Modifications to Gulf of Mexico Greater Amberjack Commercial Trip Limits

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

June 2019

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

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Name of Action

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

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Type of Action

( ) Administrative	( ) Legislative
( ) Draft	(X) Final

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ALS	Accumulated Landings System
ACL	Annual Catch Limit
ACT	Annual Catch Target
Council	Gulf of Mexico Fishery Management Council
DPS	distinct population segment
EPA	Endangered Species Act
EIS	environmental impact statement
EA	environmental assessment
EFH	essential fish habitat
EEZ	Exclusive Economic Zone
FSSI	Federal Strategic Sourcing Initiative
FMP	Fishery Management Plan
GSAD	Gulf and South Atlantic Dealer
Gulf	Gulf of Mexico
gw	gutted weight
EJ	environmental justice
HAPC	Habitat Areas of Particular Concern
IPCC	Intergovernmental Panel on Climate Change
MMPA	Marine Mammal Protection Act
MFMT	maximum fishing mortality threshold
MSY	maximum sustainable yield
mp	million pounds
MSST	minimum stock size threshold
NMFS	National Marine Fisheries Service
OY	optimum yield
RQ	regional quotient
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center
SPR	spawning potential ratio
SSC	Scientific and Statistical Committee
tpy	tons per year
TAC	total allowable catch
VOC	volatile organic compounds
ww	whole weight

TABLE OF CONTENTS

Environmental Assessment Cover Sheet i
Abbreviations Used in this Document ii
Table of Contents iii
List of Tables v
List of Figures vi
Chapter 1. Introduction 1
1.1 Background 1
1.2 Purpose and Need 3
1.3 History of Management 4
Chapter 2. Management alternatives 6
2.1 Action – Modify the Greater Amberjack Commercial Trip Limit 6
Chapter 3. Affected Environment 12
3.1 Description of the Physical Environment 12
3.2 Description of the Biological/Ecological Environment 15
3.3 Description of the Economic Environment 23
3.3.1 Commercial Sector 23
3.3.2 Recreational Sector 29
3.4 Description of the Social Environment 29
3.5 Description of the Administrative Environment 34
3.5.1 Federal Fishery Management 34
3.5.2 State Fishery Management 34
Chapter 4. Environmental Consequences 36
4.1 Modify the Greater Amberjack Commercial Trip Limit 36
4.1.1 Direct and Indirect Effects on the Physical Environment 36
4.1.2 Direct and Indirect Effects on the Biological Environment 37
4.1.3 Direct and Indirect Effects on the Economic Environment 37
4.1.4 Direct and Indirect Effects on the Social Environment 39
4.1.5 Direct and Indirect Effects on the Administrative Environment 40
4.2 Cumulative Effects Analysis 41
Chapter 5. Regulatory Impact Review 44
5.1 Introduction 44
5.2 Problems and Objectives 44
5.3 Description of the Fishery 44

Chapter 6. Regulatory Flexibility Act Analysis 45
6.1 Introduction 45
6.2 Statement of the need for, objective of, and legal basis for the proposed action 45
6.3 Description and estimate of the number of small entities to which the proposed action would apply 45
6.4 Description of the projected reporting, record-keeping and other compliance requirements of the proposed action 45
6.5 Identification of all relevant federal rules, which may duplicate, overlap or conflict with the proposed action 45
6.6 Significance of economic impacts on a substantial number of small entities 45
6.7 Description of the significant alternatives to the proposed action and discussion of how the alternatives attempt to minimize economic impacts on small entities 45
Chapter 7. Agencies, Organizations and Persons Consulted 46
Chapter 8. List of Preparers 47
Chapter 9. References 48
Appendix A. Commercial Trip Limit Analysis for Gulf Greater Amberjack 55
Appendix B. Other Applicable Law 59
Appendix C. Summaries of Public Comments Received 63

LIST OF TABLES

Table 1.1.1. Greater amberjack commercial ACLs and ACTs established in 2017 (GMFMC 2017a) based on the SEDAR 33 update assessment (2016) in lbs ww. 1
Table 1.1.2. Summary of commercial landings relative to management targets (lbs ww) for 2008 through 2018. 2
Table 1.1.3 Annual Gulf greater amberjack reported commercial landings (lbs ww) by state for: Texas (TX), Louisiana (LA), Mississippi (MS), Alabama (AL), and western Florida (FL) since 2000 3
Table 2.1.1. Predicted percent reductions in commercial harvest per trip for Gulf greater amberjack for **Alternatives 1-6** 9
Table 2.1.2. Estimated harvest number range of Gulf greater amberjack for **Alternatives 1-6**. Estimates based on 2016-2018 data obtained from the SEFSC Trip Interview Program. 9
Table 2.1.3. Gulf greater amberjack commercial sector estimated closure dates for **Alternatives 1-6** and predicted dates for harvesting 75% of the ACT for each proposed commercial trip limit **(Alternative 6)** 10
Table 3.1.3. Total Gulf greenhouse gas 2014 emissions estimates 15
Table 3.2.1. Status of species in the Reef Fish FMP grouped by family. 18
Table 3.3.1.1. Summary of vessel counts, trips, and landings (pounds gutted weight [lbs gw]) for vessels landing at least one pound of greater amberjack, 2013-2017. 24
Table 3.3.1.2. Summary of vessel counts and revenue (2017 dollars) for vessels landing at least one pound of greater amberjack, 2013-2017 24
Table 3.3.1.3. Summary of 2013-2017 average vessel counts, trips, and landings (pounds gutted weight [lbs gw]) for vessels landing at least one pound of greater amberjack, by gear type (hook and line [H&L], longline [LL], and Others) 25
Table 3.3.1.4. Summary of 2013-2017 average vessel counts and revenue (2017 dollars) for vessels landing at least one pound of greater amberjack, by gear type (hook and line [H&L], longline [LL], and Others) 26
Table 3.3.1.5. Summary of 2013-2017 average vessel counts, trips, and landings (pounds gutted weight [lbs gw]) for vessels landing at least one pound of greater amberjack in western Florida (FL), Alabama and Mississippi (AL/MS), Louisiana (LA), and Texas (TX). 27
Table 3.3.1.6. Summary of 2013-2017 average vessel counts and revenue (2017 dollars) for vessels landing at least one pound of greater amberjack 27
Table 3.3.1.7. Average revenue and annual business activity associated with the harvests of vessels that harvested greater amberjack in the Gulf. 28
Table 3.5.2.1. Gulf state marine resource agencies and web pages. 35
Table 4.1.3.1. Pounds of greater amberjack per commercial trip in the Gulf of Mexico (frequency and cumulative frequency) 2016-18. 38
Table A-1. Percent decreases in landings per trip for the proposed commercial greater amberjack trip limit options relative to the current 1,500 lb gw trip limit 56
Table A-2. Gulf of Mexico greater amberjack commercial sector predicted closure dates for different trip limits 57
Table A-3. Estimated dates for harvest of 75% of the ACT (316, 058 lbs ww) when the trip limit would be reduced 250 lbs gw and fishing season length for the Gulf of Mexico greater amberjack commercial sector for each proposed trip limit option 58

LIST OF FIGURES

Figure 2.1.1. Percent frequency of observed commercial greater amberjack harvest (lbs gw) per trip from 2016 through 2018 for west Florida and across the entire Gulf of Mexico..... 7
Figure 2.1.2. Mean pounds per trip (gw) of landed Gulf greater amberjack (black line) from 2000 through 2018. 8
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. 13
Figure 3.1.2. Map of most fishery management closed areas in the Gulf of Mexico. 14
Figure 3.2.1. Fishery closure at the height of the *Deepwater Horizon* MC252 oil spill. 22
Figure 3.4.1. Top Gulf communities ranked by pounds and value RQ of greater amberjack 31
Figure 3.4.2. Top Gulf greater amberjack communities' commercial engagement, 2010-2016. 32
Figure 3.4.3. Social vulnerability indices for top commercial fishing communities. 33
Figure A-1. Percent frequency of observed commercial greater amberjack harvest (lbs gw) per trip from 2016 through 2018..... 55
Figure A-2. Predicted commercial landings for Gulf of Mexico greater amberjack. 57

CHAPTER 1. INTRODUCTION

1.1 Background

The commercial sector harvest of Gulf of Mexico (Gulf) greater amberjack is managed to an annual catch target (ACT; also, 'quota') and the fishery is closed for the remainder of the fishing year when the ACT is met or projected to be met. The commercial season opens January 1 each year, is closed from March 1 through May 31 to protect the stock during the spawning period, and re-opens on June 1 if the ACT has not been met. Greater amberjack are not a common target species for the reef fish commercial sector and are typically caught while fishers are targeting other reef fish. As a result, the majority of Gulf reef fish commercial trips land less than 500 lbs gutted weight (gw) of greater amberjack. Still, commercial landings for greater amberjack routinely meets or exceeds the ACT before the end of the commercial fishing year, requiring an in-season closure and a payback (see details in "Landings" below) of any overage if the commercial annual catch limit (ACL) is exceeded. During public comment, at the Gulf Fishery Management Council (Council) meetings, commercial fishers have indicated a preference for as long of a fishing season as possible, since these incidentally caught fish must be discarded if the season is closed. The Council established a commercial trip limit of 2,000 lbs whole weight (ww) 1,923 lbs gw) in 2013 (GMFMC 2012), and reduced the trip limit to 1,500 lbs gw in 2016 (GMFMC 2015). To extend the duration of the commercial fishing season as long as possible, the Council is considering further reductions in the commercial trip limit in an effort to reduce the harvest rate and increase the duration of the commercial season.

In 2016, the Southeast Data Assessment and Review (SEDAR) 33 update stock assessment for Gulf greater amberjack was completed, and reviewed by the Council's Scientific and Statistical Committee (SSC) at its March 2017 meeting. The SSC accepted the SEDAR 33 update assessment as the best scientific information available. The SSC also concluded that greater amberjack was still overfished and undergoing overfishing, and that the stock would not be rebuilt by 2019 as previously projected. To address this finding given the new information, the Council completed a framework action (GMFMC 2017a) to modify the overfishing limit (OFL), acceptable biological catch (ABC), sector-specific ACLs, and ACTs for greater amberjack (Table 1.1.1). The final rule implementing this change was effective January 27, 2018.

Table 1.1.1. Greater amberjack commercial ACLs and ACTs established in 2017 (GMFMC 2017a) based on the SEDAR 33 update assessment (2016) in lbs ww.

Commercial Fishing Year	ACL (lbs ww)	ACT (lbs ww)
2018	319,140	277,651
2019	402,030	349,766
2020+	484,380	421,411

Source: GMFMC 2017a "lbs" = pounds; "ww" = whole weight

Landings:

Table 1.1.2 presents annual landings by the commercial sector for 2018-2019. Commercial landings have exceeded the ACT from 2009 – 2018 and resulted in an in-season closure in each

of those years. Annual commercial greater amberjack landings have varied among the Gulf states since 2000 (Table 1.1.3). Florida has consistently landed the highest percentage of the commercial harvest averaging 299,757 lbs ww annually. Louisiana and Texas have alternated as the state with the second most reported commercial landings with Texas reporting more landings than Louisiana from 2007 through 2010. Overall, Louisiana has a higher time series average of commercial landings (155,931 lbs ww) relative to Texas (74,751 lbs ww). Combined reported landings in Alabama and Mississippi have increased since 2013 with an average of 30,518 lb ww over the time series.

Table 1.1.2. Summary of commercial landings relative to management targets (lbs ww) for 2008 through 2018.

Year	Landings	ACT	Adjusted ACT	ACT %	ACL	Adjusted ACL	ACL %	Closure Date
2008	440,936	503,000		87.7			NA	
2009	601,446	503,000		119.6			NA	11/7/2009
2010	534,095	503,000	373,072	143.2			NA	10/28/2010
2011	508,871	503,000	342,091	148.8			NA	6/18/2011
2012	308,334	409,000	237,438	129.9	481,000	237,438	129.9	3/1/2012
2013	457,879	409,000	338,157	135.4	481,000	410,157	111.6	7/1/2013
2014	482,277	409,000		119.0	481,000		101.3	8/25/2014
2015	460,670	409,000		112.4	481,000		95.8	7/19/2015
2016	437,390	394,740		110.8	464,400		94.2	7/17/2016
2017	454,561	394,740		115.1	464,400		97.9	6/20/2017
2018*	331,403	277,651		119.4	319,140		103.8	4/3/2018
2019*	307,492	349,766	337,503	91.1	402,030	389,767	78.9	6/9/2019

Source: Southeast Fisheries Science Center commercial (10/23/18) ACL dataset. *2018 and 2019 data are preliminary including the 2019 adjusted ACT and ACL. Data presented for 2019 are complete through 5/6/19.

Table 1.1.3 Annual Gulf greater amberjack reported commercial landings (lbs ww) by state for: Texas (TX), Louisiana (LA), Mississippi (MS), Alabama (AL), and western Florida (FL) since 2000. Percent contribution to total landings by state for each year is reported in parentheses. Observed minimum and maximum annual landings for each state through 2017 are bolded. Annual and average landings for Mississippi and Alabama are combined to account for confidential data.

Year	TX	LA	MS/AL	FL	Total
2000	111,526 (14.2)	205,796 (26.2)	8,517 (1.1)	**459,840 (58.5)**	785,679
2001	56,878 (9.4)	217,314 (35.9)	5,516 (0.9)	325,577 (53.8)	605,285
2002	70,671 (10.0)	259,687 (36.9)	6,217 (0.9)	366,728 (52.1)	703,303
2003	74,146 (8.7)	320,101 (37.3)	9,367 (1.1)	453,511 (52.9)	857,125
2004	38,122 (4.4)	**406,521 (46.7)**	5,648 (0.6)	420,725 (48.3)	871,016
2005	59,282 (9.0)	162,346 (24.5)	5,035 (0.8)	435,622 (65.8)	662,285
2006	88,479 (15.6)	117,563 (20.8)	**3,835 (0.7)**	356,507 (62.9)	566,384
2007	183,175 (31.1)	92,407 (15.7)	9,380 (1.6)	304,273 (51.6)	589,235
2008	88,792 (20.1)	78,748 (17.9)	7,506 (1.7)	265,890 (60.3)	440,936
2009	138,689 (23.1)	137,802 (22.9)	23,600 (3.9)	301,355 (50.1)	601,446
2010	**191,207 (35.8)**	**73,975 (13.9)**	16,064 (3.0)	252,849 (47.3)	534,095
2011	115,311 (22.7)	122,484 (24.1)	9,075 (1.8)	262,001 (51.5)	508,871
2012	33,954 (11.0)	85,367 (27.7)	16,750 (5.4)	**172,263 (55.9)**	308,334
2013	28,978 (6.3)	155,030 (33.9)	25,728 (5.6)	248,143 (54.2)	457,879
2014	55,754 (11.6)	116,552 (24.2)	79,319 (16.4)	230,652 (47.8)	482,277
2015	32,622 (7.1)	130,258 (28.3)	89,096 (19.3)	208,694 (45.3)	460,670
2016	25,133 (5.7)	127,598 (29.2)	86,086 (19.7)	198,573 (45.4)	437,390
2017	**21,029 (4.6)**	112,934 (24.8)	**106,646 (23.5)**	213,952 (47.1)	454,561
2018*	6,523 (2.0)	40,198 (12.1)	66,448 (20.1)	218,234 (65.9)	331,403
Average	74,751	155,931	30,518	299,757	-

Source: Southeast Fisheries Science Center commercial (10/23/18) ACL dataset. *2018 data are preliminary.

1.2 Purpose and Need

The purpose of this framework action is to reduce the Gulf greater amberjack commercial trip limit.

The need for this framework action is to extend the Gulf greater amberjack commercial fishing season by constraining the harvest rate while continuing to prevent overfishing and rebuild the stock.

1.3 History of Management

The Reef Fish FMP (with 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 retained 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 mainly for purposes of data collection needed for monitoring of removals, and their take (or removals) was not regulated at that date. The following history of management focuses on the commercial sector for greater amberjack and is included for additional clarity; however, the amendments listed may also contain other measures pertaining to other aspects of the fisheries affecting greater amberjack.

Amendment 1 (with environmental assessment [EA]), implemented in 1990, added greater amberjack and lesser amberjack (*Seriola dumerili*) to the list of species in the management unit. Amendment 1 set a commercial minimum size limit of 36 inches FL. This amendment's objective was to stabilize the long-term population levels of all reef fish species. A framework procedure for specification of total allowable catch (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 EA), implemented in 1992, established a moratorium on the issuance of new commercial reef fish vessel permits for a maximum period of 3 years.

Amendment 5 (with supplemental EIS), implemented in 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 EA), submitted in 1995 and implemented in 1997, reduced the greater amberjack recreational 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). NMFS 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 EA), implemented in 1998, closed the commercial harvest of greater amberjack in the Gulf during the months of March, April, and May to protect the stock during the spawning season.

Regulatory Amendment (with EA), implemented in 1999, closed two areas (i.e., created two marine reserves), 115 and 104 square nautical miles respectively, year-round to all fishing under the jurisdiction of the Council with a 4-year sunset clause.

Generic Sustainable Fisheries Act Amendment (with EA), partially approved and implemented in 1999, set the maximum fishing mortality threshold (MFMT) for greater amberjack at the fishing mortality necessary to achieve 30% of the unfished spawning potential ratio (SPR) F30% SPR. Estimates of maximum sustainable yield (MSY), minimum stock size threshold (MSST), and optimum yield (OY) were disapproved because they were based on SPR proxies rather than biomass-based estimates.

Secretarial Amendment 2 (with EIS), implemented in 2003, specified MSY for greater amberjack 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} (where M = natural mortality) or 75% of B_{MSY}. It also set a rebuilding plan limiting the harvest to 2,900,000 lbs for 2003-2005, 5,200,000 lbs for 2006-2008, 7,000,000 lbs for 2009-2011, and for 7,900,000 lbs 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 (with EIS), implemented in 2008, was developed to stop overfishing of gray triggerfish and greater amberjack. The amendment established ACLs and AMs for greater amberjack and gray triggerfish. For greater amberjack, the rebuilding plan was modified, which included setting a commercial ACT that functions as the quota. Furthermore, it set a commercial in-season AM where if the ACT was met or projected to be met, the fishing season would close for the rest of the year. **Amendment 30A** also established an allocation for greater amberjack harvest of 73% recreational and 27% commercial.

Amendment 35 (with EA), implemented in 2012 in response to the 2010 SEDAR 9 update stock assessment established a new ACL equal to the ABC at 1,780,000 lbs, which was less than the current ACL of 1,830,000 lbs. Reducing the ABC by 18% was expected to end overfishing. The amendment also established a commercial trip limit of 2,000 lbs ww) throughout the fishing year.

2015 Framework Amendment (with EA), implemented in 2016, decreased the total ACL from 1,780,000 lbs to 1,720,000 lbs, set the commercial ACL at 464,400 lbs and the commercial ACT at 394,740 lbs, and reduced the commercial trip limit from 2,000 lbs ww to 1,500 lbs gw.

2017a Framework Amendment (with EA), was implemented in 2017. The commercial greater amberjack ACL was set at 319,140 lbs ww for 2018, 402,030 lbs ww for 2019, and 484,380 lb ww for 2020 and subsequent fishing years. The commercial greater amberjack ACT was set at 277,651 lbs ww for 2018, 349,766 lbs ww for 2019, and 421,411 lbs ww for 2020 and subsequent fishing years. In addition, this framework established a new rebuilding timeframe, which ends in 2027.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action – Modify the Greater Amberjack Commercial Trip Limit

Alternative 1: No Action – Do not modify the current commercial trip limit for Gulf of Mexico (Gulf) greater amberjack of 1,500 lbs gutted weight (gw) (1,560 lbs whole weight [ww]).

Alternative 2: Establish a commercial trip limit for Gulf greater amberjack of 1,000 lbs gw (1,040 lbs ww).

Alternative 3: Establish a commercial trip limit for Gulf greater amberjack of 750 lbs gw (780 lbs ww).

Preferred Alternative 4: Establish a commercial trip limit for Gulf greater amberjack of 500 lbs gw (520-lbs ww).

Alternative 5: Establish a commercial trip limit for Gulf greater amberjack of 250 lbs gw (260 lbs ww).

Alternative 6: Reduce the commercial trip limit for Gulf greater amberjack to 250 lbs gw (260 lbs ww) when 75% of the ACT is projected to be met.

The Gulf of Mexico Fishery Management Council (Council) may choose any one of Alternatives 1-4 in conjunction with Alternative 6 as preferred alternatives.

Discussion:

The commercial trip limit is a ceiling on the amount of Gulf greater amberjack that may be possessed on board or landed, purchased, or sold from a federally-permitted commercial vessel per trip. A person who fishes commercially in the exclusive economic zone (EEZ) may not combine a trip limit with any trip or possession limit applicable to state waters. Greater amberjack taken in the EEZ may not be transferred at sea, regardless of where such transfer takes place. 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.

Prior to 2013, there was no commercial trip limit for Gulf greater amberjack. In 2013, a 2,000-lb ww (1,923-lb gw) commercial trip limit was implemented to slow the rate of harvest and attempt to extend the commercial fishing season (GMFMC 2012). In 2016, the commercial trip limit was further reduced to 1,500 lbs gw (1,560 lbs ww) in an additional effort to extend the season (GMFMC 2015). The results of these commercial trip limits implementation to extend the duration of the Gulf greater amberjack season have been varied. The 2,000 lbs gw trip limit increased the fishing season in 2014 and 2015 relative to 2013. However, since the 1,5000 lbs gw commercial trip limit, the commercial Gulf greater amberjack fishing season duration has

decreased since 2016. The western Florida area has accounted for approximately 60% of the observed commercial trips landing Gulf greater amberjack in recent years (2016-2018) and generally land less than 500 lbs gw, which is reflective of the mean harvest-per-trip across the Gulf (Figure 2.1.1). However, approximately 33% of Gulf trips land over 1,000 lbs gw with western Florida representing a majority those trip limit observations. The commercial trip limit has not affected the overall mean landings per trip; however, implementation of commercial trip limits has affected a percentage of trips that were likely targeting greater amberjack and harvesting greater than 10,000 lbs gw per trip (Figure 2.1.2). Despite the reduction in maximum landings per trip as a result of trip limit implementation, the commercial sector has consistently reached or exceeded its annual catch target (ACT) prior to the end of the fishing season, thus requiring in-season closures (Table 1.1.2). In some years, the annual catch limit (ACL) was exceeded, and that overage was deducted from the ACL in the subsequent fishing year (Table 1.1.2). The commercial season for Gulf greater amberjack has closed before the end of the fishing year each year since 2009 (Table 1.1.2).

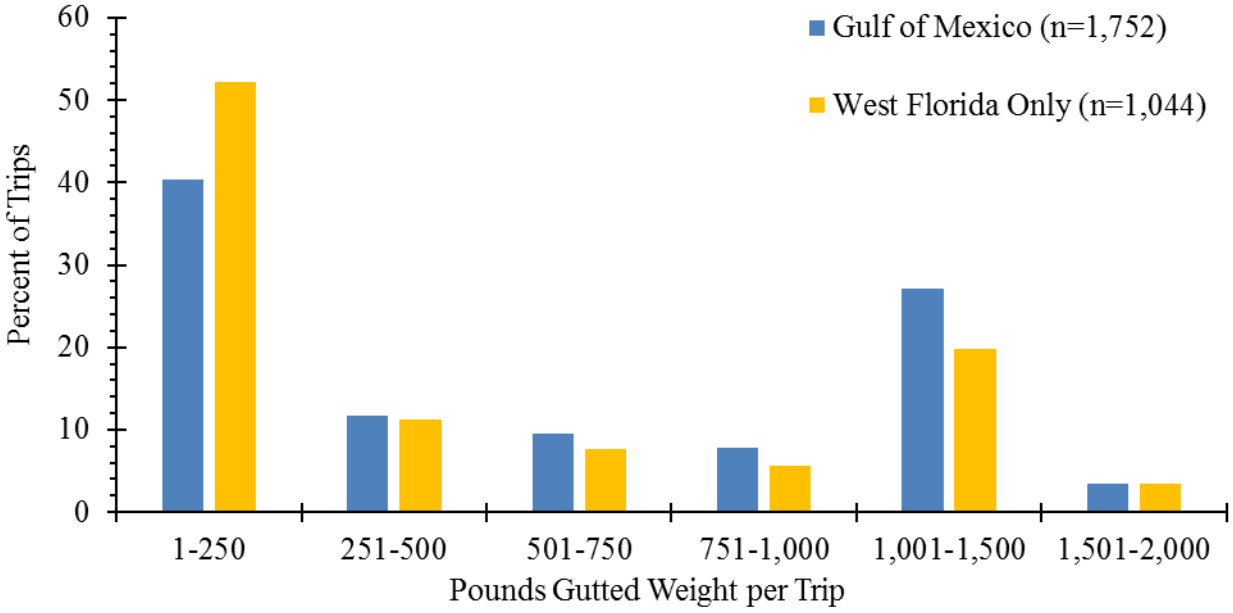

Figure 2.1.1. Percent frequency of observed commercial greater amberjack harvest (lbs gw) per trip from 2016 through 2018 for west Florida and across the entire Gulf of Mexico.
Source: Southeast Fisheries Science Center (SEFSC) logbook data as of February 27, 2019 (n = 1,752 trips). Logbook data for 2018 are not complete.

The current commercial trip limit (**Alternative 1**) is 1,500 lbs gw (1,560 lbs ww) and was implemented on January 4, 2016. Available logbook data from 2016 – 2018 were analyzed to determine the distribution of catch-per-trip after the 1,500 lbs gw trip limit was implemented. The majority of trips harvesting Gulf greater amberjack land less than 500 lbs gw per trip. Approximately 27% of trips harvested between 1,001 and 1,500 lbs gw, suggesting some commercial harvest up to the allowable trip limit (Figure 2.1.1).

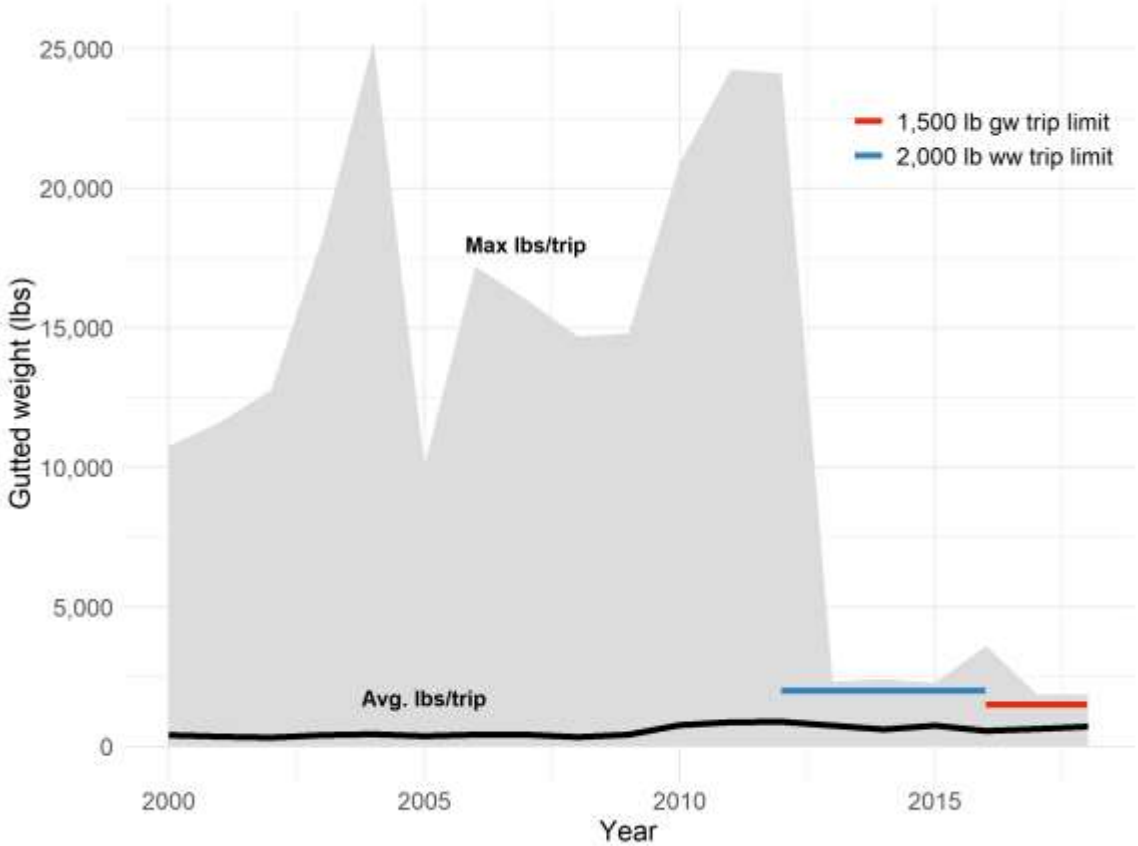

Figure 2.1.2. Mean pounds per trip (gw) of landed Gulf greater amberjack (black line) from 2000 through 2018. Gray shaded area indicates range of landings. Dark blue (2,000 lb ww) and red (1,500 lb gw) lines indicate the implementation of trip limits.
Source: Southeast Fisheries Science Center commercial logbook data (2/17/19). * 2018 data are preliminary.

Alternatives 2-6 would establish a new commercial trip limit lower than that in **Alternative 1**. To examine the effect of reduced trip limits on the commercial season, a trip limit analysis was completed using historical commercial trip data from 2016 – 2018. For this analysis, historical trips harvesting greater than 1,000 lbs gw (**Alternative 2**), 750 lbs gw (**Alternative 3**), 500 lbs gw (**Preferred Alternative 4**), or 250 lbs gw (**Alternative 5**) were adjusted to reflect each alternative commercial trip limit value. This was done to assess the predicted percent reduction in harvest per trip for each alternative relative to the current 1,500-lb gw commercial trip limit. This trip limit analysis was repeated for **Alternatives 1-4** to estimate when 75% of the ACT would be harvested and determine how a subsequent reduction in the commercial trip limit to 250 lbs gw would affect the duration of the commercial fishing season (**Alternative 6**). The details of these analyses are in Appendix A. The resulting number of days required to harvest the ACT was calculated for each trip limit alternative. This procedure followed the same methods used previously to consider commercial trip limits for Gulf greater amberjack (GMFMC 2012, GMFMC 2015), but the current analyses were based on the most recent data available (2016-2018). **Alternative 2** is expected to reduce commercial landings on a per-trip basis by 17.8%, **Alternative 3**, by 31.8%, **Preferred Alternative 4**, by 49.3%, and **Alternative 5**, by 70.6%. The predicted reduction per trip for **Alternative 6** relative to **Alternatives 1 – 4** is dependent on the implemented commercial trip limit at the beginning of the fishing year, but is

expected to be 70.6% when the trip limit is reduced to 250 lbs gw after harvesting 75% of the ACT (Table 2.1.1).

Table 2.1.1. Predicted percent reductions in commercial harvest per trip for Gulf greater amberjack for **Alternatives 1-6** relative to the current 1,500 lbs gw trip limit.

Trip limit (lbs gw)	Predicted percent reduction
Alternative 1: 1,500	0
Alternative 2: 1,000	17.8
Alternative 3: 750	31.8
Preferred Alternative 4: 500	49.3
Alternative 5: 250	70.6
Alternative 6: 1,500 until 75% ACT harvested, then 250	0/70.6
Alternative 6: 1,000 until 75% ACT harvested, then 250	17.8/70.6
Alternative 6: 750 until 75% ACT harvested, then 250	31.8/70.6
Alternative 6: 500 until 75% ACT harvested, then 250	49.3/70.6

Source: Commercial logbook dataset for 2016 through 2018; Logbook dataset downloaded on 2/17/19; 2018 data are not complete.

Data from the Southeast Fisheries Science Center (SEFSC) Trip Interview Program analyzed from 2016 through 2018 indicate individual Gulf greater amberjack weights sampled from 1,309 trips ranged between 13 to 118 lbs ww with an average of 33 lbs ww. Based on these individual Gulf greater amberjack body weight data, a number range of harvested fish can be estimated for **Alternatives 1-6** (Table 2.1.2).

Table 2.1.2. Estimated harvest number range of Gulf greater amberjack for **Alternatives 1-6**. Estimates based on 2016-2018 data obtained from the SEFSC Trip Interview Program.

Trip limit (lbs ww)	Estimated harvest number range
Alternative 1: 1,500	14 - 94
Alternative 2: 1,000	9 - 62
Alternative 3: 750	7 - 46
Preferred Alternative 4: 500	5 - 31
Alternative 5: 250	2 - 16
Alternative 6: 1,500 until 75% ACT harvested, then 250	14 - 94/2 - 16
Alternative 6: 1,000 until 75% ACT harvested, then 250	9 - 62/2 - 16
Alternative 6: 750 until 75% ACT harvested, then 250	7 - 46/2 - 16
Alternative 6: 500 until 75% ACT harvested, then 250	5 - 31/2 - 16

Source: SEFSC Trip Interview Program. Downloaded on March 19, 2019.

Commercial fishing for Gulf greater amberjack opens January 1 each year with a fixed closed season from March 1 through May 31 (273 day season). The fishery re-opens June 1 and is closed when the ACT is met or projected to be met. Based on the ACT of 421,411 lbs ww for 2020 and beyond, **Alternative 1** is expected to result in an 85-day fishing season (Table 2.1.3). **Alternatives 2-6** would be expected to increase the duration of the commercial fishing season, with **Preferred Alternative 4** extending the season to 203 days (Table 2.1.3). Selecting either **Alternative 5**, or **Alternative 6** if selected in conjunction with **Preferred Alternative 4** would provide the longest fishing season of the options under consideration resulting in a harvest of 72% and 99% of the ACT respectively.

Table 2.1.3. Gulf greater amberjack commercial sector estimated closure dates for **Alternatives 1-6** and predicted dates for harvesting 75% of the ACT for each proposed commercial trip limit **(Alternative 6)**. "Number of days open" is the total number of predicted days open for Gulf greater amberjack commercial harvest for the fishing year, accounting for the March 1 – May 31 closure.

Trip limit (lbs gw)	Predicted date of 75% ACT harvest	Estimated closure date	Number of days open
Alternative 1: 1,500	-	June 27	85
Alternative 2: 1,000	-	July 21	109
Alternative 3: 750	-	August 19	138
Preferred Alternative 4: 500	-	October 23	203
Alternative 5: 250	-	None (72% ACT)	273
Alternative 6: 1,500 until 75% ACT harvested then 250	June 7	September 2	152
Alternative 6: 1,000 until 75% ACT harvested then 250	June 20	September 20	170
Alternative 6: 750 until 75% ACT harvested then 250	July 7	October 18	198
Alternative 6: 500 until 75% ACT harvested then 250	August 21	None (99% of ACT)	273

The trip limit analysis provides information about projected fishing season duration in response to a variety of commercial trip limit options presented in this framework action. Estimated closure dates are when the 2020+ ACT of 421,411 lbs ww is projected to be harvested. Similar trip limit analyses for modifying commercial trip limits for Gulf greater amberjack have been conducted and have been optimistic with projected commercial fishing season durations being longer than realized season durations. These previous overestimations in season duration should be considered when determining a preferred alternative. Also, uncertainty exists in these projections, as economic conditions, weather events, changes in catch-per-unit effort, fisher response to management regulations, and a variety of other factors may cause departures from this prediction. Additionally, it is possible that a trip limit option between 250 and 500 lbs gw could achieve an extended season with no in-season closure and allow annual commercial landings greater than 72% of the ACT, as is predicted if the 250-lb gw trip limit is implemented. However, similar to the forecasted seasonal closures, uncertainty in estimating future annual

commercial landings totals exists and these potential variabilities should also be taken into consideration.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Physical Environment

The physical environment for Gulf of Mexico (Gulf) reef fish is detailed in the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004), Generic Amendment 3 (GMFMC 2005), and the Generic ACL/ AM Amendment (GMFMC 2011), which are hereby incorporated by reference.

The Gulf has a total area of approximately 600,000 square miles (1.5 million km^2), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.1.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). 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.[1] In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

[1] http://accession.nodc.noaa.gov/0072888

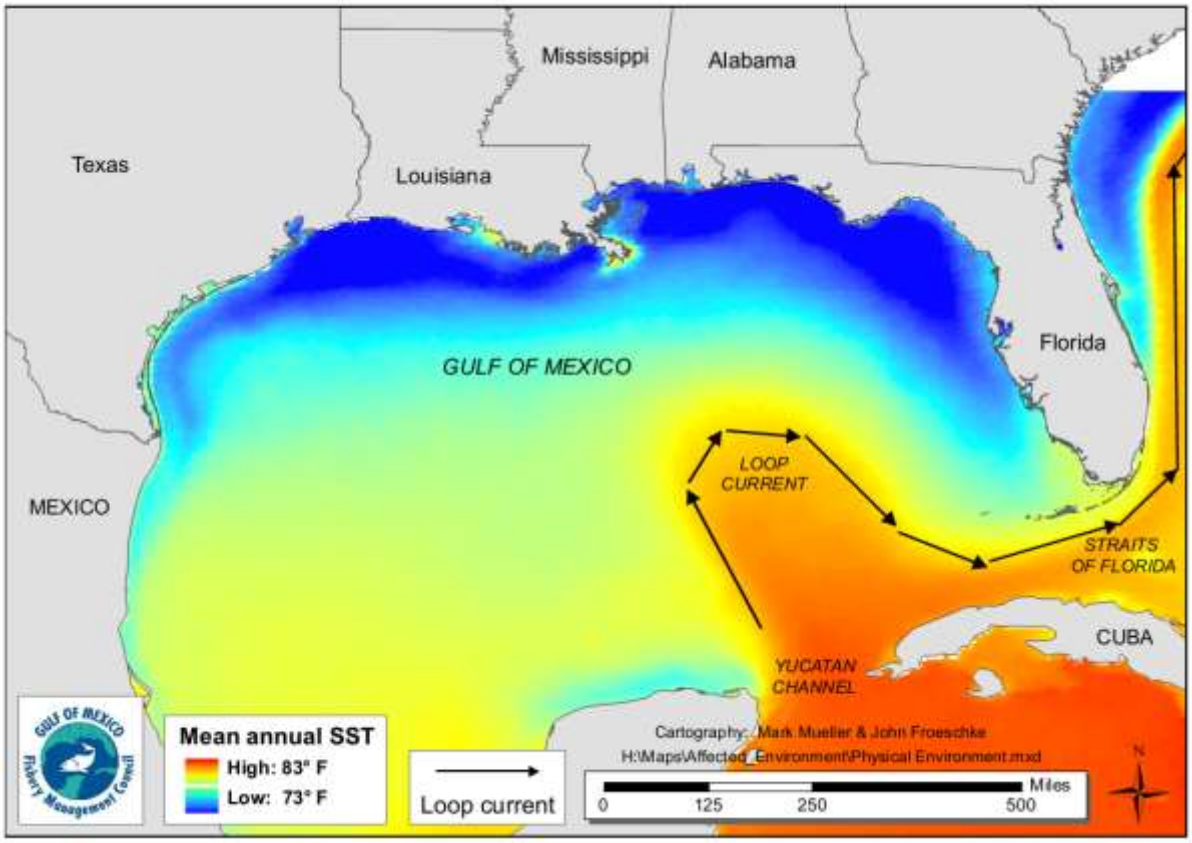

Figure 3.1.1. Mean annual sea surface temperature derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set.[2]

Fish species within the genus Seriola, including greater amberjack, are distributed circumglobally (Swart et al. 2015). In the Gulf, they are found primarily offshore and have been documented in depths up to 187 m (Reed et al. 2005). Burns et al. (2007) tagged greater amberjack from the Florida Keys to Pulley Ridge and collected them from a minimum depth of 4.6 m. All life stages can be water column associated. Additionally, postlarvae and juveniles are found in drifting algae (Hoffmayer et al. 2003). Late juveniles and adults are associated with hard bottom (Gledhill and David 2004) and adults and spawning adults have been documented on reefs based on research conducted in the U.S. south Atlantic and Caribbean (Harris et al. 2007; Heyman and Kierfye 2008). Another habitat type identified for adults were banks/shoals (Kraus et al. 2006). Lastly, while artificial reefs are not designated as EFH, greater amberjack have been documented utilizing them (Dance et al. 2011; Patterson et al. 2014).

Habitat Areas of Particular Concern (HAPC) and Environmental Sites of Special Interest Relevant to Reef Fish

[2] http://pathfinder.nodc.noaa.gov

Multiple areas closed to fishing entirely or closed during certain times of the year to specific gear types. These areas were identified in the Gulf and addressed in Generic Amendment 3 (GMFMC 2005) to provide protection for various, economically important reef fish species (Figure 3.1.2).

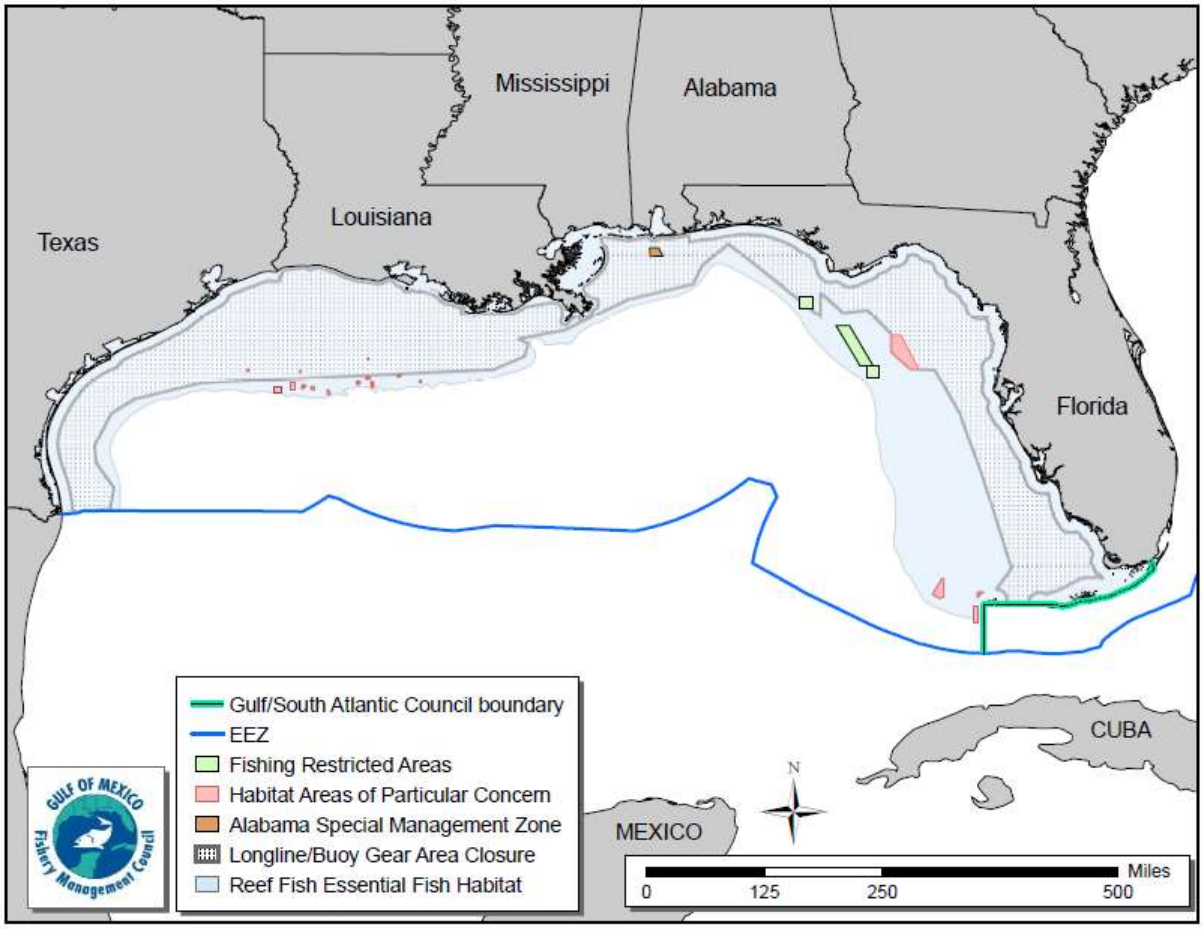

Figure 3.1.2. Map of most fishery management closed areas in the Gulf of Mexico.

Northern Gulf of Mexico Hypoxic Zone

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands by rivers to the Gulf, increasing nutrient inputs from the Mississippi River, and a seasonal layering of waters in the Gulf. The layering of the water is temperature and salinity dependent and prevents the mixing of higher oxygen content surface water with oxygen-poor bottom water. For 2018, the extent of the hypoxic area was estimated to be 2,720 square miles and is the fourth smallest area mapped since 1985.[3] The hypoxic conditions in the northern Gulf directly impact less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009). However, more mobile macroinvertebrates and demersal fishes (e.g., greater amberjack) are able to detect lower dissolved oxygen levels and move away from hypoxic

[3] http://gulfhypoxia.net

conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Greenhouse gases

The IPCC has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2017) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.2.1 with respect to total emissions and from fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (2.04% and 1.67%, respectively).

Table 3.1.3. Total Gulf greenhouse gas 2014 emissions estimates (tons per year [tpy]) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*.

Emission source	CO_2	Greenhouse CH_4	Gas N_2O	Total CO_{2e}**
Oil platform	5,940,330	225,667	98	11,611,272
Non-platform	14,017,962	1,999	2,646	14,856,307
Total	**19,958,292**	**227,665**	**2,743**	**26,467,578**
Commercial fishing	531,190	3	25	538,842
Recreational fishing	435,327	3	21	441,559
Percent commercial fishing	2.66%	>0.01%	0.91%	2.04%
Percent recreational fishing	2.18%	>0.01%	0.77%	1.67%

*Compiled from Tables 6-11, 6-12, and 6-13 in Wilson et al. (2017). **The CO_2 equivalent (CO_2e) emission estimates represent the number of tons of CO_2 emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH_4 and N_2O). Conversion factors to CO_{2e} are 21 for CH_4 and 310 for N_2O.

3.2 Description of the Biological/Ecological Environment

A more complete description of the biological/ecological environment can be found in Chapter 3 of Framework Action to the Reef Fish Fishery Management Plan (FMP) for modifications to greater amberjack allowable harvest and rebuilding plan (GMFMC 2017a). That description is summarized in the following sections and incorporated herein by reference.

Greater Amberjack Life History and Biology

Studies conducted in the Gulf have estimated that peak spawning occurs during the months of March and April (Wells and Rooker 2002; Murie and Parkyn 2008). There is also evidence for

separate and limited connectivity of the greater amberjack population structure within the Gulf, where the northern Gulf population does not appear to mix often with the Florida Keys population (Gold and Richardson 1998, Murie et al. 2011).

Early studies on greater amberjack conducted in south Florida indicated that maximum gonad development occurred in the spring months (Burch 1979) although larvae and small juveniles were reported year round in the entire Gulf (Aprieto 1974). Harris et al. (2007) provided information on reproduction in the southeastern U.S. Atlantic using fishery-dependent and fishery-independent samples 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 within this area. They estimated a spawning season of approximately 73 days off south Florida, with a spawning periodicity of 5 days, and that an individual female could spawn as frequently as 14 times during the season. 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 when larvae and juvenile greater amberjack were captured, they suggested peak spawning season occurred in March and April although they did find that peak spawning began as early as February off Texas. Murie and Parkyn (2008) provided updated information on reproduction of greater amberjack throughout the Gulf using fishery-dependent as well as fishery-independent data from 1989-2008 (it is important to note that fishery-dependent sampling has not been year round). They reported peak spawning occurring during March and April, and by May, they documented low gonad weights indicating spawning was ending.

Status of the Greater Amberjack Stock

The greater amberjack stock has been assessed five times under the SEDAR process. The first SEDAR assessment, conducted in 2000, concluded the greater amberjack stock was overfished and undergoing overfishing as of 1998 (Turner et al. 2000). The most recent assessment, SEDAR 33 Update (2016), concluded the stock was still overfished and undergoing overfishing. The results also indicated that the greater amberjack stock has been overfished in all years since 1987 and has been undergoing overfishing since 1985. A third revision to the rebuilding plan started with the implementation of a greater amberjack framework action in 2017 and is projected to rebuild the stock by 2027 (GMFMC 2017a). Reef Fish Amendment 44 increased the buffer between greater amberjack biomass at maximum sustainable yield and the minimum stock size threshold from 28% to 50% (GMFMC 2017b). However, even with an increased buffer, greater amberjack spawning stock is not above the minimum stock size threshold, and therefore the stock status remains overfished.

Status of Reef Fish Stocks

The Reef Fish Fishery Management Plan (FMP) currently encompasses 31 species (Table 3.2.1). The NMFS Office of Sustainable Fisheries updates its Status of U.S. Fisheries Report to Congress[4] on a quarterly basis using the most current stock assessment information. Stock

[4] https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates

assessments and status determinations have been conducted and designated for many reef fish stocks and can be found on the Council[5] and SEDAR[6] websites.

Of the stocks for which stock assessments have been conducted, the first quarter report of the 2019 Status of U.S. Fisheries classifies only one as overfished (greater amberjack), and two stocks as undergoing overfishing (gray snapper and lane snapper). The Council received a letter from NMFS advising them that lane snapper was subject to overfishing in 2017; however, NMFS indicated that overfishing was not expected to continue in 2018 and it did not require the Council to take any action at this time. The Council is currently developing Amendment 51 that would establish gray snapper status determination criteria, references points, and modify ACLs.

The status of both assessed and unassessed stocks, as of the most recent version of the Status of U.S. Fisheries Report, is provided in Table 3.2.1. Reef Fish Amendment 44 (GMFMC 2017b), was implemented December 2017, and modified the MSST for seven species in the Reef Fish FMP to 50% of B_{MSY}. Red snapper and gray triggerfish are now listed as not overfished but rebuilding, because the biomass for the stock is currently estimated to be greater than 50% of B_{MSY} but below B_{MSY}.

A stock assessment has been conducted for Atlantic goliath grouper (SEDAR 47 2016). The SSC accepted the assessment's general findings that the stock was not overfished nor experiencing overfishing. Although the SSC determined Atlantic goliath grouper to not be experiencing overfishing based on annual harvest remaining below the OFL, the SSC deemed the assessment not suitable for stock status determination and management advice.

Stock assessments were conducted for seven reef fish stocks using the Data Limited Methods Toolkit (DLMToolkit; SEDAR 49 2016). This method allows the setting of OFL and ABC based on limited data and life history information, but does not provide assessment-based status determinations. Several stocks did not have enough information available to complete an assessment even using the DLMToolkit. These stocks are not experiencing overfishing based on annual harvest remaining below the OFL, but no overfished status determination has been made (Table 3.2.1). Lane snapper was the only stock with adequate data to be assessed using the DLMToolkit methods resulting in OFL and ABC recommendations by the SSC.

The remaining species within the Reef Fish FMP have not been assessed at this time. Therefore, their stock status is unknown (Table 3.2.1). For those species that are listed as not undergoing overfishing, that determination has been made based on the annual harvest remaining below the OFL. The gray snapper stock assessment is final (SEDAR 51 2018) was reviewed by the SSC at its May 2018 meeting. No other unassessed species are scheduled for a stock assessment at this time.

[5] www.gulfcouncil.org

[6] www.sedarweb.org

Table 3.2.1. Status of species in the Reef Fish FMP grouped by family.

Common Name	Scientific Name	Stock Status		Most recent assessment or SSC workshop
		Overfishing	Overfished	
Family Balistidae – Triggerfishes				
gray triggerfish	*Balistes capriscus*	N	N	SEDAR 43 2015
Family Carangidae – Jacks				
greater amberjack	*Seriola dumerili*	N	Y	SEDAR 33 Update 2016a
lesser amberjack	*Seriola fasciata*	N	Unknown	SEDAR 49 2016
almaco jack	*Seriola rivoliana*	N	Unknown	SEDAR 49 2016
banded rudderfish	*Seriola zonata*	Unknown	Unknown	
Family Labridae – Wrasses				
hogfish	*Lachnolaimus maximus*	N	N	SEDAR 37 2014
Family Malacanthidae – Tilefishes				
tilefish (golden)	*Lopholatilus chamaeleonticeps*	N	N	SEDAR 22 2011a
blueline tilefish	*Caulolatilus microps*	Unknown	Unknown	
goldface tilefish	*Caulolatilus chrysops*	Unknown	Unknown	
Family Serranidae – Groupers				
gag	*Mycteroperca microlepis*	N	N	SEDAR 33 Update 2016b
red grouper	*Epinephelus morio*	N	N	SEDAR 42 2015
scamp	*Mycteroperca phenax*	Unknown	Unknown	
black grouper	*Mycteroperca bonaci*	N	N	SEDAR 19 2010
yellowedge grouper	*Hyporthodus flavolimbatus*	N	N	SEDAR 22 2011b
snowy grouper	*Hyporthodus niveatus*	N	Unknown	SEDAR 49 2016
speckled hind	*Epinephelus drummondhayi*	N	Unknown	SEDAR 49 2016
yellowmouth grouper	*Mycteroperca interstitialis*	N	Unknown	SEDAR 49 2016
yellowfin grouper	*Mycteroperca venenosa*	Unknown	Unknown	
warsaw grouper	*Hyporthodus nigritus*	N	Unknown	
*Atlantic goliath grouper	*Epinephelus itajara*	N	Unknown	SEDAR 47 2016
Family Lutjanidae – Snappers				
queen snapper	*Etelis oculatus*	N	Unknown	
mutton snapper	*Lutjanus analis*	N	N	SEDAR 15A Update 2015
blackfin snapper	*Lutjanus buccanella*	N	Unknown	
red snapper	*Lutjanus campechanus*	N	N	SEDAR 52 2018
cubera snapper	*Lutjanus cyanopterus*	N	Unknown	
gray snapper	*Lutjanus griseus*	Y	Unknown	SEDAR 51 2018
lane snapper	*Lutjanus synagris*	Y	Unknown	SEDAR 49 2016
silk snapper	*Lutjanus vivanus*	Unknown	Unknown	
yellowtail snapper	*Ocyurus chrysurus*	N	N	SEDAR 27A 2012
vermilion snapper	*Rhomboplites aurorubens*	N	N	SEDAR 45 2016
wenchman	*Pristipomoides aquilonaris*	N	N	SEDAR 49 2016

Note: *Atlantic goliath grouper is a protected grouper (i.e., ACL is set at zero) and benchmarks do not reflect appropriate stock dynamics.

Bycatch

Details of bycatch in the greater amberjack fishery can be found in Appendix C (Bycatch Practicability Analysis) of Framework to the Reef Fish FMP to modify greater amberjack allowable harvest and rebuilding plan (GMFMC 2017a), and is hereby incorporated by reference. In summary, studies have documented low bycatch and bycatch mortality of greater amberjack due to the ability of fishermen to specifically target schools when the season is open and avoid

them during times of closure. Other reef fish species known to be incidentally caught include almaco jack, vermillion snapper and some deep-water groupers. None of these species are currently undergoing overfishing; although, the overfished status of almaco jack and deep-water groupers is unknown (NMFS 4th quarter 2018 Update Summary of Stock Status for non-Federal Strategic Sourcing Initiative [FSSI] stocks). Minimum size limits are estimated to be the greatest source of regulatory discards for the majority of reef fish species. The greater amberjack commercial sector is constrained to a 36-inch fork length (FL) minimum size limit. Trip limits can also play a part in bycatch, although not as significant a role as minimum size limits. Because fishermen can target greater amberjack explicitly, little bycatch of target or non-target species is expected in the greater amberjack fishery. Interactions with other species such as sea turtles and sea birds are known to occur (see next section).

Protected Species

The Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) provide special protections to some species that occur in the Gulf. A brief summary of these two laws and more information is available on the National Marine Fisheries Service (NMFS) Office of Protected Resources website.[7] All 22 marine mammals in the Gulf are protected under the MMPA. Three marine mammals (sperm whales, Bryde's whales, and manatees) are also protected under the ESA. Bryde's whales are the only resident baleen whales in the Gulf and the species was recently listed as endangered (84 FR 15488; April 15, 2019). Other species protected under the ESA include sea turtle species (Kemp's ridley, loggerhead (Northwest Atlantic Ocean distinct population segment [DPS]), green (South Atlantic and North Atlantic DPSs), leatherback, and hawksbill), five fish species (Gulf sturgeon, smalltooth sawfish, Nassau grouper, giant manta ray, and oceanic whitetip shark), and six coral species (elkhorn, staghorn, rough cactus, lobed star, mountainous star, and boulder star). Critical habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean DPS of loggerhead sea turtles also occurs in the Gulf, though only loggerhead critical habitat occurs in federal waters.

The most recent biological opinion (opinion) on the Reef Fish FMP was completed on September 30, 2011 (NMFS 2011). The opinion determined the continued authorization of the Gulf reef fish fishery managed under the Reef Fish FMP is not likely to affect ESA-listed marine mammals or *Acropora* corals, and is not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback), or smalltooth sawfish. An incidental take statement was provided. Since issuing the opinion, in memoranda dated September 16, 2014, and October 7, 2014, NMFS concluded that the activities associated with the Reef Fish FMP are not likely to adversely affect critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle DPS or four newly listed species of corals (rough cactus, lobed star, mountainous star, and boulder star).

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered, effective May 6, 2016. Two

[7] http://www.nmfs.noaa.gov/pr/laws/

of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, occur in the Gulf and are listed as threatened. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA. NMFS has reinitiated consultation on the Reef Fish FMP to address these listings. In a memorandum dated September 29, 2016, NMFS determined that allowing fishing under the Reef Fish FMP to continue during the re-initiation period is not likely to jeopardize the continued existence of the North Atlantic and South Atlantic DPSs of green sea turtles or Nassau grouper. Furthermore, on January 22, 2018, NMFS published a final rule (83 FR 2916) listing the giant manta ray as threatened under the ESA. On January 30, 2018, NMFS published a final rule (83 FR 4153) listing the oceanic whitetip shark as threatened under the ESA. In a memorandum dated March 6, 2018, NMFS revised the reinitiated consultation on the Reef Fish FMP to address the listings of the giant manta and oceanic whitetip and determined that allowing fishing under the Reef Fish FMP to continue during the revised re-initiation period is not likely to jeopardize the continued existence of listed sea turtle species, smalltooth sawfish, the green turtle DPSs, Nassau grouper, the giant manta, or the oceanic whitetip. NMFS is currently in the process of revising the reinitiated consultation on the Reef Fish FMP to address the listing of the Bryde's whale.

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. Primary gears of the Gulf reef fish fishery are classified in the Final List of Fisheries for 2019 (84 FR 22051) as Category III 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 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. Additionally, there is no evidence that the directed greater amberjack fishery is adversely affecting seabirds.

Climate change

Climate change projections predict increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation (Intergovernmental Panel on Climate Change [IPCC]).[8] These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The National Oceanic and Atmospheric Association (NOAA) Climate Change Web Portal[9] predicts the average sea surface temperature in the Gulf will increase by 1-3ºC for 2010-2070 compared to the average over the years 1950-2010. For reef fishes, Burton (2008)

[8] http://www.ipcc.ch/

[9] https://www.esrl.noaa.gov/psd/ipcc/

speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. It is unclear if reef fish distribution in the Gulf has been affected.

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

Deepwater Horizon **MC252 Oil Spill**

General Impacts on Fishery Resources

The presence of polycyclic aromatic hydrocarbons (PAH), which are highly toxic chemicals that tend to persist in the environment for long periods of time, in marine environments can have detrimental impacts on marine finfish, especially during the more vulnerable larval stage of development (Whitehead et al. 2011). When exposed to realistic, yet toxic levels of PAHs (1–15 μg/L), greater amberjack larvae develop cardiac abnormalities and physiological defects (Incardona et al. 2014). The future reproductive success of long-lived species, including many reef fish species, may be negatively affected by episodic events resulting in high-mortality years or low recruitment. These episodic events could leave gaps in the age structure of the population, thereby affecting future reproductive output (Mendelssohn et al. 2012). Other studies have described the vulnerabilities of various marine finfish species, with morphological and/or life history characteristics similar to species found in the Gulf, to oil spills and dispersants (Hose et al. 1996; Carls et al. 1999; Heintz et al. 1999; Short 2003).

Increases in histopathological lesions were found in red snapper (*Lutjanus campechanus*) in the area affected by the oil, but Murawski et al. (2014) found that the incidence of lesions had declined between 2011 and 2012. The occurrence of such lesions in marine fish is not uncommon (Sindermann 1979; Haensly et al. 1982; Solangi and Overstreet 1982; Khan and Kiceniuk 1984, 1988; Kiceniuk and Khan 1987; Khan 1990). Red snapper diet was also affected after the spill. A decrease in zooplankton consumed, especially by adults (greater than 400 mm total length) over natural and artificial substrates may have contributed to an increase in the consumption of fish and invertebrate prey – more so at artificial reefs than natural reefs (Tarnecki and Patterson 2015).

In addition to the crude oil, over a million gallons of the dispersant, Corexit 9500A®, was applied to the ocean surface and an additional hundreds of thousands of gallons of dispersant was pumped to the mile-deep well head (National Commission 2010). No large-scale applications of dispersants in deep water had been conducted until the *Deepwater Horizon* MC252 oil spill. Thus, no data exist on the environmental fate of dispersants in deep water. The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. Marine fish species typically concentrate PAHs in the digestive tract, making stomach

bile an appropriate testing medium. A study by Snyder et al. (2015) assessed bile samples from golden tilefish (*Lopholatilus chamaeleonticeps*), king snake eel (*Ophichthus rex*), and red snapper for PAH accumulation over time, and reported concentrations were highest in golden tilefish during the same time period when compared to king snake eel and red snapper. These results suggest that the more highly associated an organism is with the sediment in an oil spill area, the higher the likelihood of toxic PAH accumulation. Twenty-first century dispersant applications are thought to be less harmful than their predecessors. However, the combination of oil and dispersants has proven to be more toxic to marine fishes than either dispersants or crude oil alone. Marine fish which are more active (e.g., a pelagic species versus a demersal species) appear to be more susceptible to negative effects from interactions with weathered oil/dispersant emulsions. These effects can include mobility impairment and inhibited respiration (Swedmark et al. 1973). Another study found that while Corexit 9500A® and oil are similar in their toxicity, when Corexit 9500A® and oil were mixed in lab tests, toxicity to microscopic rotifers increased up to 52-fold (Rico-Martínez et al. 2013). These studies suggest that the toxicity of the oil and dispersant combined may be greater than anticipated. No large-scale applications of dispersants in deep water had been conducted until the Deepwater Horizon MC252 oil spill. Thus, no data exist on the environmental fate of dispersants in deep water.

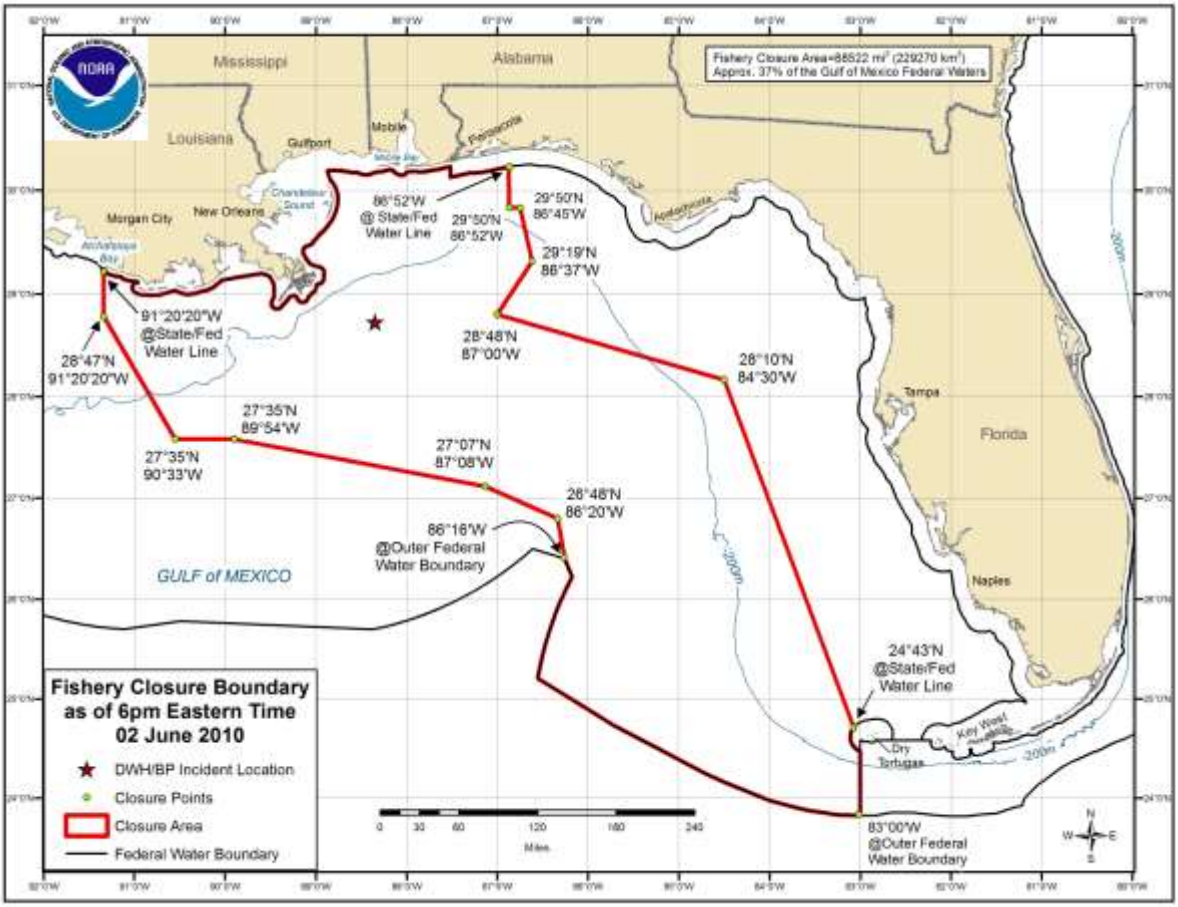

Figure 3.2.1. Fishery closure at the height of the *Deepwater Horizon* MC252 oil spill.

3.3 Description of the Economic Environment

3.3.1 Commercial Sector

Vessel Permits

Commercial operators harvesting greater amberjack from federal waters must have a Gulf reef fish permit, which is a limited access permit. As of May 3, 2019, 836 vessels have valid or renewable permits. Vessels that use bottom longline gear in federal waters east of 85º30'W longitude must also have a valid Eastern Gulf longline endorsement. As of May 3, 2019, 62 Gulf reef fish permit holders also have the longline endorsement, and all but one of the endorsement holders have a mailing address in Florida.

Vessel Activity

Information on commercial vessel performance presented in Tables 3.3.1.1-3.3.1.6 covers all vessels that harvested greater amberjack anywhere in the Gulf, regardless of trip length, species target intent, or area fished, during 2013-2017. The main sources for this information are logbook data for landings and NMFS Southeast Fisheries Science Center (SEFSC) Accumulated Landings System (ALS) for prices (SEFSC-SSRG Economic Panel Data). Landings in these tables would not exactly match with greater amberjack landings shown in Tables 1.1.2-1.1.3, which are based on SEFSC ACL databases.[10] In addition, the landings are presented in gutted weight rather than whole weight. Landings for all species in the SEFSC-SSRG Economic Panel Data are expressed in gutted weight to provide one unit for all species, because data summarizations involve a multitude of species. Federally permitted vessels required to submit logbooks generally report their harvest of most species regardless of whether the fish were caught in state or federal waters.

On average, 204 vessels per year landed greater amberjack in the Gulf. These vessels, combined, averaged 628 trips per year in the Gulf on which greater amberjack was landed and 3,167 other trips (Table 3.3.1.1). The average annual total dockside revenue (2017 dollars) was approximately $0.66 million from greater amberjack, $5.68 million from other species co-harvested with greater amberjack (on the same trips), and $26.75 million from other trips by these vessels on trips in the Gulf on which no greater amberjack were harvested or occurred in the South Atlantic. Total average annual revenue from all species harvested by vessels harvesting greater amberjack in the Gulf was approximately $38.87 million or approximately $190,000 per vessel (Table 3.3.1.2). Revenues from greater amberjack accounted for

[10] A major source of the ACL database is the dealer reports. Logbooks are trip reports submitted by fishermen sometime at the end of each trip. Both the dealer reports and logbooks are required to be submitted to NMFS. Generally dealer reports are more comprehensive than logbooks in accounting for landings, so landings based on dealer reports may differ from those based on logbooks. In 2017, for example, the ACL data shows greater amberjack landings of 454,561 lbs ww (437,077 lbs gw) while logbook data shows landings of 417,326 lbs gw. Logbooks, on the other hand, provide more details at the vessel and trip levels.

approximately 0.17% of total revenues from all species, indicating that greater amberjack is a minor revenue generator for an average vessel.

Table 3.3.1.1. Summary of vessel counts, trips, and landings (pounds gutted weight [lbs gw]) for vessels landing at least one pound of greater amberjack, 2013-2017.

Year	Number of Vessels	Number of Gulf Trips that Caught Greater Amberjack	Greater Amberjack Landings (lbs gw)	"Other Species" Landings Jointly Caught with Greater Amberjack (lbs gw)	Number of Other Trips*	Landings on Other Trips (lbs gw)
2013	184	501	359,316	1,160,832	2,707	7,130,886
2014	221	718	427,543	1,794,266	3,463	8,901,382
2015	185	554	400,548	1,364,588	3,026	8,671,588
2016	210	699	399,499	1,663,040	3,568	9,114,131
2017	221	669	417,326	1,196,010	3,072	7,280,264
Average	204	628	400,846	1,435,747	3,167	8,219,650

Source: NMFS SEFSC Economic Query System, May 3, 2019.
*Includes Gulf trips on which greater amberjack were not harvested as well as trips in the South Atlantic regardless of what species were harvested, including greater amberjack

Table 3.3.1.2. Summary of vessel counts and revenue (2017 dollars) for vessels landing at least one pound of greater amberjack, 2013-2017.

Year	Number of Vessels	Dockside Revenue from Gulf Greater Amberjack	Dockside Revenue from "Other Species" Jointly Caught with Greater Amberjack	Dockside Revenue on Other Trips	Total Dockside Revenue	Average Total Dockside Revenue per Vessel
2013	184	$557,039	$4,426,436	$27,387,360	$32,370,835	$175,928
2014	221	$666,404	$6,876,223	$34,508,984	$42,051,611	$190,279
2015	185	$626,895	$5,533,951	$34,836,672	$40,997,518	$221,608
2016	210	$698,881	$6,772,454	$36,704,401	$44,175,736	$210,361
2017	221	$747,812	$4,814,342	$29,214,230	$34,776,384	$157,359
Average	204	$659,406	$5,684,681	$32,530,329	$38,874,417	$190,374

Source: NMFS SEFSC Economic Query System, May 3, 2019.

Commercial vessels in the Gulf used a variety of gear types in harvesting reef fish, including greater amberjack. Most vessels used hook and line in harvesting greater amberjack, with a few using longline or some other gear types, such as spear or powerhead diving (Table 3.3.1.3). For the current purpose, hook and line includes handline, bandit, and trolling. All vessels, regardless of gear type used, depended more on species other than greater amberjack for their revenues (Table 3.3.1.4). Relative to total revenues, greater amberjack accounted for approximately 2.24%, 0.25%, and 9.75% for vessels using hook and line, longline, and other gear types, respectively. Although greater amberjack is a minor revenue generator for an average vessel, it appears that vessels using diving gear depend on greater amberjack more than other vessels.

Table 3.3.1.3. Summary of 2013-2017 average vessel counts, trips, and landings (pounds gutted weight [lbs gw]) for vessels landing at least one pound of greater amberjack, by gear type (hook and line [H&L], longline [LL], and Others).

Gear	Number of Vessels	Number of Gulf Trips that Caught Greater Amberjack	Greater Amberjack Landings (lbs gw)	"Other Species" Landings Jointly Caught with Greater Amberjack (lbs gw)	Number of Other Trips	Landings on Other Trips (lbs gw)
H&L	165	523	353,708	943,579	2,603	5,538,869
LL	35	63	18,822	465,358	404	2,588,597
Others	16	43	28,316	26,810	138	71,133

Source: NMFS SEFSC Economic Query System, May 3, 2019.
H&L includes handline, bandit, and trolling; Others includes spear and powerhead diving.

Table 3.3.1.4. Summary of 2013-2017 average vessel counts and revenue (2017 dollars) for vessels landing at least one pound of greater amberjack, by gear type (hook and line [H&L], longline [LL], and Others).

Gear	Number of Vessels	Dockside Revenue from Gulf Greater Amberjack	Dockside Revenue from "Other Species" Jointly Caught with Greater Amberjack	Dockside Revenue on Other Trips	Total Dockside Revenue	Average Total Dockside Revenue per Vessel
H&L	165	$583,832	$3,683,717	$21,787,805	$26,055,353	$158,295
LL	35	$30,439	$1,889,305	$10,396,457	$12,316,201	$349,892
Others	16	$45,151	$111,821	$306,197	$463,169	$29,690

Source: NMFS SEFSC Economic Query System, May 3, 2019.
H&L includes handline, bandit, and trolling; Others includes spear and powerhead diving.

Florida is by far the dominant state in the harvest of Gulf greater amberjack, both in terms of landings (Table 3.3.1.5) and revenues (Table 3.3.1.6). The number of Florida vessels that harvested greater amberjack is the key factor that placed Florida on top of other states. Although Louisiana registered a much lower number of vessels than Florida, greater amberjack landings and revenues from the species appear to be relatively substantial. The other three states have relatively minor landings in the commercial greater amberjack sector. Although Florida ranks first in terms of total revenues from all sources, Texas ranks first in terms of revenues per vessel, with Alabama/Mississippi ranking last.

Table 3.3.1.5. Summary of 2013-2017 average vessel counts, trips, and landings (pounds gutted weight [lbs gw]) for vessels landing at least one pound of greater amberjack in western Florida (FL), Alabama and Mississippi (AL/MS), Louisiana (LA), and Texas (TX).

State	Number of Vessels	Number of Gulf Trips that Caught Greater Amberjack	Greater Amberjack Landings (lbs gw)	"Other Species" Landings Jointly Caught with Greater Amberjack (lbs gw)	Number of Other Trips	Landings on Other Trips (lbs gw)
FL	155	381	189,915	896,635	2,201	5,015,939
AL/MS	13	96	70,932	41,168	380	363,218
LA	20	108	113,090	244,359	317	1,247,904
TX	19	43	26,910	253,585	265	1,581,998

Source: NMFS SEFSC Economic Query System, May 3, 2019.
AL and MS are combined for confidentiality purposes.

Table 3.3.1.6. Summary of 2013-2017 average vessel counts and revenue (2017 dollars) for vessels landing at least one pound of greater amberjack, in western Florida (FL), Alabama and Mississippi (AL/MS), Louisiana (LA), and Texas (TX).

State	Number of Vessels	Dockside Revenue from Gulf Greater Amberjack	Dockside Revenue from "Other Species" Jointly Caught with Greater Amberjack	Dockside Revenue on Other Trips	Total Dockside Revenue	Average Total Dockside Revenue per Vessel
FL	155	$301,518	$3,431,910	$19,092,406	$22,825,835	$147,074
AL/MS	13	$120,169	$134,899	$1,069,755	$1,324,824	$100,365
LA	20	$191,035	$968,300	$5,016,751	$6,176,086	$302,749
TX	19	$46,700	$1,149,733	$7,304,901	$8,501,334	$457,061

Source: NMFS SEFSC Economic Query System, May 3, 2019.
AL and MS are combined for confidentiality.

Ex-vessel Prices

The dockside or ex-vessel price is the price the vessel receives at the first sale of harvest. From 2013 through 2017, the average annual ex-vessel price per pound for greater amberjack harvested in the Gulf was $1.65 (2017 dollars), and ranged from $1.56 in 2014 to $2.00 in 2013.

Commercial Sector Business Activity

Estimates of the business activity (economic impacts) in the U.S. associated with the Gulf greater amberjack commercial harvests were derived using the model developed for and applied in NMFS (2015) and are provided in Table 3.3.1.7. Business activity for the commercial sector is characterized in the form of full-time equivalent jobs, output (sales) impacts (gross business sales), income impacts (wages, salaries, and self-employed income), and value added impacts (difference between the sales price of a good and the cost of the goods and services needed to produce it). Income impacts should not be added to output (sales) impacts because this would result in double counting. The estimates of economic activity include the direct effects (effects in the sector where an expenditure is actually made), indirect effects (effects in sectors providing goods and services to directly affected sectors), and induced effects (effects induced by the personal consumption expenditures of employees in the direct and indirectly affected sectors).

Table 3.3.1.7. Average revenue and annual business activity associated with the harvests of vessels that harvested greater amberjack in the Gulf. Dollar values are in thousand 2017 dollars.

Species	Average Annual Dockside Revenue	Jobs	Output (Sales) Impacts	Income Impacts	Value Added Impacts
Greater Amberjack	$659	86	$6,539	$2,401	$3,393
All species*	$38,874	5,099	$385,510	$141,573	$200,026

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

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

Dealers

Commercial vessels landing greater amberjack can only sell their catch to seafood dealers with valid Gulf and South Atlantic Dealer (GSAD) permit. On May 3, 2019, 408 dealers had a valid

GSAD permit. There are no income or sales requirements to acquire a GSAD permit. As a result, the total number of dealers can vary over the course of the year and from year to year.

Imports

Information on the imports of all snapper and grouper species, either fresh or frozen, are available at the NOAA website[11] Information on the imports of individual snapper or grouper species, including greater amberjack, is not available. In 2017, imports of all snapper and grouper species (fresh and frozen) were approximately 57.68 million pounds (mp) valued at approximately $177.22 million (2017 dollars). These amounts are contrasted with the harvest of all reef fish in the Gulf in 2017 of approximately 16.37 mp valued at approximately $60.07 million (2017 dollars; data available at the NOAA website[12]). Although the levels of domestic production and imports are not totally comparable for several reasons, including considerations of different product form such as fresh versus frozen, and possible product mislabeling, the difference in the magnitude of imports relative to the amount of domestic harvest is indicative of the dominance of imports in the domestic market. Final comparable data for more recent years are not currently available.

3.3.2 Recreational Sector

The focus of this amendment is the commercial sector. Therefore, a description of the economic environment for the recreational sector is not provided here. Information regarding the recreational sector may be found in recent amendments affecting the Gulf greater amberjack segment of the reef fish fishery and is incorporated herein by reference. Specifically, see Framework Action to Modify the Greater Amberjack Allowable Harvest and Rebuilding Plan (GMFMC 2017a) and Framework Action to Modify the Greater Amberjack Fishing Year and Recreational Fishing Season (GMFMC 2017b).

3.4 Description of the Social Environment

This framework action affects commercial management of greater amberjack in the Gulf. Commercial landings by state are included to provide information on the geographic distribution of fishing involvement. Descriptions of the top communities involved in commercial greater amberjack are included. Community level data are presented in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Act, which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented to assess the potential for environmental justice concerns.

Landings by State

[11] http://www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataProduct.html.

[12] http://www.st.nmfs.noaa.gov/commercial-fisheries/publications/index.

The greatest proportion of commercial greater amberjack landings are in Florida (average of 49.4% from 2014-2018), followed by Louisiana (24.4%), Mississippi and Alabama (19.7%), and Texas (6.5%, Table 1.1.3).

Fishing Communities

The descriptions of Gulf communities include information about the top communities based on a "regional quotient" (RQ) of commercial landings and value for greater amberjack. The RQ is species-specific relative measure of the proportion of landings and value by region. These communities would be most likely to experience the effects of the proposed actions that could change the greater amberjack fishery and impact participants, associated businesses, and communities within the region. If a community is identified as a greater amberjack community, based on the RQ, this does not necessarily mean that the community would experience significant impacts due to changes in the fishery if a different species or number of species was also important to the local community and economy. Additional detailed information about communities with the highest RQs can be found on the Southeast Regional Office (SERO)'s Community Snapshots website.[13]

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

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

The top greater amberjack communities are located in Florida, Alabama, Louisiana, and Texas (Figure 3.4.1). About 48% of greater amberjack is landed in the top three communities (Key Largo, Florida; Islamorada, Florida; and Bayou La Batre, Alabama) representing about 45% of the Gulf-wide ex-vessel value for the species (Figure 3.4.1). Several Florida Keys communities (Key Largo, Islamorada, and Sugarloaf Shores) are included in the top communities.

[13] http://sero.nmfs.noaa.gov/sustainable_fisheries/social/community_snapshot/

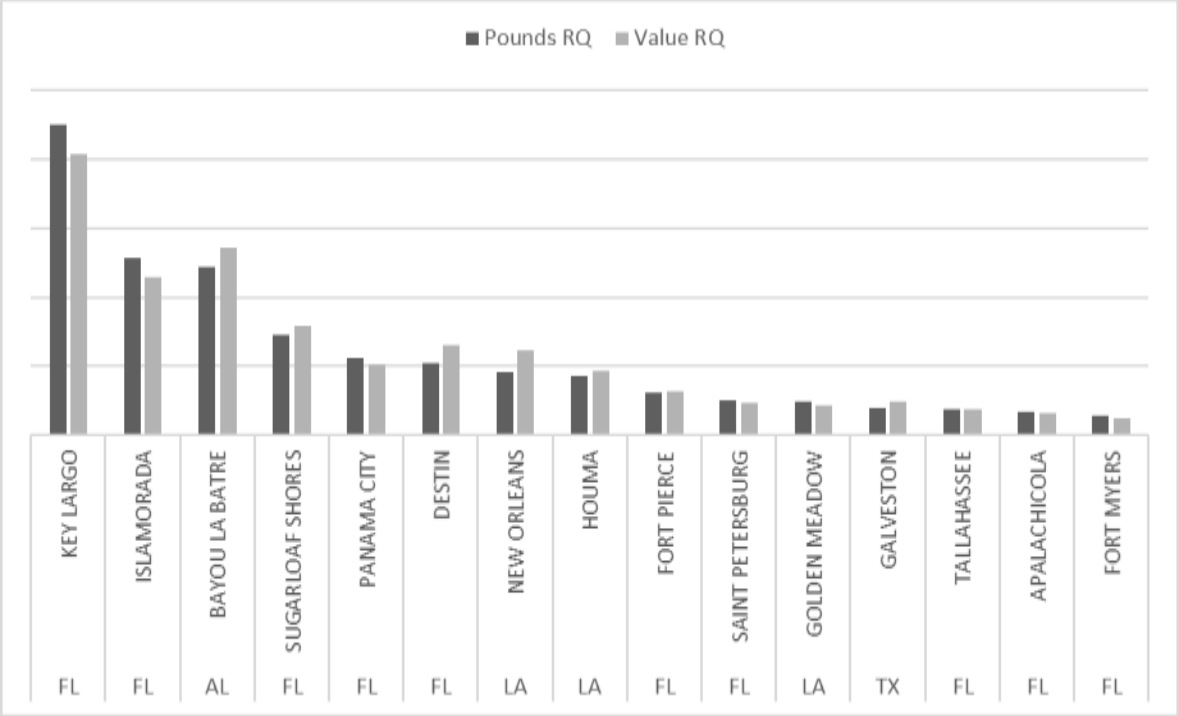

Figure 3.4.1. Top Gulf communities ranked by pounds and value RQ of greater amberjack. The actual RQ values (y-axis) are omitted from the figure to maintain confidentiality.
Source: SERO, Community ALS 2017.

The communities that demonstrate high levels of commercial engagement include Key Largo, Islamorada, Panama City, Destin, Fort Pierce, Saint Petersburg, Apalachicola, and Fort Myers, Florida; Bayou La Batre, Alabama; New Orleans, Houma, and Golden Meadow, Louisiana; and Galveston, Texas (Figure 3.4.2).

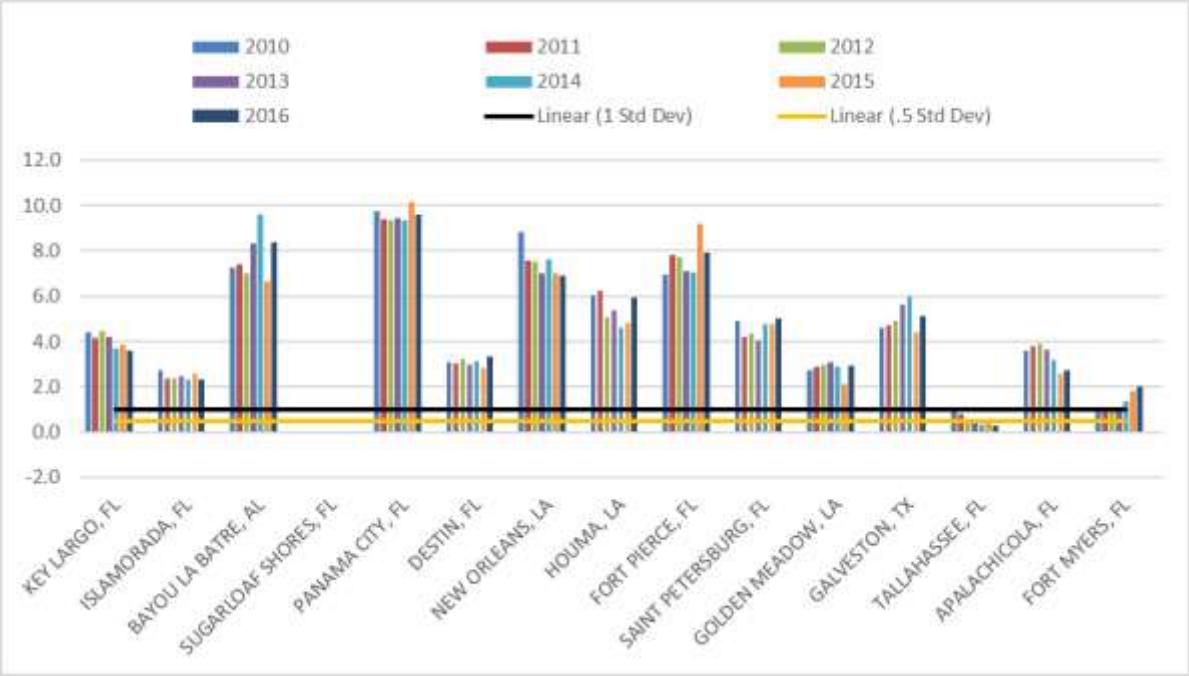

Figure 3.4.2. Top Gulf greater amberjack communities' commercial engagement, 2010-2016.
Source: SERO, Community Social Vulnerability Indicators Database 2018 (American Community Survey 2012-2016).

Environmental Justice

Executive Order 12898 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. The main focus of Executive Order 12898 is to consider "the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories…" This executive order is generally referred to as environmental justice (EJ).

Commercial fishermen and associated industries could be impacted by the proposed actions. However, information on the race and income status for groups at the different participation levels 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 activities themselves. To help assess whether any environmental justice concerns arise from the actions in this amendment, 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.

Figure 3.4.3 provides the social vulnerability of the top commercial communities. Two communities exceed the threshold of one standard deviation above the mean for all three indices (Bayou La Batre, Alabama and Fort Pierce, Florida). Several communities exceed the threshold of one-half standard deviation above the mean for more than one index (Fort Myers, Florida; Galveston, Texas; Golden Meadow, Louisiana; New Orleans, Louisiana; and Panama City, Florida). These communities would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

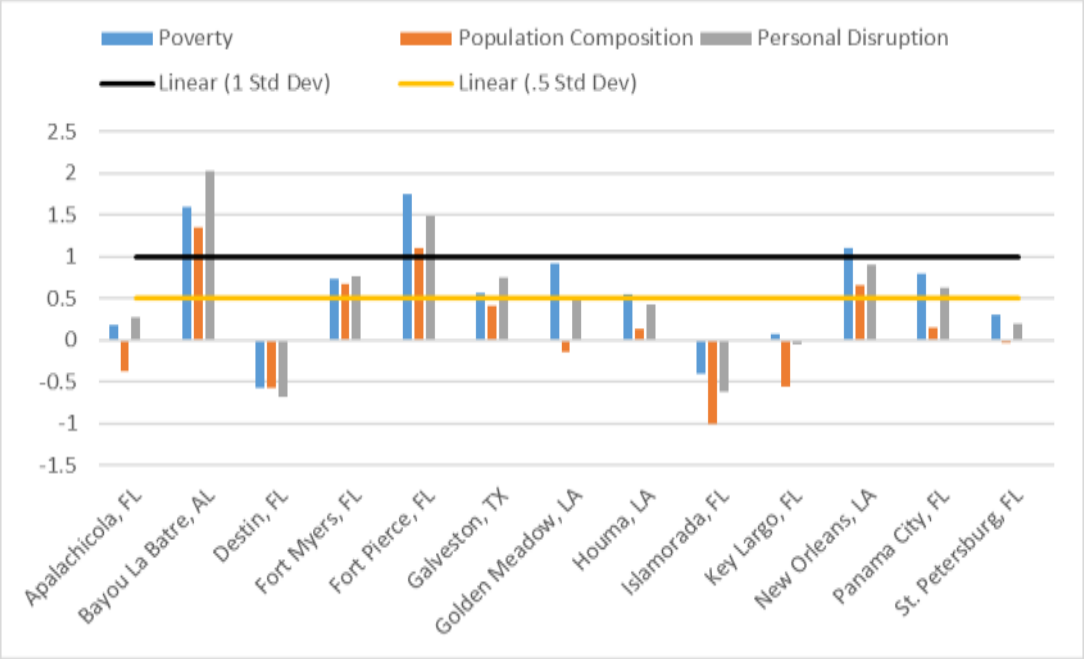

Figure 3.4.3. Social vulnerability indices for top commercial fishing communities.
Source: SERO, Community Social Vulnerability Indicators Database 2018 (American Community Survey 2012-2016).

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). However, the implementation of the proposed actions of this amendment would not discriminate against any group based on their race, ethnicity, or income status because the proposed actions would be applied to all participants in the fishery. Further, there is no known subsistence fishing for greater amberjack. Thus, the actions of this amendment are not expected to result in adverse or disproportionate environmental or public health impacts to EJ populations. Although no EJ issues have been identified, the absence of potential EJ concerns cannot be assumed.

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*.), which was enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the exclusive economic zone (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 and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix B. In most cases, the Secretary has delegated this authority to NMFS.

The Council is responsible for fishery resources in federal waters of the Gulf. For reef fish, these waters extend 9 to 200 miles offshore from the seaward boundaries of Alabama, Florida, Louisiana, Mississippi, and Texas, as those boundaries have been defined by law. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline extending 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 17 voting members: 11 public members appointed by the Secretary; one each from the fishery agencies of Texas, Louisiana, Mississippi, Alabama, and Florida; and one from NMFS. The public is also involved in the fishery management process.

3.5.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf states exercises legislative and regulatory authority over their 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 on their respective web pages (Table 3.5.2.1).

Table 3.5.2.1. Gulf state marine resource agencies and web pages.

State Marine Resource Agency	Web Page
Alabama Marine Resources Division	http://www.outdooralabama.com/
Florida Fish and Wildlife Conservation Commission	http://myfwc.com/
Louisiana Department of Wildlife and Fisheries	http://www.wlf.louisiana.gov/
Mississippi Department of Marine Resources	http://www.dmr.ms.gov/
Texas Parks and Wildlife Department	http://tpwd.texas.gov/

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Modify the Greater Amberjack Commercial Trip Limit

Alternative 1: No Action – Do not modify the current commercial trip limit for Gulf of Mexico (Gulf) greater amberjack of 1,500 lbs gutted weight (gw) (1,560 lbs whole weight [ww]).

Alternative 2: Establish a commercial trip limit for Gulf greater amberjack of 1,000 lbs gw (1,040 lbs ww).

Alternative 3: Establish a commercial trip limit for Gulf greater amberjack of 750 lbs gw (780 lbs ww).

Preferred Alternative 4: Establish a commercial trip limit for Gulf greater amberjack of 500 lbs gw (520-lbs ww).

Alternative 5: Establish a commercial trip limit for Gulf greater amberjack of 250 lbs gw (260 lbs ww).

Alternative 6: Reduce the commercial trip limit for Gulf greater amberjack to 250 lbs gw (260 lbs ww) when 75% of the ACT is projected to be met.

The Gulf of Mexico Fishery Management Council (Council) may choose any one of Alternatives 1-4 in conjunction with Alternative 6 as preferred alternatives.

4.1.1 Direct and Indirect Effects on the Physical Environment

This action proposes a reduction to an established commercial trip limit for Gulf of Mexico (Gulf) greater amberjack. The effects on the physical environment from the implementation of a commercial greater amberjack trip limit have been previously considered (GMFMC 2012). In general, greater amberjack are opportunistically harvested (Figure 2.1.1) by fishermen targeting other reef fish species (e.g., snappers and groupers)-line. Commercial fishing gear can negatively affect the physical environment when coming into contact with ocean bottom, and these effects are gear-dependent. Commercial fishing for reef fish species is commonly conducted using vertical-line gear and less frequently with bottom longline and spear gear. All three of these gear types have the potential to snag and entangle bottom structures (Barnette 2001). Potential bottom substrate damage can also occur when deploying the vessel's anchor is also associated with vertical-line fishing. Additionally, preferred fishing sites, like reefs, are targeted and revisited multiple times by fishing vessels which increases the potential for prolonged effects to the physical environment (Bohnsack 2000).

Alternative 1 (No Action) would maintain the currently commercial greater amberjack commercial trip limit of 1,500 pounds (lbs) gutted weight (gw), and therefore would not result in changes in effects to the physical environment. **Alternatives 2-6** would increase the duration of

the commercial fishing season (Table 2.1.2) through the establishment of a lower commercial trip limit. However, only **Alternative 5** or **Preferred Alternative 4** selected in combination with **Alternative 6** may extend the fishing season to the end of the calendar year without exceeding the commercial annual catch target (ACT). Gulf greater amberjack are typically harvested opportunistically within the broader commercial reef fish sector and the proposed trip limit action will not increase the ACT. Therefore, it is unlikely that changes to the Gulf greater amberjack commercial trip limit would substantial change commercial reef fish fishing effort and result in any significant effects on the physical environment.

4.1.2 Direct and Indirect Effects on the Biological Environment

Removal of fish from a population through fishing mortality reduces the overall population size and reproductive potential of the stock. Benefits associated with ending overfishing and rebuilding the stock include: a more uniform size- and age-structure and increased stock abundance and biomass. Currently, Gulf greater amberjack is experiencing overfishing and is overfished.

Alternative 1 (No Action) would result in no change in effects to the biological environment. **Alternatives 2-6** would all increase the duration of the fishing season and may reduce the number of commercial seasonal regulatory discards relative to **Alternative 1**. These regulatory discards may be reduced if the commercial fishing season remains open for more of the calendar year, as commercial fishers will not have to discard greater amberjack while the season is open, unless they have already retained the trip limit. Because the majority of trips harvest less than 500 lbs gw per trip, fishers would be less likely to have met the trip limit and have to discard fish during the open season under **Alternatives 2** and **3**, and **Preferred Alternative 4** than under **Alternative 5**. However, an in-season closure is expected under most of these alternatives resulting in potential regulatory discards (Table 2.1.2). Only **Alternative 5** alone and if combined **Preferred Alternative 4** selected in conjunction with **Alternative 6** are predicted to extend the commercial fishing year sufficiently to avoid an in-season closure. Regardless of the alternative selected, no significant impacts to the biological environment, including non-target species is expected because this action will not substantially change the prosecution of the reef fish fishery.

4.1.3 Direct and Indirect Effects on the Economic Environment

This action considers reductions to the commercial greater amberjack trip limit from the current 1,500 lbs gw. Reductions proposed would establish a trip limit of 1,000 lbs gw (**Alternative 2**), 750 lbs gw (**Alternative 3**), 500 lbs gw (**Preferred Alternative 4**) or 250 lbs gw (**Alternative 5**). In addition, **Alternative 6**, which could be selected in conjunction with **Alternatives 1-3** or **Preferred Alternative 4**, would reduce the trip limit to 250 lbs gw when 75% of the quota is projected to be met. **Alternative 1** (no action) would not affect the commercial harvest 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 for vessels that normally harvest, or would be expected to harvest,

over the proposed trip limits. The frequency distribution of greater amberjack landings per commercial trip (Table 4.1.3.1) suggests that trip limit reductions under consideration could affect a limited number of trips and would therefore be expected to result in relatively limited effects. Greater trip limit reductions would be expected to impact larger number of trips and thus result in greater effects.

Table 4.1.3.1. Pounds of greater amberjack per commercial trip in the Gulf of Mexico (frequency and cumulative frequency) 2016-18.

Pounds per trip (gw)	Frequency (%)	Cumulative Frequency (%)
1 to 250	40.3	40.3
251 to 500	11.8	52.1
501 to 750	9.5	61.5
751 to 1,000	7.9	69.4
1,001 to 1,500	27.1	96.5
over 1,500	3.5	100.0

Under the status quo trip limit, commercial fishermen have already developed adequate fishing practices, e.g., catch composition, to optimize their fishing operations. Therefore, reductions in trip limits would be expected to disrupt these customary practices and could be expected to adversely affect their revenues. These vessels would be expected to experience a reduction in per-trip greater amberjack ex-vessel revenues and associated profits, assuming relatively stable operating costs per trip. However, fishermen may also be expected to alter their catch composition to mitigate potential revenue losses that could result from lower greater amberjack harvests per trip. To the extent that a trip limit reduction would be expected to postpone (or eliminate) quota closures to a later date compared to status quo, some of the revenue losses from a trip limit could be recouped by making more trips later in the year.

Because a trip limit reduction typically provides the opportunity to extend the fishing season, it would be expected to spread landings over a longer time period and avoid ex-vessel prices drops generally associated with market gluts. However, if the greater amberjack trip limit is too low, it may preclude fishermen from harvesting the entirety of the commercial quota, possibly resulting in a net loss in total industry revenue. Landings projections provided in Table 2.1.2 indicate that **Alternative 5** and **Preferred Alternative 4** combined with **Alternative 6** would not allow fishermen to harvest the entirety of the quota. **Alternative 5** would allow commercial fishermen to only harvest 72% of the ACT, thereby leaving 28% of the ACT or 97,934 lbs of quota unharvested. Based on an average ex-vessel price of $1.65 per pound (derived from Tables 3.3.1.1 and 3.3.1.2), forgone harvests under **Alternative 5** are valued at $161,591. When combined with **Alternative 6**, **Preferred Alternative 4** would leave 1% of the ACT or 3,498 lbs unharvested, corresponding to a $5,772 loss in ex-vessel value.

Overall, the net economic effects that would be expected to result from a reduction to the commercial greater amberjack trip limit may be negative, nil, or positive. The direction and magnitude of the net economic effects would be determined by the relative size of the potential effects discussed above. Other things being equal, greater trip limit reductions would be expected to result in greater decreases in ex-vessel revenues per trip, wider adjustments to catch composition, longer fishing seasons, and more significant mitigation of potential price decreases due to the concentration of market supply within a shorter window of time. Conversely, smaller reductions in trip limits would be expected to result in less pronounced disruptions to fishing practices and market conditions. Therefore, regardless of the direction of the net economic effects expected to result from this action, **Alternative 2** would be expected to result in the lowest net economic effects. Greatest economic effects would be expected from **Alternative 5** because it would establish the lowest trip limit and would not allow the commercial sector to harvest of the total commercial quota. Economic effects that would be expected to result from **Preferred Alternative 4** would be expected to be greater than the effects associated to **Alternatives 2** or **3** but less than effects expected from **Alternative 5**.

4.1.4 Direct and Indirect Effects on the Social Environment

Greater amberjack is not a directed fishery, and most commercial fishermen land greater amberjack incidentally alongside other reef fish as part of a multi-species fishing strategy. In the past, there has been a small component that targeted the stock before a trip limit was established. A 2,000-lb ww trip limit (GMFMC 2012), in place from 2013 through 2015, was projected to affect at most 8% of vessels that landed greater than 2,000 lbs ww of greater amberjack at some time during the year (GMFMC 2012). At that time, the trip limit was noted to essentially prohibit greater amberjack as a directed fishery. The 2,000-lb ww trip limit was replaced with the 1,500-lb gw trip limit (GMFMC 2015) in 2016, now **Alternative 1**. From 2016 through 2018, the majority of trips have landed 500 lbs gw or less greater amberjack (Figure 2.1.1).

Although additional effects would not be expected from maintaining the 1,500-lb gw trip limit (**Alternative 1**), the commercial sector exceeded its ACL in 2018, triggering an overage adjustment that reduced the 2019 ACL (Table 1.1.2). Under the lower 2019 ACL, the commercial season will reopen for only 8 days following the fixed March 1 through May 31 fixed closure that coincides with peak spawning time. Thus, some additional measure is needed to slow the commercial harvest and extend the season. Modifying the trip limit would affect commercial fishermen depending on their existing fishing practice. Although greater amberjack is mostly caught incidentally as part of a multi-species diversified fishing strategy, reducing the trip limit would further narrow the available fishing options, negatively affecting fishing behavior and practice for some fishermen.

Alternatives 2-6, including **Preferred Alternative 4**, would reduce the trip limit and be expected to result in greater negative effects to fishermen who would make landings in excess of each proposed threshold compared with **Alternative 1**. On the other hand, the smaller the trip limit, the longer the fishing season would be expected to remain open, resulting in positive effects. Thus, 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. The proportion of trips that make landings in excess of the threshold proposed by each alternative is shown in Figure 2.1.1, and the

predicted percent reduction in commercial harvest per trip is provided in Table 2.1.1. For each of **Alternatives 2-5**, fishermen who incidentally catch more greater amberjack than each proposed trip limit would be most affected by the alternative selected, while all fishermen who incidentally catch any greater amberjack would be negatively affected from the season closing early. In general, the lower the trip limit, the more fishermen and vessels would be likely to be affected, and only those vessels that would land more than the new trip limit would be affected. Thus, **Alternative 2** would affect the fewest fishermen and vessels among all **Alternatives 2-5**, and would be expected to result in a 17.8% reduction in commercial harvest per trip relative to **Alternative 1**; on the other hand, **Alternative 2** would be expected to result in the shortest season among **Alternatives 2-5**. The greatest negative effects would be expected from selecting the smallest trip limit (250 lbs gw; **Alternative 5**), which is predicted to result in a 70.6% reduction in the commercial harvest per trip, but also avoids an in-season closure. The effects under **Alternative 3** and **Preferred Alternative 4** would be intermediary.

Alternative 6 would reduce the trip limit to 250 lbs gw when 75% of the ACT is projected to be met, and could help extend the length of the fishing season compared to selecting a larger trip limit alone (**Alternatives 1-4**), resulting in additional positive effects. The season would be expected to be open longest by selecting **Alternative 6** with **Preferred Alternative 4** (extended by 118 days; Table 2.1.2), which would allow the harvest of almost the entire quota. The season would be expected to remain open an additional 53 days by selecting **Alternative 3** with **Alternative 6**, and 24 days by selecting **Alternative 2** with **Alternative 6.** The shortest extension of the season would be expected from selecting **Alternative 6** and retaining **Alternative 1** (extended by 67 days).

4.1.5 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 commercial trip limit. **Alternative 2**, **Alternative 3**, **Preferred Alternative 4**, and **Alternative 5** would result in a short-term increased burden on the administrative environment due to the establishment of a new commercial trip limit. Changing the trip limit from **Alternative 1** would increase the burden for NMFS which would have to engage in rulemaking to implement this change in management. The administrative burden for law enforcement would go largely unchanged, as law enforcement officers would continue to monitor compliance with any established trip limit. **Alternative 5** is expected to have the lowest impact on the administrative environment among **Alternatives 2-6** because the commercial fishing season is not expected to close under a 250 lb gw trip limit, therefore requiring no action by NMFS to announce an in-season closure once the ACT is projected to be met. **Alternative 6** would result in an increased administrative burden for both NMFS and law enforcement officers. Under **Alternative 6**, NMFS would have to monitor landings and announce the reduction in the commercial trip limit once 75% of the ACT was projected to be landed, and then would have to announce the in-season closure for commercial harvest if 100% of the ACT is met or projected to be met before the end of the fishing year. Law enforcement officers would need to enforce the original trip limit until NMFS announces the step-down to 250 lbs gw, and then enforce that trip limit until the end of the fishing season.

4.2 Cumulative Effects Analysis

Federal agencies preparing an environmental assessment (EA) must also consider cumulative effects of a proposed action and other actions. Cumulative effects are those effects that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions that take place over a period of time (40 C.F.R. 1508.7). Below is our five-step cumulative effects analysis that identifies criteria that must be considered in an EA.

1. *The area in which the effects of the proposed action will occur* - The affected area of this proposed action encompasses the state and federal waters of the Gulf as well as Gulf communities that are dependent on reef fish fishing. Most relevant to this proposed action is greater amberjack and those who fish for them. For more information about the area in which the effects of this proposed action will occur, please see Chapter 3, Affected Environment which describes these important resources as well as other relevant features of the human environment.

2. *The impacts that are expected in that area from the proposed action* - The proposed action would modify greater amberjack commercial trip limits. The environmental consequences of the proposed action are analyzed in detail in Section 4.1. Modifying the commercial trip limit should have very little effect on the physical and biological/ecological environment because the action is not expected to alter the manner in which the greater amberjack portion of the reef fish fishery is prosecuted (Sections 4.1.1 and 4.1.2). Greater amberjack are not usually a target species and fishermen could continue to avoid greater amberjack if the season is closed or continue to harvest them if it is open. Changing fishing practices on one stock does not generally change overall fishing effort or fishing practices. Furthermore, a longer season may be beneficial to the greater amberjack species itself as it is assumed regulatory discards would be reduced, thereby assisting with rebuilding the stock. This action would likely have minor direct and indirect on the social and economic environments in the near future (Sections 4.1.3 and 4.1.4). While lowering the trip limit, which would extend the fishing season, may lead to more costs in terms of vessel trips, these trips would most likely already be occurring for the target reef fish species. If the season for greater amberjack is extended due to a lower trip limit, this species would be available for commercial fishermen to harvest for a longer timeframe. The action is also not expected to adversely or beneficially significantly affect the administrative environment (Section 4.1.5).

3. *Other Past, Present and reasonably foreseeable future actions (RFFAs) that have or are expected to have impacts in the area* - There are numerous actions going on in the Gulf annually. Many of these activities are expected to have impacts associated with them. Below is a discussion those actions that have the potential to combine with the proposed action to result in cumulative effects.

Other Fishery related actions - The cumulative effects associated with modifying greater amberjack commercial trip limits were analyzed in the EA for Amendments 35 (GMFMC 2012) and the greater amberjack framework action to modify allowable harvest and management measures (GMFMC 2015). In addition, cumulative effects relative to reef fish management have

been analyzed in the EISs for Amendment 22 (GMFMC 2004b), Amendment 26 (GMFMC 2006), and Amendment 27/14 (GMFMC 2007), Amendment 29 (GMFMC 2008a), Amendment 30A (GMFMC 2008b), Amendment 30B (GMFMC 2008c), Amendment 31 (GMFMC 2009), Amendment 40 (GMFMC 2014), and Amendment 28 (GMFMC (2015). These cumulative effects analyses are incorporated here by reference. Other pertinent actions are summarized in the history of management (Section 1.3). Currently, there are several present and RFFAs that are being considered by the Council for the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico, which could affect reef fish stocks. These include: a framework action to extend lower red grouper ACLs and ACTs; Amendment 36B, which would further revise the red snapper and grouper-tilefish commercial individual fishing quota programs; Amendment 48, which would establish status determination criteria for many reef fish stocks; Amendment 50, which would establish state recreational management programs for red snapper; a generic amendment to modify charter vessel and headboat reporting requirements, and some actions to address red snapper allocation, the carryover of unharvested quota, and acceptable biological catch control rule.[14] While the Council is not currently considering other RFFAs specific to greater amberjack, recent changes to the greater amberjack recreational fishing year and fixed closed season (GMFMC 2017a) still resulted in complete harvest of the recreational annual catch limit before the fishing year was over. The Council may revisit greater amberjack recreational management measures in the near future.

Non-fishery related actions - Actions affecting the reef fish fishery have been described in previous cumulative effect analyses (e.g., Amendment 40). Three important events include impacts of the *Deepwater Horizon* MC252 oil spill, the Northern Gulf Hypoxic Zone, and climate change (See Sections 3.1 and 3.2). Reef fish species are mobile and are able to avoid hypoxic conditions, so any effects from the Northern Gulf Hypoxic Zone on reef fish species are likely minimal regardless of this action, particularly greater amberjack that are found primarily on the west Florida Shelf. Impacts from the *Deepwater Horizon* MC252 oil spill are still being examined; however, as indicated in Section 3.2, the oil spill had some adverse effects on fish species. However, it is unlikely that the oil spill in conjunction with setting a commercial trip limit would have any significant cumulative effect on greater amberjack.

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 (EPA) climate change web page provides basic background information on these and other measured or anticipated effects. In addition, the Intergovernmental Panel on Climate Change (IPCC) has numerous reports addressing their assessments of climate change.[15] Global climate changes could affect the Gulf fisheries as discussed in Section 3.2. 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 reef fish species in the future, but the level of impacts cannot be quantified at this

[14] http://gulfcouncil.org

[15] http://www.ipcc.ch/publications_and_data/publications_and_data.shtml

time, nor is the time frame known in which these impacts would occur. The proposed action is not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing as these actions should not change how the fishery is prosecuted. As described in Section 3.2, the contribution to greenhouse gas emissions from fishing is minor compared to other emission sources (e.g., oil platforms).

4. The impacts or expected impacts from these other actions - The cumulative effects from managing the reef fish fishery have been analyzed in other actions as listed in part three of this section. They include detailed analysis of the reef fish fishery, cumulative effects on non-target species, protected species, and habitats in the Gulf. In general, the effects of these actions are positive as they ultimately act to restore/maintain the stocks at a level that will allow the maximum benefits in yield and recreational fishing opportunities to be achieved. However, some short-term negative impacts on the fisheries' socioeconomic environment may occur due to the need to limit directed harvest and increase the number of trips made until the commercial quota is harvested. These negative impacts can be minimized by using combinations of management measures that provide the least disruption to the fishery while holding harvest to sustainable levels. Furthermore, it is assumed that reef fish trips would be ongoing regardless of whether greater amberjack is harvested or not.

5. *The overall impact that can be expected if the individual impacts are allowed to accumulate:* This action, combined with other past actions, present actions, and RFFAs, is not expected to have significant beneficial or adverse effects on the physical and biological/ecological environments because this action will only minimally affect current fishing practices (Sections 4.1.1 and 4.1.2). However, for the social and economic environments, short-term adverse effects, although minor, are likely and could result in economic losses to fishing communities (Sections 4.1.3 and 4.1.4). These short-term effects are expected to be compensated for by long-term management goals to maintain the stock at healthy levels and by extending the fishing season for greater amberjack. These effects are likely minimal as the proposed action, along with other past actions, present actions, and RFFAs, are not expected to alter the manner in which the fishery is prosecuted. Because it is unlikely there would be any changes in how the fishery is prosecuted, this action, combined with past actions, present actions, and RFFAs, is not expected to have significant adverse effects on public health or safety.

6. Summary: The proposed action is not expected to have individual significant effects to the biological, physical, or socio-economic environment. Any effects of the proposed action, when combined with other past actions, present actions, and RFFAs are not expected to be significant. The effects of the proposed action are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. Landings data for the commercial sector in the Gulf are collected through trip ticket programs, port samplers, and logbook programs.

CHAPTER 5. REGULATORY IMPACT REVIEW

5.1 Introduction

5.2 Problems and Objectives

5.3 Description of the Fishery

CHAPTER 6. REGULATORY FLEXIBILITY ACT ANALYSIS

6.1 Introduction

6.2 Statement of the need for, objective of, and legal basis for the proposed action

6.3 Description and estimate of the number of small entities to which the proposed action would apply

6.4 Description of the projected reporting, record-keeping and other compliance requirements of the proposed action

6.5 Identification of all relevant federal rules, which may duplicate, overlap or conflict with the proposed action

6.6 Significance of economic impacts on a substantial number of small entities

6.7 Description of the significant alternatives to the proposed action and discussion of how the alternatives attempt to minimize economic impacts on small entities

CHAPTER 7. 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
Alabama Department of Conservation and Natural Resources/Marine Resources Division
Florida Fish and Wildlife Conservation Commission
Louisiana Department of Wildlife and Fisheries
Mississippi Department of Marine Resources
Texas Parks and Wildlife Department

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CHAPTER 9. REFERENCES

Aprieto, V. L. 1974. Early development of five carangid fishes of the Gulf of Mexico and the south Atlantic coast of the United States. Fishery Bulletin 72:415-443.

Baustian, M. M. and N. N. Rabalais. 2009. Seasonal composition of benthic macroinfauna exposed to hypoxia in the northern Gulf of Mexico. Estuaries and Coasts 32:975–983.

Barnette, M. C. 2001. A review of the fishing gear utilized within the Southeast Region and their potential impacts on essential fish habitat. NOAA Tech. Memo. NMFS-SEFSC-449. National Marine Fisheries Service, 263 13th Avenue, South St. Petersburg, Florida 33701. 62 pp.

Bohnsack, J.A. 2000. A comparison of the short-term impact of no-take marine reserves and minimum size limits. Bulletin of Marine Science 66(3):635–650.

Burch, R. K. 1979. The greater amberjack, *Seriola dumerili*: its biology and fishery off Southeastern Florida. Master's Thesis. University of Miami, Florida.

Burns, K. M., N. J. Brown-Peterson, D. R. Gregory, Jr., and B. D. Robbins. 2004. Combining a partnership among researchers, commercial, recreational, and recreational-for-hire fishers with a cooperative tagging program to elucidate the life history and habitat utilization of select reef fish and coastal pelagic species in the Florida Keys. Semi-annual progress report for June 1, 2004-November 30, 2004. Mote Marine Laboratory, 1600 Ken Thompson Parkway, Sarasota Florida 34236. 20 pp.

Burton, M. L. 2008. Southeast U. S. Continental Shelf, Gulf of Mexico and U. S Caribbean chapter, pp.31-43. *In*: Climate impacts on U. S. living marine resources: National Marine Fisheries Service concerns, activities and needs. K. E. Osgood, Ed. U. S. Dept. Commerce, NOAA Technical Memorandum NMFS-F/SPO-89. 118 pp.

Carls, M. G., S. D. Rice, and J. E. Hose. 1999. Sensitivity of fish embryos to weathered crude oil: Part I. low-level exposure during incubation causes malformations, genetic damage, and mortality in larval Pacific herring (*Clupea pallasi*). Environmental Toxicology and Chemistry 18(3):481–493.

Craig, J. K. 2012. Aggregation on the edge: effects of hypoxia avoidance on the spatial distribution of brown shrimp and demersal fishes in the Northern Gulf of Mexico. Marine Ecology Progress Series 445:75–95.

Dance, M. A., W. F. Patterson III, and D. T. Addis. 2011. Fish community and trophic structure at artificial reef sites in the northeastern Gulf of Mexico. Bulletin of Marine Science 87(3): 301-324

Gledhill, C. and A. David. 2004. Survey of fish assemblages and habitat within two marine protected areas on the West Florida Shelf. Proceedings of the 55th Gulf and Caribbean Fisheries Institute. 11 pp.

GMFMC. 1989. Amendment 1 to the reef fish fishery management plan. Gulf of Mexico Fishery Management Council, Tampa, Florida. 356 pp. http://archive.gulfcouncil.org/Beta//GMFMCWeb/downloads/RF%20Amend-01%20Final%201989-08-rescan.pdf

GMFMC. 2004. Final environmental impact statement for the generic essential fish habitat amendment to the following fishery management plans of the Gulf of Mexico: shrimp fishery of the Gulf of Mexico, red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico, stone crab fishery of the Gulf of Mexico, coral and coral reef fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, coastal migratory pelagic resources of the Gulf of Mexico of Mexico and South Atlantic. Gulf of Mexico Fishery Management Council. Tampa, Florida. 682 pp. http://www.gulfcouncil.org/Beta/GMFMCWeb/downloads/Final%20EFH%20EIS.pdf

GMFMC. 2005. Generic amendment number 3 for addressing essential fish habitat requirements, habitat areas of particular concern, and adverse effects of fishing in the following fishery management plans of the Gulf of Mexico: shrimp fishery of the Gulf of Mexico, United States waters, red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico, coastal migratory pelagic resources (mackerels) in the Gulf of Mexico and South Atlantic, stone crab fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, coral and coral reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council. Tampa, Florida. 106 pp. http://archive.gulfcouncil.org/Beta//GMFMCWeb/downloads/FINAL3_EFH_Amendment.pdf

GMFMC. 2011. Final generic annual catch limits/accountability measures amendment for the Gulf of Mexico fishery management council's red drum, reef fish, shrimp, coral and coral reefs fishery management plans, including environmental impact statement, regulatory impact review, regulatory flexibility analysis, and fishery impact statement. Gulf of Mexico Fishery Management Council. Tampa, Florida. 378 pp. http://gulfcouncil.org/wp-content/uploads/Final-Generic-ACL-AM-Amendment-September-9-2011-v.pdf

GMFMC. 2012. Final regulatory Amendment 35 to the reef fish fishery management plan – greater amberjack – Modifications to the Greater Amberjack Rebuilding Plan and Adjustments to the Recreational and Commercial Management Measures**.** Gulf of Mexico Fishery Management Council. Tampa, Florida. 179pp. http://gulfcouncil.org/Beta/GMFMCWeb/downloads/Final_Amendment_35_Greater_Amberjack_Rebuilding_8_May_2012.pdf

GMFMC. 2017a. Final framework action to the fishery management plan for the reef fish fishery of the Gulf of Mexico, United States waters: Modifications to greater amberjack allowable harvest and rebuilding plan, including environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council. Tampa, Florida. 121 pp. http://gulfcouncil.org/wp-content/uploads/GreaterAmberjackFramework20170906FINAL.pdf

GMFMC. 2017b. Final amendment 44 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Minimum stock size threshold (MSST) revision for reef fish stocks with existing status determination criteria, including environmental assessment and fishery impact statement. Gulf of Mexico Fishery Management Council. Tampa, Florida. 121 pp. http://gulfcouncil.org/wp-content/uploads/B-4a-Public-Hearing-Draft-Amendment-44-MSST-GOM-Reef-Fish.pdf

Gold, J. R., and L. R. Richardson. 1998. Population structure in greater amberjack, Seriola dumerili, from the Gulf of Mexico and the western Atlantic Ocean. Fishery Bulletin 96(4):767-778.

Gore, R. H. 1992. The Gulf of Mexico: A treasury of resources in the American Mediterranean. Pineapple Press. Sarasota, Florida.

Haensly, W. E., J. M. Neff, J. R. Sharp, A. C. Morris, M. F. Bedgood, and P. D. Beom. 1982. Histopathology of *Pleuronectes platessa* from Aber Wrac'h and Aber Benoit, Brittany, France: long-term effects of the Amoco Cadiz crude oil spill. Journal of Fish Disease 5:365-391.

Harris, P. J., D. M. Wyanski, D. B. White, P. P. Mikell, and P. B. Eyo. 2007. Age, growth, and reproduction of greater amberjack off the southeastern U.S. Atlantic Coast. Transactions of American Fisheries Society 136:1534-1545.

Heintz, R. A., J. W. Short, and S. D. Rice. 1999. Sensitivity of fish embryos to weathered crude oil: Part II. Increased mortality of pink salmon (*Oncorhynchus gorbuscha*) embryos incubating downstream from weathered Exxon *Valdez* crude oil. Environmental Toxicology and Chemistry 18(3):494–503.

Heyman, W. D. and B. Kjerfve. 2008. Characterization of transient multi-species reef fish spawning aggregations at Gladden Spit, Belize. Bulletin of Marine Science 83(3): 531-551

Hoffmayer, E. R., J. S. Franks, B. H. Comyns, J. R. Hendon, R. S. Waller. 2005. Larval and juvenile fishes associated with pelagic Sargassum in the northcentral Gulf of Mexico. Proceedings of the 56th Gulf and Caribbean Fisheries Institute. 11 pp.

Hollowed, A. B., M. Barange, R. Beamish, K. Brander, K. Cochrane, K. Drinkwater, M. Foreman, J. Hare, J. Holt, S-I. Ito, S. Kim, J. King, H. Loeng, B. MacKenzie, F. Mueter, T. Okey, M. A. Peck, V. Radchenko, J. Rice, M. Schirripa, A. Yatsu, and Y. Yamanaka. 2013. Projected impacts of climate change on marine fish and fisheries. ICES Journal of Marine Science 70:1023–1037.

Hose, J. E., M. D. McGurk, G. D. Marty, D. E. Hinton, E. D Brown, and T. T. Baker. 1996. Sublethal effects of the (Exxon *Valdez*) oil spill on herring embryos and larvae: morphological, cytogenetic, and histopathological assessments, 1989–1991. Canadian Journal of Fisheries and Aquatic Sciences 53:2355-2365.

Incardona, J.P., L, D. Gardnerb, T. L. Linbo, T. L. Brown, A. J. Esbaugh, E. M. Mager, J. D. Stieglitz, B. L. French, J. S. Labenia, C. A. Laetz, M. Tagal, C. A. Sloan, A. Elizur, D. D. Benetti, M. Grosell, B. A. Block, and N. L. Scholz. 2014. Deepwater Horizon crude oil impacts the developing hearts of large predatory pelagic fish. Proceedings of the National Academy of Sciences of the United States of America 111(15): 1510-1518.

Jacob, S., P. Weeks, B. Blount, and M. Jepson. 2013. Development and evaluation of social indicators of vulnerability and resiliency for fishing communities in the Gulf of Mexico. Marine Policy 37:86-95.

Jepson, M. and L.L. Colburn. 2013. Development of Social Indicators of Fishing Community Vulnerability and Resilience in the U.S. Southeast and Northeast Regions. U.S. Dept. of Commerce., NOAA Technical Memorandum NMFS-F/SPO-129, 64 pp.

Justic, D., Turner, R.E., Rabalais, N.N. 2003. Climate influences on riverine nitrate flux: implications for coastal marine eutrophication and hypoxia. Estuaries 26, 1–11.

Kennedy, V. S., R. R. Twilley, J. A. Kleypas, J. H. Cowan, Jr., S. R. Hare. 2002. Coastal and marine ecosystems and global climate change. Pew Center on Global Climate Change, Arlington, VA. 52 pp.

Khan, R. A. and J. W. Kiceniuk. 1984. Histopathological effects of crude oil on Atlantic cod following chronic exposure. Canadian Journal of Zoology 62:2038-2043.

Khan, R. A. and J. W. Kiceniuk. 1988. Effect of petroleum aromatic hydrocarbons on monogeneids parasitizing Atlantic cod, *Gadus morhua*. Bulletin of Environmental Contamination and Toxicology 41:94-100.

Khan, R. A. 1990. Parasitism in marine fish after chronic exposure to petroleum hydrocarbons in the laboratory and to the Exxon *Valdez* oil spill. Bulletin of Environmental Contamination and Toxicology 44:759-763.

Kiceniuk, J. W. and R. A. Khan. 1987. Effect of petroleum hydrocarbons on Atlantic cod, *Gadus morhua*, following chronic exposure. Canadian Journal of Zoology 65:490-494.

Kraus, R. T., R. L. Hill, J. R. Rooker, and T. M. Dellapenna. 2006. Preliminary characterization of a mid-shelf bank in the northwestern Gulf of Mexico as essential habitat of reef fishes. Proceedings of the 57th Gulf and Caribbean Fisheries Institute 12pp.

McEachran, J. D. and J. D. Fechhelm. 2005. Fishes of the Gulf of Mexico. Volume 2 University of Texas Press, Austin.

Mendelssohn, I. A., G. L. Andersen, D. M. Baltz, R. H. Caffey, K. R. Carman, J. W. Fleeger, S. B. Joye, Q. Lin, E. Maltby, E. B. Overton, and L. P. Rozas. 2012. Oil impacts on coastal wetlands: Implications for the Mississippi river delta ecosystem after the *Deepwater Horizon* oil spill. BioScience 62:562–574.

Murawski, S. A., W. T. Hogarth, E. B. Peebles, and L. Barbeiri. 2014. Prevalence of external skin lesions and polycyclic aromatic hydrocarbon concentrations in Gulf of Mexico fishes, post-*Deepwater Horizon*, Transactions of the American Fisheries Society 143(4):1084-1097.

Murie, D.J., and D.C. Parkyn. 2008. Age, Growth and Sex Maturity of Greater Amberjack (*Seriola dumerili*) in the Gulf of Mexico. MARFIN Final Report NA05NMF4331071, 52 pp.

Murie, D. J., D. C. Parkyn and J. Austin. 2011. Seasonal movement and mixing rates of greater amberjack in the Gulf of Mexico and assessment of exchange with the South Atlantic spawning stock. *SEDAR33-DW12*:46. http://sedarweb.org/docs/wpapers/SEDAR33-DW12%20Murie%20et%20al.%202011%20GAJ%20Movement%20%26%20Mixing%20Rates.pdf

National Commission. 2010. The use of surface and subsea dispersants during the BP *Deepwater Horizon* oil spill. National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (National Commission). Staff Working Paper No. 4. https://docs.lib.noaa.gov/noaa_documents/DWH_IR/reports/Working_Paper_Dispersants_For_Release.pdf

NMFS. 2011. Biological opinion on the continued authorization of Reef Fish fishing under the Gulf of Mexico Reef Fish Fishery Management Plan. September 30, 2011. Available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/gulf_fisheries/reef_fish/documents/pdfs/2013/gulf_reef_fish_biop_2011.pdf

NOAA. 2010. Deepwater Horizon Oil: Characteristics and Concerns. NOAA Office of Response and Restoration, Emergency Response Division. 2 p.
National Oceanic Data Center, National Oceanic and Atmospheric Administration. 2012. 4 km NODC/RSMAS AVHRR Pathfinder v5 Seasonal and Annual Day-Night Sea Surface Temperature Climatologies for 1982-2009 for the Gulf of Mexico (NODC Accession 0072888). Available: http://accession.nodc.noaa.gov/0072888

Osgood, K. E. (editor). 2008. Climate impacts on U.S. living marine resources: National Marine Fisheries Service concerns, activities and needs. U.S. Department of Commerce, NOAA Technical Memo. NMFSF/SPO-89 118 pp. https://spo.nmfs.noaa.gov/sites/default/files/tm89.pdf

Patterson III, W. F., J. H. Tarnecki, D. T. Addis, L. R. Barbieri. 2014. Reef fish community structure at natural versus artificial reefs in the northern Gulf of Mexico. Proceedings of the 66th Gulf and Caribbean Fisheries Institute 4-8
Reed, J.K., S.A. Pomponi, D. Weaver, C.K. Paull, and A.E. Wright. 2005. Deep-water sinkholes and bioherms of south Florida and the Pourtales Terrance-habitat and fauna. Bulletin of Marine Science 77(2): 267-296

Rico-Martínez, R., T. W. Snell, and T. L. Shearer. 2013. Synergistic toxicity of Macondo crude oil and dispersant Corexit 9500A® to the *Brachionus plicatilis* species complex (Rotifera). Environmental Pollution 173:5-10.

SEDAR 33 Update Assessment. 2016. SEDAR 33 Gulf of Mexico Greater Amberjack Stock Assessment Report. South East Data Assessment and Review, North Charleston SC. 490 pp. http://sedarweb.org/docs/suar/GAJ_S33_2016%20Update_Final.pdf

SEDAR 47 Stock Assessment Review. 2016. SEDAR 47 Southeastern U.S. Goliath Grouper Stock Assessment Report. South East Data Assessment and Review, North Charleston SC. 206 pp. https://sedarweb.org/docs/sar/S47_Final_SAR.pdf

SEDAR 49 Update Assessment. 2016. SEDAR 49 Gulf of Mexico Data-limited Species: Red Drum, Lane Snapper, Wenchmen, Yellowmouth Grouper, Speckled Hind, Snowy Grouper, Almaco Jack, Lesser Amberjack Stock Assessment Report. South East Data Assessment and Review, North Charleston SC. 618 pp. https://sedarweb.org/docs/sar/SEDAR_49_SAR_report.pdf

SEDAR 51 Update Assessment. 2018. SEDAR 51 Gulf of Mexico Gray Snapper Stock Assessment Report. South East Data Assessment and Review, North Charleston SC. 428 pp. https://sedarweb.org/docs/sar/S51_FINAL_SAR_0.pdf

Sindermann, C. J. 1979. Pollution-associated diseases and abnormalities of fish and shellfish: a review. Fisheries Bulletin 76:717-749.

Short, J. 2003. Long-term effects of crude oil on developing fish: Lessons from the Exxon *Valdez* oil spill. Energy Sources 25(6):509-517.

Snyder, S. M., E. L. Pulster, D. L. Wetzel, and S. A. Murawski. 2015. PAH exposure in Gulf of Mexico demersal fishes, post-*Deepwater Horizon*. Environmental Science and Technology 49(14):8786–8795.

Solangi, M. A. and R. M. Overstreet. 1982. Histopathological changes in two estuarine fishes, *Menidia beryllina* (Cope) and *Trinectes maculatus* (Bloch and Schneider), exposed to crude oil and its water-soluble fractions. Journal of Fish Disease 5:13-35.

Stephen, J. A. and P. J. Harris. 2010. Commercial catch composition with discard and immediate release mortality proportions off the southeastern coast of the United States. Fisheries Research 103:18-24.

Swart, B.L., S. von der Heyden, A. Bester-van der Merwe, and R. Roodt-Wilding. 2015. Molecular systematics and biogeography of the circumglobally distributed genus Seriola (Pisces: Carangidae). Molecular phylogenetics and evolution 93: 274-280.
Swedmark, M., A. Granmo, and S. Kollberg. 1973. Effects of oil dispersants and oil emulsions on marine animals. Water Research 7(11):1649-1672.

Tarnecki, J. H. and W. F. Patterson III. 2015. Changes in red snapper diet and trophic ecology. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 7:135–147.

Turner, S. C., N. J. Cummings, and C. P. Porch. 2000. Stock assessment of Gulf of Mexico greater amberjack using data through 1998. NOAA, NMFS, SEFSC, 75 Virginia Beach Drive, Miami, Florida 33149. SFD-99/00-100.

Weisberg, R.H., Zheng, L., Liu, Y., Murawski, S., Hu, C., and Paul, J. 2014. Did Deepwater Horizon Hydrocarbons Transit to the West Florida Continental Shelf? Deep Sea Research Part II: Topical Studies in Oceanography, Available online 17 February 2014, ISSN 0967-0645, http://dx.doi.org/10.1016/j.dsr2.2014.02.002.

Wells, R. J. D. and J. R. Rooker. 2002. Distribution, age, and growth of young-of-the-year greater amberjack (*Seriola dumerili*) associated with pelagic *Sargassum*. Fishery Bulletin 102:545-554.

Whitehead A., B. Dubansky, C. Bodinier, T. I. Garcia, S. Miles, C. Pilley, V. Raghunathan, J. L. Roach, N. Walker, R. B. Walter, C. D. Rice, and F. Galvez. 2012. Genomic and physiological footprint of the *Deepwater Horizon* oil spill on resident marsh fishes. Proceedings of the National Academy of Sciences USA 109(50):20298–20302.

Wilson, D., R. Billings, R. Chang, S. Enoch, B. Do, H. Perez, and J. Sellers. 2017. Year 2014 Gulf wide emissions inventory study. US Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2017-044, 289 pp. https://www.boem.gov/ESPIS/5/5625.pdf

APPENDIX A. COMMERCIAL TRIP LIMIT ANALYSIS FOR GULF GREATER AMBERJACK

The Gulf of Mexico Fishery Management Council (Council) is considering changes to commercial trip limits in a framework action to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP). The first step in analyzing the impact of changes to the trip limit is to review the available data. Gulf Greater Amberjack landings data from the Coastal Fisheries Logbook Program (logbook) were provided from the Southeast Fisheries Science Center (SEFSC) on February 27, 2019. On January 4, 2016 a framework action to the FMP reduced the trip limit from 2,000 pounds whole weight (lbs ww) down to 1,500 pounds gutted weight (lbs gw). Since there was a change to the trip limit in early 2016 only data from 2016, 2017, and 2018 were examined (Figure A-1).

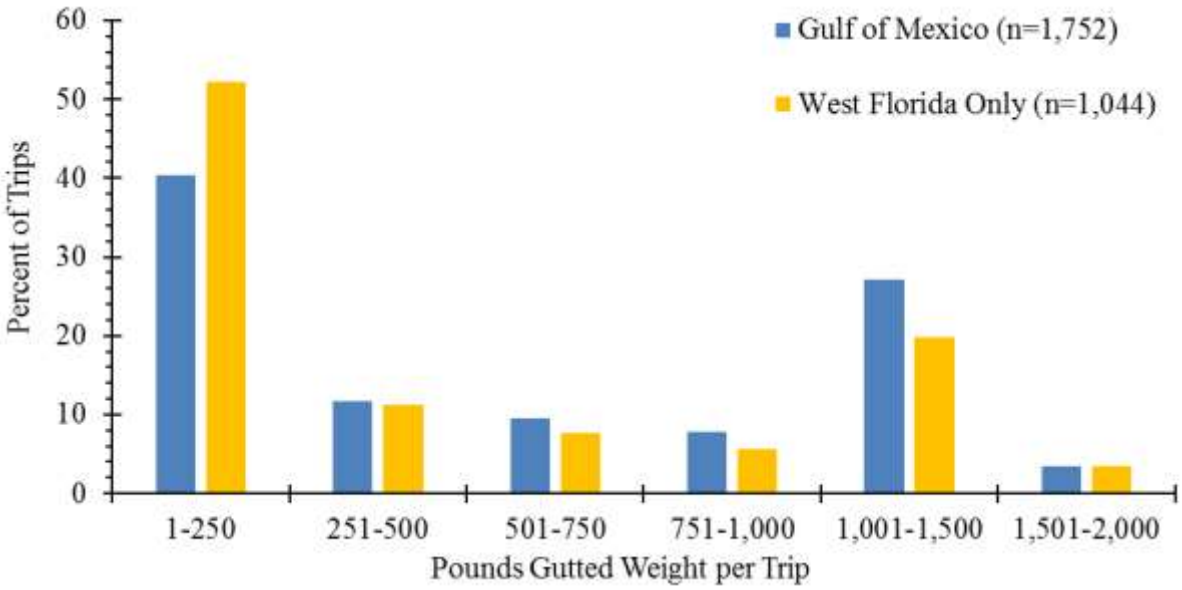

Figure A-1. Percent frequency of observed commercial greater amberjack harvest (lbs gw) per trip from 2016 through 2018. During this time period, there was a total of 1,752 trips reported across the Gulf of Mexico with 1,044 of those trips observed from west Florida.

<u>Trip Limit Analysis</u>

The current Framework Action is proposing a seasonal trip limit from 1,500 lbs gw (1,040-lbs ww) for **(Alternative 1)** down to either 1,000 lbs gw (780-lbs ww) for **(Alternative 2)** , 750 lbs gw for **(Alternative 3)**, 500 lbs gw (520-lbs ww) for **(Preferred Alternative 4)**, or 250 lbs gw (260-lbs ww) for **(Alternative 5)**. Additionally, another considered alternative would reduce the commercial trip limit to 250 lbs gw once 75% of the ACT is projected to be harvested **(Alternative 6)**. The impact to the landings from reducing the trip limit was calculated by limiting trips in previous years (2016 to 2018) to newly proposed trip limits. For example, if analyzing the reduction down to the 500 lbs gw trip limit a trip with 800 pounds would be reduced to 500 pounds. Estimated reductions were calculated based on the difference in landings

with no trip limit change (left at status quo of 1,500 lbs gw) compared to landings when a trip limit was imposed. These reductions were converted to percentages based on the total harvest from previous years (Table A-1).

Table A-1. Percent decreases in landings per trip for the proposed commercial greater amberjack trip limit options relative to the current 1,500 lb gw trip limit. Data were generated from logbook data for 2016 through 2018.

Trip limit (lbs gw)	Predicted Percent reduction
Alternative 1: 1,500	0
Alternative 2: 1,000	17.8
Alternative 3: 750	31.8
Preferred Alternative 4: 500	49.3
Alternative 5: 250	70.6
Alternative 6: 1,500 until 75% ACT harvested, then 250	0/70.6
Alternative 6: 1,000 until 75% ACT harvested, then 250	17.8/70.6
Alternative 6: 750 until 75% ACT harvested, then 250	31.8/70.6
Alternative 6: 500 until 75% ACT harvested, then 250	49.3/70.6

Predicting Closure Dates

The Gulf of Mexico greater amberjack commercial sector exceeded the annual catch target (ACT) in 2016, 2017, and 2018. The current framework action is considering reducing the trip limit with the intent of decreasing the rate of landings. The purpose of reducing the rate of landings is to keep the landings below the ACT and avoid an in-season closure. The commercial sector has had an in-season closure every year since 2009 with closures occurring as early as March 1 and as late as November 7. To capture recent trends in landings the average monthly commercial landings in January and February for 2016, 2017, and 2018 were used as a proxy for future January and February landings. The stock has had a March through May closure for more than a decade and this closure will continue in the future. Therefore, March through May landings were assumed to be zero. Since the stock has had numerous closures in the months of June through December the predicted landings for these months came from SERO-LAPP-2014-09. This report conducted an analysis of historic greater amberjack commercial landings and made a prediction of June through December landings. Figure A-2 shows the predicted landings for the Gulf of Mexico greater amberjack commercial sector.

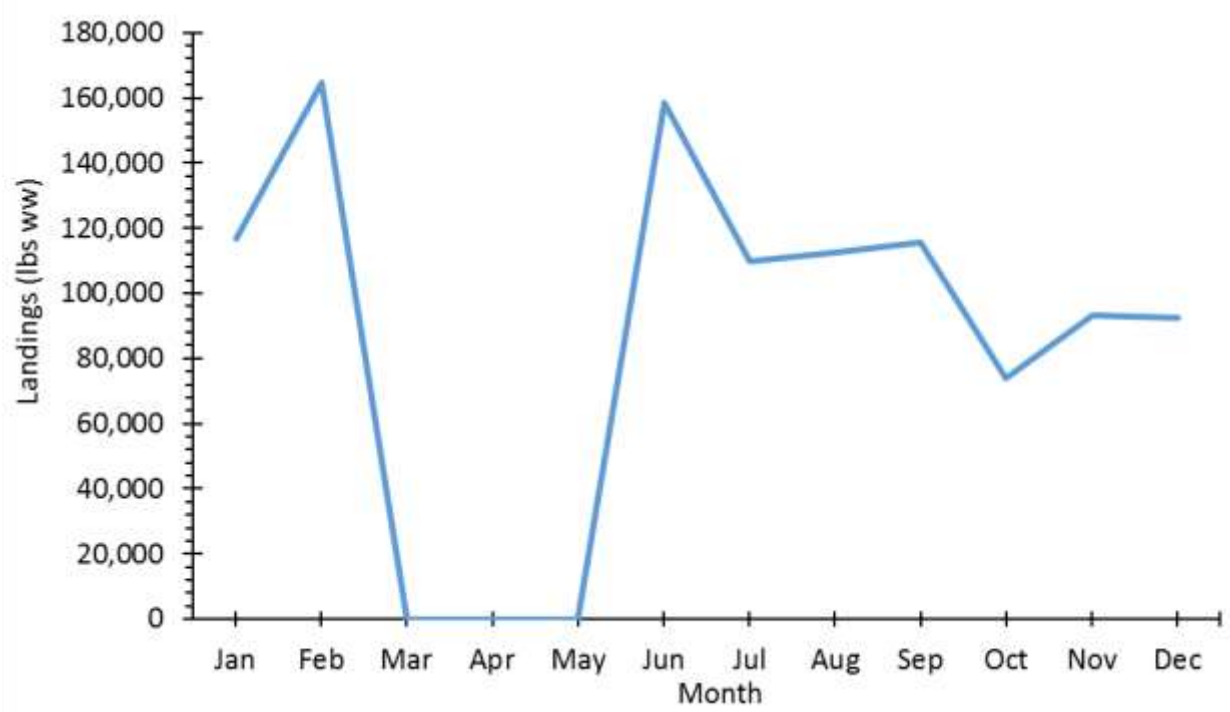

Figure A-2. Predicted commercial landings for Gulf of Mexico greater amberjack. The fishery is closed March 1 to May 31.

The predicted commercial landings (Figure A-2) were combined with the estimated percent reductions (Table A-1) to determine when the commercial sector's ACT will be met. The commercial sector ACT for 2020 and beyond is 421,411 lbs ww, and predicted closure dates are shown in Table A-2. No in-season closure is estimated for a 250 lbs gw trip limit, while a June 27 closure is estimated if the trip limit is left at the current 1,500 lbs gw value.

Table A-2. Gulf of Mexico greater amberjack commercial sector predicted closure dates for different trip limits. Closure dates are when the 2020+ ACT of 421,411 lbs ww is predicted to be met.

Trip limit (lbs gw)	Estimated closure date	Number of days open
Alternative 1: 1,500	June 27	85
Alternative 2: 1,000	July 21	109
Alternative 3: 750	August 19	138
Preferred Alternative 4: 500	October 23	203
Alternative 5: 250	None (72% ACT)	273

<u>Forecast analyses for Alternative 6</u>

The Council is also considering **Alternative 6** where the trip limit at the beginning of the fishing year is reduced to 250 lbs gw when 75% of the ACT (75% of ACT = 316,058 lbs ww) is projected to be met. For this alternative, analyses were conducted to estimate dates for harvesting 75% of the ACT and predict fishing season lengths for each proposed commercial trip limit (**Alternative 1:** 1,500 lbs gw, **Alternative 2:** 1,000 lbs gw, **Alternative 3:** 750 lbs gw, **Preferred Alternative 4:** 500 lbs gw; Table A-3). An implementation of **Preferred Alternative**

4 on January 1 is projected to harvest 75% of the ACT on August 21. The step down of the trip limit from 500 lb gw to 250 lb gw on August 21 will prevent the commercial sector from reaching the ACT of 421,411 lbs ww. The step down will allow the commercial sector to stay open for the remainder of the fishing year. Therefore, the commercial sector will be open from January 1 to December 31, except for the fixed closure of March through May.

Table A-3. Estimated dates for harvest of 75% of the ACT (316, 058 lbs ww) when the trip limit would be reduced 250 lbs gw and fishing season length for the Gulf of Mexico greater amberjack commercial sector for each proposed trip limit option. The seasonal closure date was estimated using the 2020+ ACT of 421,411 lbs ww.

Trip limit (lbs gw)	Date 75% of ACT Met	Estimated closure date	Number of days open
1,500 until 75% ACT harvested, then 250	7-Jun	2-Sep	152
1,000 until 75% ACT harvested, then 250	20-Jun	20-Sep	170
750 until 75% ACT harvested, then 250	7-Jul	18-Oct	198
500 until 75% ACT harvested, then 250	21-Aug	None (99% of ACT)	273

These analyses attempted to predict realistic changes to the landings from the various trip limit options presented in the framework action. Uncertainty exists in these projections, as economic conditions, weather events, changes in catch-per-unit effort, fisher response to management regulations, and a variety of other factors may cause departures from this assumption. In addition to the aforementioned sources of uncertainty, the modeled reductions associated with management measures assume that past performance in the fishery is a good predictor of future dynamics. An attempt was made to constrain the range of data considered to recent years to reduce the unreliability of this assumption.

Reference

SERO-LAPP-2014-09. 2014. Modeling the combined effects of Gulf framework action proposed management for commercially and recreationally caught greater amberjack.

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 (FMP) 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 include the Endangered Species Act (Section 3.3.3), E.O. 12866 (Regulatory Planning and Review, Chapter 5) and E.O. 12898 (Environmental Justice, Section 3.5). Other applicable laws 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. Proposed and final rules will be published before implementing the action in this framework.

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 framework 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 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 Magnuson-Stevens 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.

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.

Historical research indicates that over 2,000 ships have sunk on the Federal Outer Continental Shelf between 1625 and 1951; thousands more have sunk closer to shore in state waters during the same period. Only a handful of these have been scientifically excavated by archaeologists for the benefit of generations to come.[16]

The proposed action does not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places nor is it expected to cause loss or destruction of significant scientific, cultural, or historical resources. In the Gulf of Mexico (Gulf), the *U.S.S. Hatteras*, located in federal waters off Texas, is listed in the National Register of Historic Places. Fishing activity already occurs in the vicinity of this site, but the proposed action would have no additional adverse impacts on listed historic resources, nor would

[16] http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx

they alter any regulations intended to protect them.

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. 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. 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 commercial harvest of greater amberjack. Therefore, consultation with state officials under Executive Order 12612 was not necessary.

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

APPENDIX C. SUMMARIES OF PUBLIC COMMENTS RECEIVED

(List the locations of the scoping hearings and public hearings, then list the summaries and written comments)