significantly affect marine mammals and birds. There is no information to indicate marine mammals and birds rely on greater amberjack for food, and they are not generally caught by fishers harvesting greater amberjack.

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

Reducing the stock annual catch limit (ACL), recreational management measures and the commercial trip limit will affect costs associated with fishing operations. Modifying recreational seasonal closures for greater amberjack will have direct impacts to recreational anglers. Recreational anglers would incur greater losses in consumer surplus resulting from a seasonal closure when compared to a higher minimum size limit. To the extent that reducing the ACL for greater amberjack, reductions in commercial revenue and recreational consumer surplus would occur. Commercial fishermen will incur losses in revenue due to limiting the amount of harvest per trip. However, a commercial trip limit is expected to increase the duration of the fishing season and thus increase revenues when the fishery has previously been closed. A trip limit is also expected to bring a higher market price due to the fact that market demand remains constant while there is less fish harvested per trip.

Criterion 6: Changes in fishing practices and behavior of fishermen

Increasing the minimum size limit will increase bycatch catch rates, and affect decisions about where to fish. Seasonal closures and trip limits will alter angler effort, at least initially, and may affect decisions about when and where to fish. Shifts or changes in fishing locations and seasons will have an effect on fishing behavior and practices that may potentially affect the bycatch of other reef fish.

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

The proposed management measures are not expected to significantly impact administrative costs. Quotas based on stock allocation measures are currently used to regulate the commercial and recreational sectors harvesting greater amberjack. None of the resultant recreational subquotas from this action are expected to diminish regulatory effectiveness. All of these measures will require additional research to determine the magnitude and extent of impacts to bycatch and bycatch mortality. Administrative activities such as quota monitoring and enforcement should not be affected by the proposed management measures.

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

If the minimum size limit for the recreational harvest of greater amberjack is increased it is expected to positively impact the stock by fostering a faster recovery rate, but may have negative social implications. If the closed season is modified to coincide with the spawning season rather than the peak months of fishing effort there maybe changes to fishing effort along with social changes.

The establishment of a commercial trip limit is expected to result in positive benefits to the commercial sector. The economic benefits of the commercial trip limit is expected to include an extended fishing season, maintaining higher market prices by not flooding the market with large harvest, and being able to maintain the local market after the traditional tourist season.

Criterion 9: Changes in the distribution of benefits and costs

Bycatch minimization measures that provide an overall net benefit to the stock and increase the rate of recovery will benefit both sectors. Additionally, proposed commercial trip limits would reduce the commercial fishermen ability to harvest larger amounts of greater amberjack per trip. Bycatch minimization measures are intended to provide an overall net benefit to the stock, by reducing mortality associated with bycatch and increasing the rate of stock recovery.

Criterion 10: Social effects

Bycatch is considered wasteful and it reduces overall yield obtained from the fishery. Minimizing bycatch to the extent practicable will increase efficiency, reduce waste, and benefit stock recovery, thereby resulting in net social benefits. In Action 2.1, of the Recreational Management Measures the proposed increase in recreational size limits from 30 inches to 32, 34, or 36 inches FL would narrow the difference between the 36 inch FL commercial minimum size limit. This may be a social benefit as the size limits would be perceived as more fair and equitable to all user groups.