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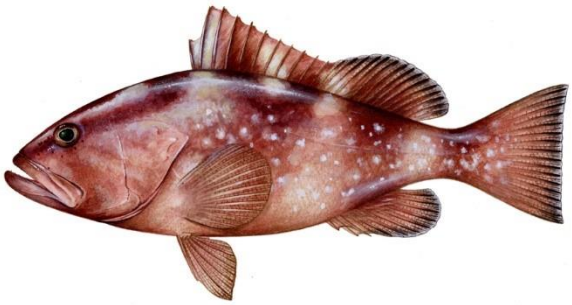
Red Grouper Allocations and Annual Catch Levels and Targets



Amendment 53

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

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DRAFT AMENDMENT 53 TO THE FISHERY MANAGEMENT PLAN FOR THE REEF FISH FISHERY IN THE GULF OF MEXICO DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

Abstract: This Draft DEIS is prepared pursuant to the National Environmental Policy Act to assess the environmental impacts associated with a reasonable range of alternatives intended to modify the sector allocation, overfishing limit, acceptable biological catch, annual catch limits, and annual catch targets of red grouper in the Gulf of Mexico.

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DRAFT EIS TABLE OF CONTENTS

Draft Environmental Impact Statement (DEIS) i
Draft EIS Table of Contents ii
Chapter 1. Introduction 1
1.3 Purpose and Need 7
Chapter 2. Management Alternatives 13
Chapter 3. Affected Environment 24
Chapter 4. Environmental Consequences 83

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
AM	accountability measure
APAIS	Access Point Angler Intercept Survey
BiOp	biological opinion
BLL	bottom longline
CHTS	Coastal Household Telephone Survey
COI	certificate of inspection
Council	Gulf of Mexico Fishery Management Council
CS	consumer surplus
DLMTool	Data Limited Methods Tool
DPS	distinct population segment
DWG	deep water grouper
ELMRP	Estuarine Living Marine Resources Program
EEZ	exclusive economic zone
EJ	environmental justice
ESA	Endangered Species Act
F	fishing mortality rate
FES	Fishing Effort Survey
FMP	fishery management plan
FWCC	Florida Fish and Wildlife Conservation Commission
FWRI	Florida Fish and Wildlife Research Institute
GG	gag grouper
GGM	gag grouper multi-use
Gulf	Gulf of Mexico
gw	gutted weight
HCR	harvest control rule
IFQ	individual fishing quota
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
mp	million pounds
MRIP	Marine Recreational Information Program
MRFSS	Marine Recreational Fisheries Statistics Survey
MSST	minimum stock size threshold
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
OFL	overfishing limit
OY	optimum yield
PAH	polycyclic aromatic hydrocarbons
PDF	probability distribution function

PS	producer surplus
PSE	proportional standard error
RG	red grouper
RGM	red grouper multi-use
rq	regional quotient
RS	red snapper
Secretary	Secretary of Commerce
SEDAR	Southeast Data, Assessment and Review
SEFSC	Southeast Fisheries Science Center
SOI	Segments of Interest
SPR	spawning potential ratio
SSB	spawning stock biomass
SSC	Scientific and Statistical Committee
SWG	shallow-water grouper
TAC	total allowable catch
TF	tilefish
USCG	United States Coast Guard
ww	whole weight

TABLE OF CONTENTS

Draft Amendment 53 to the Fishery Management Plan for the Reef Fish Fishery in the Gulf of Mexico i
Draft Environmental Impact Statement (DEIS) i
Draft EIS Table of Contents ii
Abbreviations Used in this Document iii
Table of Contents v
List of Tables vii
List of Figures x
Chapter 1. Introduction 1
1.1 Background 1
1.2 Objectives of the Reef Fish Fishery Management Plan 7
1.3 Purpose and Need 7
1.4 History of Management 8
Chapter 2. Management Alternatives 13
2.1 Action 1 – Modify the Sector Allocations, OFL, ABC, and ACLs for Red Grouper 13
2.2 Action 2 – Modify the Gulf Red Grouper Annual Catch Targets (ACTs) 18
Chapter 3. Affected Environment 24
3.1 Description of the Fishery 24
3.2 Description of the Physical Environment 32
3.3 Description of the Biological/Ecological Environment 35
3.4 Description of the Economic Environment 43
3.4.1 Commercial Sector 44
3.4.2 Recreational Sector 63
3.5 Description of the Social Environment 74
3.5.1 Commercial Sector 74
3.5.2 Recreational Sector 78
3.5.3 Environmental Justice Considerations 79
3.6 Description of the Administrative Environment 81
3.6.1 Federal Fishery Management 81
3.6.2 State Fishery Management 82
Chapter 4. Environmental Consequences 83
4.1 Action 1 – Modify the Sector Allocations, OFL, ABC, and ACLs for Gulf of Mexico (Gulf) Red Grouper 83

4.1.1 Direct and Indirect Effects on the Physical Environment 83
4.1.2 Direct and Indirect Effects on the Biological Environment 85
4.1.3 Direct and Indirect Effects on the Economic Environment 86
4.1.4 Direct and Indirect Effects on the Social Environment 90
4.1.5 Direct and Indirect Effects on the Administrative Environment 93
4.2 Action 2 – Modify the Gulf Red Grouper Annual Catch Targets (ACTs) 95
4.2.1 Direct and Indirect Effects on the Physical Environment 95
4.2.2 Direct and Indirect Effects on the Biological Environment 96
4.2.3 Direct and Indirect Effects on the Economic Environment 96
4.2.4 Direct and Indirect Effects on the Social Environment 103
4.2.5 Direct and Indirect Effects on the Administrative Environment 104
Chapter 5. References 106
Appendix A. Other Applicable Law 118
Appendix B. Gulf of Mexico Fishery Management Council – Allocation Policy 122
Appendix C. Allocation Triggers 125
Appendix D. Allocation Factors 142
Appendix E. Allocation Review Triggers 159
Appendix F. ACL/ACT Control Rule for the Recreational Sector 162
Appendix G. ACL/ACT Control Rule for the Commercial Sector 163
Appendix H. Modification of Management for Red Grouper in the Gulf 164

LIST OF TABLES

Table 1.1.1. SEDAR 42 (2015) yield projections for red grouper at a constant catch level, averaged over the 2016-2020 time series. Recreational data used to create these projections include the Marine Recreational Information Program Coastal Household Telephone Survey..... 3
Table 1.1.2. Status determination criteria and stock status of red grouper based on SEDAR 61 (2019) and Amendment 44 (2017)..... 6
Table 1.1.3. Alternative constant catch yield projections accepted as scientifically valid by the SSC at its January 2020 meeting. 6
Table 2.1.1. OFL, ABC, total and sector ACLs for **Alternatives 1-5**. 13
Table 2.1.2. Commercial and recreational landings for red grouper in pounds gutted weight (gw) from SEDAR 12 (MRFSS) and the SEFSC ACL monitoring datasets (MRIP FES) used to calculate sector allocations. 16
Table 2.2.1. ACL/ACT Control Rule data inputs for Alternative 2 of Action 2..... 19
Table 2.2.2. Percentage (and weight in pounds [lbs]) of multi-use allocations used by fishermen for landing red grouper and gag..... 20
Table 2.2.3. Commercial and recreational sector ACTs resulting from alternatives selected in Actions 1 and 2. 20
Table 2.2.4. The predicted closure dates for each recreational ACT (mp gw) currently in Amendment 53 generated from predicted landings and also predicted landings upper and lower 95% confidence intervals..... 22
Table 2.2.5. Red grouper private mode Florida landings (pounds whole weight) from GRFS, MRIP CHTS, and MRIP FES surveys..... 23
Table 3.1.1. Number and percentage of vessels with a Gulf reef fish permit by state, final totals for 2018..... 26
Table 3.1.2. Red grouper landings in pounds gutted weight for the commercial sector..... 27
Table 3.1.3. Red grouper commercial discards (number of fish) by gear..... 29
Table 3.1.4. Number and percentage of for-hire reef fish permits by state of mailing recipient (of permit)..... 30
Table 3.1.5. Red grouper landings in pounds gutted weight for recreational fleets..... 30
Table 3.1.6. Red grouper recreational discards (number of fish)..... 31
Table 3.2.1. Total Gulf greenhouse gas emissions estimates (tons per year) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*. Data are for 2011 only..... 34
Table 3.4.1. Number of valid or renewable commercial reef fish permits, 2008-2019..... 44
Source: NMFS SERO Sustainable Fisheries (SF) Access permits database. 44
Table 3.4.1.2. Vessels and businesses with a commercial reef fish permit, end of year (EOY) 2018..... 45
Table 3.4.1.3. IFQ eligible vessels and businesses with a Gulf reef fish permit, EOY 2018. 45
Table 3.4.1.4. Quota share statistics (in percent) for accounts with RG shares, Feb. 19, 2020.. 47
Table 3.4.1.5. Quota share statistics (in percent) for businesses with RG shares and permitted vessels, Feb. 19, 2020. 48
Table 3.4.1.6. Quota share statistics (in percent) for businesses with RG shares and no permitted vessels, Feb. 19, 2020. 48
Table 3.4.1.7. Annual allocation statistics for accounts with RG shares, Feb. 19, 2020. 48

Table 3.4.1.8. Annual allocation statistics for businesses with RG shares and permitted vessels, February 19, 2020. 49
Table 3.4.1.9. Annual allocation statistics for businesses with RG shares and no permitted vessels, February 19, 2020. 49
Table 3.4.1.10. Quota share value statistics for accounts with RG shares (2019$). 49
Table 3.4.1.11. Average share prices by share category, 2015-2019 (2019$). 50
Table 3.4.1.12. Quota share value statistics for businesses with RG shares and permitted vessels, February 19, 2020 (2019$). 50
Table 3.4.1.13. Quota share value statistics for businesses with RG shares but no permitted vessels, February 19, 2020 (2019$). 50
Table 3.4.1.14. Potential market value of annual allocation in 2020 for all accounts with RG shares (2019$). 51
Table 3.4.1.15. Average allocation prices by share category, 2015-2019 (2019$). 52
Table 3.4.1.16. Allocation value statistics for businesses with RG shares and permitted vessels, ... 52
February 19, 2020 (2019$). 52
Table 3.4.1.17. Allocation value statistics for businesses with RG shares but no permitted vessels, February 19, 2020 (2019$). 53
Table 3.4.1.18. Potential ex-vessel value of annual allocation in 2020 for accounts with RG shares (2019$). 53
Table 3.4.1.19. Average ex-vessel prices by share category, 2015-2019 (2019$). 54
Table 3.4.1.20. Landings and revenue statistics for vessels harvesting RG by year, 2014-2018 (2019$). 55
Table 3.4.1.21. Economic characteristics of RG trips 2014-2016 (2019$). 57
Table 3.4.1.22. Economic characteristics of RG vessels from 2014-2016 (2019$). 58
Table 3.4.1.23. Dealer statistics for dealers that purchased RG landings by year, 2014-2018... 59
Table 3.4.1.24. Average annual economic impacts of red grouper in the commercial sector of the Gulf reef fish fishery. 62
Table 3.4.2.1. Recreational landings (lbs gw) and percent distribution of red grouper across all states by mode for 2014-2018. 64
Table 3.4.2.2. Number of red grouper recreational target trips, by mode and state, 2014-2018. 65
Table 3.4.2.3. Number of red grouper recreational catch trips, by mode and state, 2014-2018. 66
Table 3.4.2.4. Red grouper target trips by wave and mode, 2014 – 2018.* 67
Table 3.4.2.5. Red grouper catch trips by wave and mode, 2014 – 2018.* 68
Table 3.4.2.6. Gulf headboat angler days and percent distribution by state (2014-2018). 69
Table 3.4.2.7. Number of valid or renewable for-hire Gulf reef fish permits, 2008-2019. 70
Table 3.4.2.8. Trip economics for offshore trips by Gulf charter vessels and Southeast headboats in 2017 (2019$). 72
Table 3.4.2.9. Estimated economic impacts from average annual Gulf red grouper recreational target trips by state and mode (2014-2018), using state-level multipliers. All monetary estimates are in thousands of 2018$ and employment is in full-time equivalent jobs.* 73
Table 3.5.1.1. Number of vessels landing red grouper by top 10 county homeports. 75
Table 3.5.1.2. Number of vessels landing red grouper by top 10 community homeports. 75
Table 3.6.2.1. Gulf state marine resource agencies and web pages. 82
Table 4.1.3.1. Expected change in landings for the red grouper commercial sector, expected change in revenue, and expected change in PS for **Alternatives 2-5**, relative to **Alternative 1**. 87

Table 4.1.3.2. Alternatives 2-5 - Proposed change in the red grouper commercial sector ACT (relative to **Alternative 1**) and associated estimated average price loss ($/lb) and change in CS. 88
Table 4.1.3.3. Alternatives 2-5 - Proposed change in the red grouper recreational sector ACL and ACT (relative to **Alternative 1**) and associated estimated change in CS. 89
Table 4.1.3.4. Wave in which predicted closure date occurs, canceled charter trips in the interrupted wave, and total canceled charter trips for **Alternatives 2-5**..... 90
Table 4.1.3.5. Short-term change in PS for **Alternatives 2-5**..... 90
Table 4.2.3.1. Expected change in landings for the red grouper commercial sector, expected change in revenue, and expected change in PS for Action 2 **Alternatives 2-5**, relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**. 97
Table 4.2.3.2. Alternatives 1-3 - Proposed change in the red grouper commercial sector ACT (relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**) and associated estimated average price loss ($/lb) and change in CS. 99
Table 4.2.3.3. Alternatives 1-3 - Proposed change in the red grouper recreational sector ACT (relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**) and associated estimated change in CS. 100
Table 4.2.3.4. Wave in which predicted closure date occurs, canceled charter trips in the interrupted wave, and total canceled charter trips for Action 2 **Alternatives 1-3** paired with Action 1 **Alternatives 2-5**. 102
Table 4.2.3.5. Short-term change in PS for Action 2 **Alternatives 1-3** paired with Action 1 **Alternatives 2-5**. 103

LIST OF FIGURES

Figure 2.2.1. Gulf recreational landings by two-month wave and predicted future landings..... 21
Figure 2.2.2. Cumulative predicted red grouper recreational landings with 95% confidence interval 22
Figure 3.2.1. Physical environment of the Gulf, including major feature names and mean annual sea surface temperature as derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://accession.nodc.noaa.gov/0072888) 33
Figure 3.5.1.1. Red grouper regional quotient by top 10 homeport counties. 76
Figure 3.5.1.2. Red grouper regional quotient by top 20 homeport communities. 77
Figure 3.5.1.3. Commercial fishing engagement and reliance of the top 15 red grouper homeports for 2017. 78
Figure 3.5.2.1. Recreational fishing engagement and reliance for communities on Florida's west coast for 2017..... 79
Figure 3.5.3.1. Community social vulnerability indices for communities on Florida's west coast. 80

CHAPTER 1. INTRODUCTION

1.1 Background

Amendment 53 to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) is being developed by the Gulf of Mexico Fishery Management Council (Council) to address the results of the Southeast Data Assessment and Review (SEDAR) 61 (2019) stock assessment and subsequent overfishing limit (OFL) and acceptable biological catch (ABC) recommendations from the Council's Scientific and Statistical Committee (SSC). Amendment 53 revises the red grouper allocation between the commercial and recreational sectors and modifies the OFL, ABC, the total and sector annual catch limits (ACLs), and sector annual catch targets (ACTs).

In October 2000, the National Marine Fisheries Service (NMFS) determined that the Gulf of Mexico (Gulf) red grouper stock was overfished and undergoing overfishing. This determination was based on the results of a 1999 red grouper stock assessment (Schirripa et al. 1999), which assessed the status of the stock as of 1997, and several subsequent analyses by the NMFS Southeast Fisheries Science Center (SEFSC) and the Council's Reef Fish Stock Assessment Panel. Secretarial Amendment 1 established a 10-year rebuilding plan for red grouper, based on a 3-year interval rebuilding strategy, with the initial ABC set for 2003-2005 at 6.56 million pounds (mp) gutted weight (gw).

Although Secretarial Amendment 1 set the initial ABC for 2003-2005, the recreational sector experienced large increases in red grouper catch in 2004, and so the total catch was held at 6.56 mp gw, with new regulations to control recreational harvest implemented in 2005 and 2006. In 2007, NMFS determined that the red grouper stock was rebuilt, in part due to higher than average recruitment and modifications to how natural mortality is calculated (SEDAR 12 2006). Consistent with the statutory requirement to achieve optimum yield (OY) from each fishery, Reef Fish Amendment 30B (GMFMC 2008c) set the red grouper total allowable catch (TAC) [1] at 7.57 mp gw, which was the constant catch level corresponding to fishing at equilibrium OY.

Allocation of Red Grouper

For grouper species in aggregate, an initial allocation between the commercial and recreational sectors was established in 1990 through Amendment 1 (GMFMC 1989) to the Reef Fish FMP. The amendment specified a framework procedure for setting the TAC to allow for annual management changes. A part of that specification was to establish a species' allocation, which were based on the percentage of total landings during the reference period of 1979-1987. For grouper in aggregate, the commercial sector landed 65% and the recreational sector landed 35% over the reference period.

[1] The Generic ACL/Accountability Measures (AM) Amendment (GMFMC 2011a) established a mechanism for specifying annual catch limits, which replaced the use of TACs.

Noting that allocation procedures should be regularly reviewed, the Council examined the red grouper allocation in 2007. Because grouper was not identified to the species level in commercial landings until 1986, the new red grouper allocation was based on the percentage of average red grouper landings from 1986 through 2005. This resulted in a 76% commercial: 24% recreational allocation, which was set through the final rule for Reef Fish Amendment 30B (GMFMC 2008c) and remains in effect. This was considered an interim allocation that would be in effect until the Council could implement a separate amendment to allocate grouper resources between recreational and commercial sectors, based on the recommendations of the Ad Hoc Allocation Committee.

The Council established the Ad Hoc Allocation Committee composed of Council members to assist in drafting an allocation policy that would streamline future allocation decisions. The Council's allocation policy was adopted in early 2009 and provides principles, guidelines, and suggested methods for allocating fisheries resources between or within sectors (Appendix B). In February 2012, NMFS released a technical memorandum on the principles and practice of allocating fishery harvests, which provides additional guidance to the Council (Plummer et al. 2012). Additionally, NMFS and the Council Coordination Committee released further guidance through an Allocation Review Policy[2] (01-119) and two procedural directives (01-119-01 and 01-119-02, respectively as Appendix C and Appendix D) in 2016. These documents were developed to provide relevant information for allocation decision-making as well as what factors should be considered. In April 2019, the Council selected time-based criteria as its primary allocation review trigger bolstered by general monitoring of indicators for reallocation justification through the Council's general deliberative process including public input channels as a secondary trigger (Appendix E). The review of the recreational and commercial allocations of red grouper has a time interval of 7 years, with the next scheduled review beginning in April 2026. In addition to the allocation reviews scheduled based on the review triggers selected above, the Council may initiate supplementary allocation reviews at any time.

Commercial Management Measures

Reef Fish Amendment 29 (GMFMC 2008a) established an individual fishing quota (IFQ) program for grouper harvested by the commercial sector, which began January 1, 2010. The IFQ program shifted away from a traditional command and control approach that resulted in an overcapitalized commercial grouper fishery. Under the IFQ program, red grouper allocation is distributed on January 1 of each year to those who hold red grouper shares. The amount of allocation distributed is based on the annual quota and the amount of shares possessed in each shareholder account (expressed as a percent of the quota). In addition, the IFQ program provides flexibility to accommodate the multi-species nature of the grouper fishery and to reduce bycatch. As discussed in more detail in Section 2.2, both the red grouper and gag share categories have a multi-use provision that allows a portion of the red grouper quota to be harvested under the gag allocation, and vice versa.

[2] The Allocation Review Policy and two procedural directives may be accessed at https://www.fisheries.noaa.gov/national/laws-and-policies/fisheries-management-policy-directives.

For more information on the IFQ program, see the NMFS's Southeast Regional Office webpage on limited access programs.[3]

Overview of Stock Assessments and Stock Status

Red grouper in the Gulf has been assessed four times through the SEDAR process: SEDAR 12 in 2006, SEDAR 12 Update in 2009, SEDAR 42 in 2015, and most recently SEDAR 61 in 2019. The current OFL and ABC are based on the results of SEDAR 42. The SSC reviewed the assessment results at its January 2016 meeting and agreed with the determination that red grouper was not overfished or experiencing overfishing. However, the OFL and ABC recommendations from the 2015 stock assessment (Table 1.1.1) would have increased catch limits in excess of the observed harvest levels over the management history of this species, and were largely driven by a computation error later identified in SEDAR 61 (2019). The projected yields from SEDAR 42 (2015) assumed recruitment levels equivalent to the long-term average; however, red grouper recruitment spikes are sporadic, and recent annual recruitment has been generally lower than that suggested by the long-term average (SEDAR 42 2015; NMFS 2018a).

Table 1.1.1. SEDAR 42 (2015) yield projections for red grouper at a constant catch level, averaged over the 2016-2020 time series. Recreational data used to create these projections include the Marine Recreational Information Program Coastal Household Telephone Survey. OFL and ABC values are in mp gw.

Year	OFL (mp gw)	ABC (mp gw)
2015	8.10	7.93
2016-2020(+)	14.16	13.92

Fishermen expressed their concern about the health of the stock because they were unable to harvest the allowable quota based on the outcomes of SEDAR 42 (2015), suggesting that the stock size may be smaller than anticipated. In addition, 2017 landings were the second lowest since 2004, and a severe red tide occurred in 2018. The Council requested that the SEFSC conduct an interim analysis for developing updated harvest advice for 2019 (NMFS 2018a). The SSC reviewed this analysis at its October 2018 meeting and recommended a 2019 ACL of 4.6 mp gw that would remain in place until the next stock assessment. The Council began work on a framework action to reduce the red grouper ACL and requested that NMFS implement an emergency rule to specify a red grouper ACL for 2019 of 4.6 mp gw or the 2017 total (commercial and recreational) landings, whichever was lower, while the framework action was being developed. The 2017 total landings were 4.16 mp gw; therefore, the 2019 red grouper stock ACL was temporarily set at 4.16 mp gw through the emergency rule and resulted in a commercial ACL and ACT of 3.16 mp gw and 3.00 mp gw, respectively, and a recreational ACL and ACT of 1.00 mp gw and 0.92 mp gw, respectively. These values from the emergency rule were formally adopted through a framework action implemented in the fall of 2019 (GMFMC 2019a).

[3] at http://portal.southeast.fisheries.noaa.gov/cs/main.html

Red Grouper Recreational Data and Recalibration

NMFS created the Marine Recreational Fisheries Statistics Survey (MRFSS) in 1979. In the Gulf, MRFSS collected recreational data on catch and effort, including red grouper, since 1981. MRFSS included both offsite telephone surveys and onsite interviews at marinas and other points where recreational anglers fish. In 2008, the Marine Recreational Information Program (MRIP) replaced MRFSS to meet increasing demand for more precise, accurate, and timely recreational catch estimates. Until 2013, recreational catch, effort, and participation were estimated through a suite of independent but complementary surveys: telephone surveys of households and for-hire vessel operators that collected information about recreational fishing activity; and an angler intercept survey that collected information about the fish that were caught.

The MRIP Access Point Angler Intercept Survey (APAIS) began incorporating a new survey design in 2013. This new design addressed concerns regarding the validity of the survey approach, specifically that trips recorded during a given time period are representative of trips for a full day (Foster et al. 2018). The more complete temporal coverage with the new survey design provides for consistent increases or decreases in APAIS angler catch rate statistics, which are used in stock assessments and management, for at least some species (NOAA Fisheries 2019).

MRIP also transitioned from the legacy Coastal Household Telephone Survey (CHTS) to a new mail survey (Fishing Effort Survey [FES]) beginning in 2015, and in 2018, the FES replaced the CHTS. Both survey methods collect data needed to estimate marine recreational fishing effort (number of fishing trips) by shore and private/rental boat anglers on the Atlantic and Gulf coasts. The CHTS used random-digit dialing of homes in coastal counties to contact anglers. The new mail-based FES uses angler license and registration information as one way to identify and contact anglers (supplemented with data from the U.S. Postal Service, which includes virtually all U.S. households). Because the FES and CHTS are so different, NMFS conducted side-by-side testing of the two methods from 2015 to 2017 to develop a calibration model.

In general, total recreational fishing effort estimates generated from the FES are higher — and in some cases substantially higher — than the CHTS estimates (NOAA Fisheries 2019). This is because the FES is designed to more accurately measure fishing activity than the CHTS, not because there was a sudden rise in fishing effort. NMFS developed a calibration model to adjust historic effort estimates so that they can be accurately compared to new estimates from the FES. The new effort estimates alone do not lead to definitive conclusions about stock size or status in the past or currently.

Following the completion of SEDAR 61 (2019), an update to the weight estimation metrics for red grouper for the recreational sector was finalized. This data update modifies the recreational data from what were used in SEDAR 61 (2019) but has no impact on the assessment results because the assessment model input recreational landings and discards as numbers of fish, not as weights. Weight is estimated internally in the model, after the model results for the recreational sector are generated in numbers of fish. This means that stock status is determined before the application of this weight estimation procedure. In SEDAR 61 (2019; SEDAR 42 2015), the

shore mode was excluded from recreational analyses in the assessment because of very sporadic landings throughout the time series combined with the exceptionally low probability of harvesting a legal size (20 inches total length) red grouper via that mode. As such, the SEFSC has determined that the best scientific information available for updating sector allocations are the Accumulated Landings System/IFQ program data for the commercial landings and the FES-adjusted MRIP data, excluding the shore mode, for recreational landings. These datasets are also used to monitor the quotas for all stocks, including red grouper, and are therefore referred to as the ACL monitoring datasets.

Red Grouper Most Recent Stock Assessment (SEDAR 61 2019)

The SEDAR 61 (2019) assessment was completed in September 2019 and used updated recreational data from the MRIP APAIS and FES, which collectively estimate larger than previously calculated catch and effort data for the recreational sector.

The assessment concluded that red grouper in the Gulf is not overfished and overfishing is not occurring, but the stock remained below the spawning stock biomass (SSB) at 30% of the spawning potential ratio (SPR) in 2017, where SPR is the ratio of SSB to its unfished state. Because of the unknown impacts of the 2018 algal bloom attributable to red tide (*Karenia brevis*) occurring off the west Florida shelf in summer and fall, SEDAR 61 (2019) provided projections for retained yield and associated depletion under assumed conditions (e.g., recent average recruitment and catch allocations of 76% commercial and 24% recreational) for five red tide scenarios (red tide-associated "fishing mortality" noted in parentheses): a) no red tide mortality in 2018; b) half 2014 magnitude (0.1285); c) same as 2014 (0.257); d) same as 2005 (0.339); and e) double 2005 magnitude (0.678). The assessment indicated that maintaining landings at the levels observed in 2017 (and in the 2019 emergency action) resulted in a low probability of overfishing in 2020–2024 under all red tide scenarios with the exception of the most severe simulation of double the 2005 red tide mortality, which resulted in an 83% chance of overfishing.

After reviewing the full report at its September 2019 meeting, the SSC decided to treat the 2018 red tide event as similar to the red tide event observed in 2005 for the purpose of the projections. The SSC reviewed the assessment and the analyses of the 2018 red tide event at its September 2019 meeting. The SSC accepted SEDAR 61 (2019) as the best scientific information available and indicated that the stock is not overfished and is not experiencing overfishing as of 2017 (Table 1.1.2). The SSC further agreed that the 2018 red tide event (which persisted from November 2017 through February 2019) was equivalent in severity to the event in 2005, and adjusted projections of future harvest accordingly (see Section 2.2). A December 2019 interim analysis of red grouper abundance (SEFSC 2019), reviewed by the SSC in January 2020, provided support for the assumption that the 2018 red tide event was severe, and likely similar to the 2005 red tide event (outlined in "scenario d" above). The SSC recommended an OFL of 5.35 mp gw and an ABC of 4.9 mp gw, but recommended that the decision table from the stock assessment presentation be conveyed to the Council to illustrate the probabilistic risk of a given catch level, based on various assumptions about the severity of the 2018 red tide. This catch level recommendation assumed status quo sector allocations for red grouper, which were based on MRFSS data from 1986-2005. At its October 2019 meeting, the Council reviewed the SSC's

recommendations and requested that the SSC examine alternative sector allocation scenarios using MRIP FES data and the resulting catch level projections. The SSC reviewed these alternative sector allocation scenarios in January 2020 and, after affirming that the MRIP FES recreational landings represented the best scientific information available, recommended the projections in Table 1.1.3 as scientifically valid estimates of OFL and ABC.

This amendment considers alternatives that would modify the allocation of red grouper between the recreational and commercial sectors based on updated historical recreational harvest data. Based on the allocation decision made in Action 1 (Section 2.1), this amendment further proposes modifications to the OFLs, ABCs, ACLs, and ACTs for red grouper based on the stock assessment results and the resultant yield projections, considering the severity of the 2018 red tide event.

Table 1.1.2. Status determination criteria and stock status of red grouper based on SEDAR 61 (2019) and Amendment 44 (2017).

Criteria	Definitions	SEDAR 61 Values	Status
M	Avg M for Fully Selected Ages	0.144	
Steepness		0.99	
Virgin Recruitment	1,000s	20,443	
SSB Unfished	Numbers of fish	2,494,130	
Mortality Rate Criteria			
F_{MSY} or proxy	$F_{SPR30\%}$	0.259	
MFMT*	$F_{SPR30\%}$	0.259	
$F_{CURRENT}$	geometric mean ($F_{2015-2017}$)	0.203	
$F_{CURRENT}$/MFMT		0.784	No overfishing
Biomass Criteria			
SSB_{MSY} or proxy (relative # of eggs)	$SSB_{SPR30\%}$	748,241	
MSST (relative # of eggs) @ (1-M)	(1-M)*$SSB_{SPR30\%}$	640,494	
MSST (relative # of eggs) @ 50%	0.50*$SSB_{SPR30\%}$	374,120	
$SSB_{CURRENT}$ (relative # of eggs)	SSB_{2017}	613,517	
$SSB_{CURRENT}/SSB_{SPR30\%}$	SSB_{2017}	0.82	
$SSB_{CURRENT}$/MSST @ 50%	MSST = 0.50* $SSB_{SPR30\%}$	1.64	Not overfished

*Maximum fishing mortality threshold (MFMT); fishing mortality (F); maximum sustainable yield (MSY); minimum stock size threshold (MSST).

Table 1.1.3. Alternative constant catch yield projections accepted as scientifically valid by the SSC at its January 2020 meeting. Recreational data used to create these projections include MRIP FES, which informs both the sector allocations and resulting yields.

Landings Time Series	Comm %	Rec %	Million pounds gutted weight	
			OFL (P*=0.5)	ABC (P*=0.3)
1986-2005	59.3	40.7	4.66	4.26
1986-2009	60.5	39.5	4.70	4.30
1986-2018	59.7	40.3	4.67	4.28

1.2 Objectives of the Reef Fish Fishery Management Plan

At its August 2019 meeting, the Council last modified the objectives of the Reef Fish FMP. Through Reef Fish Amendment 51 (GMFMC 2019b), the Council adopted the updated objectives as shown below. Any allocation or reallocation must be consistent with the Reef Fish FMP objectives.

The overall goal of the Reef Fish FMP is:

To manage the reef fish fishery of the United States within the waters of the Gulf of Mexico Fishery Management Council jurisdiction to attain the greatest overall benefit to the nation with particular reference to food production and recreational opportunities on the basis of the maximum sustainable yield as reduced by relevant ecological, economic, or social factors.

The new Reef Fish FMP objectives are as follows:

1. To prevent overfishing and rebuild overfished stocks.
2. To achieve robust fishery reporting and data collection systems across all sectors for monitoring the reef fish fishery, which minimizes scientific, management, and risk uncertainty.
3. To conserve and protect reef fish habitat.
4. To minimize conflicts between user groups.
5. To minimize and reduce dead discards.
6. To manage Gulf stocks at OY as defined in MSA.
7. To revise the definitions of the fishery management unit and fishery to reflect the current species composition of the reef fish fishery.
8. To encourage and periodically review research on the efficacy of artificial reefs for management purposes.
9. To promote stability in the fishery by allowing for enhanced fisher flexibility and increasing fishing opportunities to the extent practicable.
10. To avoid to the extent practicable the "derby" type fishing season.
11. To provide for cost-effective and enforceable management of the fishery.
12. To promote and maintain accountability in the reef fish fishery.

1.3 Purpose and Need

The purposes are to revise the red grouper allocation between the commercial and recreational sectors using the best scientific information available and to modify the total and sector ACLs based on results of the recent stock assessment and subsequent OFL and ABC recommendations from the SSC.

The need is to use the best scientific information available to establish Gulf red grouper sector allocations and ACLs, ensuring that the historical participation by the recreational and commercial sectors is accurately reflected by the sector ACLs, and that recreational ACL is consistent with the data used to monitor recreational landings and trigger accountability measures (AM).

1.4 History of Management

The following summary describes management actions that affect the management of red grouper in the Reef Fish FMP. More information on the Reef Fish FMP can be obtained from the Council.[4]

Amendments to the Reef Fish FMP

Amendment 1 was implemented in January 1990. It set a 20-inch total length minimum size limit on red grouper; set a five-grouper recreational daily bag limit; set an 11.0 mp ww commercial quota for grouper, with the commercial quota divided into a 9.2 mp ww shallow-water grouper quota and a 1.8 mp ww deep-water grouper quota; and defined shallow-water grouper as black grouper, gag, red grouper, Nassau grouper, yellowfin grouper, yellowmouth grouper, rock hind, red hind, speckled hind, and scamp; and defined deep-water grouper as misty grouper, snowy grouper, warsaw grouper, and yellowedge grouper. The amendment also allowed a two-day possession limit for charter vessels and headboats on trips that extended beyond 24 hours, provided the vessel has two licensed operators aboard as required by the United States Coast Guard (USCG), and each passenger can provide a receipt to verify the length of the trip. In addition, the amendment limited fishermen fishing under a bag limit to a single day limit; established a longline and buoy gear boundary at the 50-fathom depth contour west of Cape San Blas, Florida, and the 20-fathom depth contour east of Cape San Blas, inshore of which the directed harvest of reef fish with longlines and buoy gear was prohibited, and limited the retention of reef fish captured incidentally in other longline operations (e.g., shark) to the recreational daily bag limit; limited trawl vessels to the recreational size and daily bag limits of reef fish; established fish trap permits, allowing a maximum of 100 fish traps per permit holder; prohibited the use of entangling nets for directed harvest of reef fish; limited retention of reef fish caught in entangling nets for other fisheries to the recreational daily bag limit; established the fishing year to be January 1 through December 31; and established a commercial reef fish vessel permit.

A **July 1991 regulatory amendment**, implemented in November 1991, provided a one-time increase in the 1991 quota for shallow-water grouper from 9.2 mp ww to 9.9 mp ww to provide the commercial fishery an opportunity to harvest 0.7 mp ww that was not harvested in 1990.

[4] http://www.gulfcouncil.org/fishery_management_plans/index.php.

A **November 1991 regulatory amendment**, implemented in June 1992, raised the 1992 commercial quota for shallow-water grouper to 9.8 mp ww after a red grouper stock assessment indicated that the red grouper SPR was well above the Council's minimum target of 20%.

An **August 1999 regulatory amendment**, implemented in June 2000, prohibited commercial sale of red grouper each year from February 15 to March 15 (during the peak gag spawning season) and established two marine reserves (Steamboat Lumps and Madison-Swanson) that are closed year-round to fishing for all species under the Council's jurisdiction.

Generic Sustainable Fisheries Act Amendment was partially approved and implemented in November 1999. This amendment set the MFMT for most reef fish stocks at a fishing mortality rate (F) corresponding to $F_{30\% \text{ SPR}}$.

Amendment 19, also known as Generic Essential Fish Habitat Amendment 2, was implemented in August 2002. This amendment established two marine reserves off the Dry Tortugas where fishing for any species and anchoring by fishing vessels is prohibited.

Amendment 21 was implemented in July 2003, and continued the Steamboat Lumps and Madison-Swanson reserves for an additional 6 years, until June 2010.

Secretarial Amendment 1 was implemented in July 2004. It established a rebuilding plan for red grouper with a 5.31 mp gw commercial quota and a 1.25 mp gw recreational target catch level; reduced the commercial quota for shallow-water grouper from 9.35 to 8.80 mp gw; reduced the commercial quota for deep-water grouper from 1.35 to 1.02 mp gw; and reduced the red grouper recreational bag limit to two fish per person per day.

An **emergency rule**, published in February 2005, established a series of trip limit reductions for the commercial grouper fishery to extend the commercial fishing season. The trip limit was initially set at 10,000 lbs gw. By August 1, if the fishery had landed more than 50% of either the shallow-water or red grouper quotas, then a 7,500-lb gw trip limit would take effect; and if by October 1, if more than 75% of either the shallow-water or red grouper quotas had been landed, then a 5,500-lb gw trip limit would take effect.

An **interim rule**, published in July 2005, established a temporary reduction in the red grouper recreational bag limit from two to one fish per person per day. The approved measure was subsequently extended through July 22, 2006.

An **October 2005 regulatory amendment**, implemented in January 2006, established a 6,000-lb gw aggregate deep-water grouper and shallow-water grouper trip limit for the commercial sector.

A **March 2006 regulatory amendment**, implemented in July 2006, established a red grouper recreational bag limit of one fish per person per day as part of the five grouper per person aggregate bag limit; prohibited for-hire vessel captains and crews from retaining bag limits of any grouper while under charter; and established an annual recreational closed season for red grouper from February 15 to March 15, beginning with the 2007 season.

Amendment 18A was implemented in September 2006. It prohibited vessels from retaining reef fish caught under recreational bag/possession limits when commercial quantities of Gulf reef fish are aboard; adjusted the maximum crew size on charter vessels that also have a commercial reef fish permit and a USCG certificate of inspection (COI) to allow the minimum crew size specified by the COI when the vessel is fishing commercially for more than 12 hours; prohibited the use of reef fish for bait except for sand perch or dwarf sand perch; required devices for the safe release of endangered sea turtles and smalltooth sawfish; changed the permit application process to an annual procedure and simplified income qualification documentation requirements; and required electronic vessel monitoring systems aboard vessels with federal reef fish commercial and charter vessel permits (implemented May 6, 2007).

The majority of the regulatory actions in **Amendment 27** were implemented in February 2008. However, the regulatory actions which addressed the use of non-stainless-steel circle hooks when using natural baits to fish for Gulf reef fish and also required the use of venting tools and dehooking devices when participating in the commercial or recreational reef fish fisheries were effective June 1, 2008.

An **emergency rule** was implemented in May 2009 through October 2009 prohibiting the use of bottom longline (BLL) gear to harvest reef fish east of 85°30′ W longitude shoreward of the 50-fathom (91.4 m) contour as long as the 2009 deep-water grouper and tilefish quotas are unfilled. After the quotas have been filled, the use of BLL gear to harvest reef fish in water of all depths east of 85°30′ W longitude was prohibited.

Amendment 30B was implemented in May 2009. It set an interim allocation of red grouper between the recreational and commercial sectors; made adjustments to the red grouper TACs; established ACLs and AMs for the commercial and recreational red grouper sectors and the commercial aggregate shallow-water grouper fishery; adjusted recreational grouper bag limits and seasons; adjusted commercial grouper quotas; reduced the red grouper commercial minimum size limit; replaced the one-month commercial grouper closed season with a four-month seasonal area closure at the Edges; eliminated the end date for Madison-Swanson and Steamboat Lumps marine protected areas; and required that vessels with a federal charter vessel/headboat permit for Gulf reef fish must comply with the more restrictive of state or federal reef fish regulations when fishing in state waters.

An **emergency rule under the Endangered Species Act** was implemented in October 2009 that prohibited bottom longlining for Gulf reef fish east of 85º30’W longitude (near Cape San Blas, Florida) shoreward of a line approximating the 35-fathom depth contour. It restricted the number of hooks on board to 1,000 hooks per vessel with no more than 750 hooks being fished or rigged for fishing at any given time.

Amendment 29 was implemented in January 2010 and established an IFQ program for the commercial harvest of grouper and tilefish species in the reef fish fishery.

Amendment 31 was implemented in May 2010. It prohibited the use of BLL gear shoreward of a line approximating the 35-fathom contour from June through August; reduced the number of longline vessels operating in the fishery through an endorsement provided only to vessel permits

with a history of landings, on average of at least 40,000 lbs of reef fish annually with fish traps or longline gear during 1999-2007; and restricted the total number of hooks that may be possessed onboard each reef fish BLL vessel to 1,000, only 750 of which may be rigged for fishing.

An **emergency rule**, implemented in May 2010, temporarily closed a portion of the Gulf exclusive economic zone (EEZ) to all fishing in response to the *Deepwater Horizon* oil spill. The initial closed area extended from approximately the mouth of the Mississippi River to south of Pensacola, Florida and covered an area of 6,817 square statute miles. The coordinates of the closed area were subsequently modified periodically in response to changes in the size and location of the area affected by the spill. At its largest size on June 1, 2010, the closed area covered 88,522 square statute miles, or approximately 37% of the Gulf EEZ. The size of the closed area was subsequently reduced in stages, and on April 19, 2011, all remaining waters that had been closed were reopened.

An **August 2010 regulatory amendment**, implemented in January 2011, reduced TAC for red grouper from 7.57 mp gw to 5.68 mp gw, based on the projections from the 2009 red grouper update assessment. Based on the 76:24 commercial and recreational allocation of red grouper, the commercial quota was reduced from 5.75 to 4.32 mp gw, and the recreational allocation was reduced from 1.82 to 1.36 mp gw.

An **interim rule** was published in December 2010, suspending the use of red grouper multi-use IFQ allocation so it could not be used to harvest gag; and continuing the suspension of red grouper multi-use IFQ allocation from June 1, 2011, through November 27, 2011, and subsequently extended through June 12, 2012.

An **August 2011 regulatory amendment**, implemented in November 2011, increased the 2011 red grouper TAC to 6.88 mp gw with subsequent increases each year from 2012 to 2015; and increased the red grouper bag limit to four fish per person.

Generic ACL/AM Amendment, largely implemented in January 2012 with other elements implemented later in the same year, established in-season and post-season AMs for all stocks that did not already have such measures defined. The AM states that if an ACL is exceeded, in subsequent years an in-season AM will be implemented that will close all shallow-water grouper fishing when the ACL is reached or projected to be reached.

Amendment 32 was implemented in March 2012. It set the red grouper commercial ACL at 6.03 mp gw and the recreational ACL at 1.90 mp gw; modified grouper IFQ multi-use allocations; added an overage adjustment and in-season measures to the red grouper recreational AMs to avoid exceeding the ACL; and added an AM for the red grouper bag limit that would reduce the four red grouper bag limit in the future to three red grouper, and then to two red grouper, if the red grouper recreational ACL is exceeded.

A **December 2012 framework action**, implemented in July 2013, eliminated the February 1 through March 31 recreational shallow-water grouper closed season shoreward of 20 fathoms

(except for gag). However, the closed season remained in effect beyond 20 fathoms to protect spawning aggregations of gag and other species that spawn offshore during that time.

Amendment 38 was implemented in March 2013. It revised the post-season recreational AM to reduce the recreational season of only the species for which the ACL was exceeded; and modified the reef fish framework procedure to include the addition of AMs to the list of items that can be changed through the standard framework procedure.

A **December 2014 framework action**, implemented in May 2015, reduced the red grouper bag limit from four fish to two fish per person per day and eliminated the bag limit reduction AM.

A **June 2016 framework action**, implemented in October 2016, increased the commercial ACL to 8.19 mp gw and the commercial quota to 7.78 mp gw. The recreational ACL was increased to 2.58 mp gw; and the recreational ACT to 2.37 mp gw.

Amendment 44, implemented in December 2017, standardized the MSST for certain reef fish species, including red grouper, to 50% of the biomass at MSY.

A **June 2017 framework action**, implemented in February 2018, removed the 1,000 total hook limit per BLL vessel, while maintaining the limit of 750 hooks which may be rigged for fishing.

Amendment 36A returned shares from non-activated accounts and provided the Regional Administrator the authority to withhold the amount of red snapper or grouper-tilefish allocation before distribution at the beginning of a year in which a commercial quota reduction is expected to occur. Withheld red snapper and grouper-tilefish annual allocation will be distributed to shareholders if the effective date of the final rule implementing the quota reduction has not occurred by June 1. These actions were implemented in July 2018. The amendment also implemented a requirement that all reef fish permitted vessels make an advance landing notification, which was implemented in January 2019.

A **December 2018 temporary rule**, implemented in January 2019, withheld a portion of the Gulf red grouper commercial quota from the IFQ for 2019 as a result of a proposed commercial quota reduction. NMFS withheld 59.4% of the red grouper IFQ allocation (4.78 mp gw) in anticipation of the reduction.

An **emergency rule**, implemented in May 2019, reduced the red grouper commercial and recreational ACLs and ACTs consistent with a stock ACL of 4.16 mp gw, to provide a temporary reduction in harvest levels while a framework action was developed to reduce catch limits on a long-term basis. The commercial ACL is 3.16 mp gw; the commercial quota is 3.00 mp gw. The recreational ACL is 1.00 mp gw; the recreational ACT is 0.92 mp gw.

An **April 2019 framework action**, implemented in October 2019, reduced the catch limits for red grouper consistent with the May 2019 emergency rule.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1 – Modify the Sector Allocations, OFL, ABC, and ACLs for Red Grouper

Note: This action considers modifying the overfishing limit (OFL), acceptable biological catch (ABC), and annual catch limits (ACLs) for red grouper in the Gulf of Mexico (Gulf).

Alternative 1: No Action – Maintain the sector allocations of the total ACL for red grouper between the commercial and recreational sectors. The allocations for red grouper are 76% commercial and 24% recreational. The allocation was derived from the average landings using Marine Recreational Fisheries Statistics Survey (MRFSS) data from the years 1986 through 2005, established in Reef Fish Amendment 30B. Maintain the current OFL, ABC, and ACLs.

Alternative 2: Maintain the sector allocations of the total ACL as 76% commercial and 24% recreational. Revise the OFL and ABC as recommended by the Scientific and Statistical Committee (SSC) based on Southeast Data Assessment and Review (SEDAR) 61 (2019). Set the stock ACL equal to the stock ABC.

Alternative 3: Revise the sector allocations of the total ACL between the recreational and commercial sectors as the average landings using Fishing Effort Survey (FES)-adjusted Marine Recreational Information Program (MRIP FES) data during the years 1986 through 2005, based on the Southeast Fisheries Science Center (SEFSC) ACL monitoring datasets. The allocations for red grouper are 59.3% commercial and 40.7% recreational. Revise the OFL and ABC as recommended by the SSC based on SEDAR 61 (2019). Set the stock ACL equal to the stock ABC.

Alternative 4: Revise the sector allocations of the total ACL between the recreational and commercial sectors as the average landings using MRIP FES data during the years 1986 through 2009, based on the SEFSC ACL monitoring datasets. The allocations for red grouper are 60.5% commercial and 39.5% recreational. Revise the OFL and ABC as recommended by the SSC based on SEDAR 61 (2019). Set the stock ACL equal to the stock ABC.

Alternative 5: Revise the sector allocations of the total ACL between the recreational and commercial sectors as the average landings using MRIP FES data during the years 1986 through 2018, based on the SEFSC ACL monitoring datasets. The allocations for red grouper are 59.7% commercial and 40.3% recreational. Revise the OFL and ABC as recommended by the SSC based on SEDAR 61 (2019). Set the stock ACL equal to the stock ABC.

Table 2.1.1. OFL, ABC, total and sector ACLs for **Alternatives 1-5**.

	OFL*	**ABC**	**Total ACL**	**Comm ACL**	**Rec ACL**
Alternative 1**	14.16	13.92	4.16	3.16	1.00
MRIP FES equivalent			(5.26)		(2.10)

	OFL*	ABC	Total ACL	Comm ACL	Rec ACL
Alternative 2* **	5.35	4.90	4.90	3.72	1.18
Alternative 3* **	4.66	4.26	4.26	2.53	1.73
Alternative 4* **	4.70	4.30	4.30	2.60	1.70
Alternative 5* **	4.67	4.28	4.28	2.56	1.72

*Values for OFL, ACB, total ACL, commercial ACL, and recreational ACL are in millions of pounds (mp) gutted weight (gw).
**The recreational portion of the current OFL, ABC, and ACLs are based on MRIP CHTS data.
***The recreational sector ACL is in MRIP FES currency.

Discussion:

At its October 2019 meeting, the Gulf of Mexico Fishery Management Council (Council) discussed the implications of the FES-adjusted MRIP recreational data on allocation. Given that Amendment 30B to the Fishery Management Plan (FMP) for Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP; GMFMC 2008c) used SEDAR 12 (2006) and the MRFSS data for the recreational sector in determining the sector allocations, the Council requested that the SSC review red grouper projections for the OFL and ABC using the best available landings data. The Council also directed staff to begin work on a plan amendment to update the red grouper allocation and establish catch levels based on the best available landings data. At the January 2020 SSC meeting, the SEFSC presented estimates of OFL and ABC associated with the time series of 1986-2005, 1986-2009, and 1986-2018; the SSC affirmed that those time series yield scientifically valid estimates of OFL and ABC as shown in Table 1.1.3.[5] The time series chosen directly affects the resulting sector allocations, which affects the yield projections for OFL and ABC. As more of the ACL is allocated to the recreational sector, the proportion of discards by that sector increases. Even though recreational discard rates are assumed to be lower than commercial discard rates, the magnitude of recreational discards is considerably greater than commercial discards, resulting in additional removals and a lower annual projected yield.[6]

Alternative 1 (No Action) would maintain the sector allocations established in Amendment 30B (GMFMC 2008c), with commercial and recreational allocation of the red grouper stock ACL divided 76% and 24%, respectively. **Alternative 1** would use MRFSS landings data from SEDAR 12 (2006) to set the allocation. When Amendment 30B was developed, the resulting sector allocations were based on all available years during which grouper were identified by species and also on the longest and most robust time series for landings at the time (1986-2005). A long time series reduces the influence of short-term shifts in landings resulting from changes in recruitment or regulations. As seen in Table 2.1.1, **Alternative 1** would also maintain the current OFL, ABC, and ACLs. The stock ACL in **Alternative 1** was set by the Council in 2019 through an emergency rule and subsequent framework action discussed in Chapter 1, and is equivalent to the landings from the 2017 fishing year (GMFMC 2019a). The framework action

[5] The OFL and ABC associated with Alternative 2 was recommended at the September 2019 meeting; the OFLs and ABCs associated with Alternatives 3-5 were recommended at the January 2020 meeting, based on timeframes from a Council motion in October 2019. http://gulfcouncil.org/meetings/ssc/archive/
[6] See SEDAR 61 (2019) for more information on the sector discard mortality rates and estimated sector discards.

did not change the OFL and ABC, so those values provided in **Alternative 1** are based on recommendations by the SSC after reviewing the SEDAR 42 2015 stock assessment of red grouper. The recreational portion of the current OFL, ABC, and ACLs are based on MRIP CHTS data, and the current recreational ACL of 1.00 million pounds in MRIP CHTS units is equivalent to 2.10 million pounds in MRIP FES units. **Alternative 1** is not legally viable because it is not based on the best scientific information available, and would retain the current OFL and ABC, which are above the values produced by the SEDAR 61 stock assessment and recommended by the SSC.

As in **Alternative 1**, **Alternative 2** would maintain the allocation established in Amendment 30B (GMFMC 2008c), with commercial and recreational allocation of the red grouper stock ACL divided 76% and 24%, respectively. However, **Alternative 2** would revise the OFL and ABC based on SEDAR 61 (2019) and SSC recommendations. The stock ACL is equal to the stock ABC.

While the allocations in **Alternatives 1-2** reflect recreational landings estimated using MRFSS, the allocations in **Alternatives 3-5** reflect recreational landings estimated using MRIP FES from the SEFSC ACL monitoring datasets. To compare recreational landings to the current recreational ACL and annual catch target (ACT) the SEFSC converted the MRIP FES estimates into MRIP CHTS units. If Amendment 53 is implemented, MRIP FES units would be used to compare recreational landings to the recreational ACL and ACT. Therefore, although **Alternative 2** retains the current percentage allocation, it would result in a decrease in the recreational ACL when compared to the MRIP FES equivalent of 2.10 million pounds in **Alternative 1,** and an increase in the commercial ACL. In effect, because the recreational ACL would decrease compared to its MRIP FES equivalent, and because the increase in estimated stock productivity is attributable to historic estimates of recreational catch and effort, not reallocating using the MRIP FES data results in a *de facto* reallocation to the commercial sector.

Alternative 3 would base the commercial and recreational sector allocations of red grouper on landings from the same timeframe as used in Amendment 30B (GMFMC 2008c), 1986 through 2005, but would use MRIP FES landings from the SEFSC ACL monitoring dataset,[7] which is considered the best scientific information available (Table 2.1.2). By using the SEFSC ACL monitoring dataset, **Alternative 3** best reflects the landings from each sector from 1986-2005. The resulting allocations are 59.3% commercial and 40.7% recreational. **Alternative 3** would revise the OFL and ABC based on SEDAR 61 (2019) and then set the stock ACL equal to the stock ABC.

Alternative 4 would base the commercial and recreational sector allocations on landings from the timeframe 1986 through 2009 (Table 2.1.2), ending the time series upon implementation of the commercial grouper-tilefish individual fishing quota (IFQ) program, which includes management of red grouper (GMFMC 2008a). Beginning in 2010, the IFQ program has constrained the commercial sector from exceeding its red grouper quota, as a commercial vessel must have a sufficient amount of allocation before landing. In contrast, the recreational sector could exceed its quota, which would trigger accountability measures, as landings are monitored in-season and it may not be possible to close the fishing season before the quota is met. The

[7] Dates for when data sources were accessed are noted in Table 2.1.2.

resulting allocations are 60.5% commercial and 39.5% recreational. **Alternative 4** would revise the OFL and ABC based on SEDAR 61 (2019) and then set the stock ACL equal to the stock ABC.

Alternative 5 would base the commercial and recreational allocations on landings from the timeframe 1986 through 2018, which incorporates the longest time period of landings currently available (Table 2.1.2). The *Deepwater Horizon* MC252 oil spill began in April 2010 and resulted in extensive fishery closures; therefore, landings from 2010 should be viewed with caution. This timeframe also includes landings after implementation of the grouper-tilefish commercial IFQ program discussed in **Alternative 4**. The resulting allocations are 59.7% commercial and 40.3% recreational. **Alternative 5** would revise the OFL and ABC based on the stock assessment and then set the stock ACL equal to the stock ABC.

Although the commercial and recreational allocations were in effect for the timeframe 2010-2018, the commercial ACL has never been exceeded and the recreational ACL has only been exceeded in 2013, and was subject to in-season closures in 2014 and 2015. The various time series under consideration in **Alternatives 3-5** have relatively small differences in sector allocations (at most 1.2%; Table 2.1.2). The difference in the commercial and recreational allocations when **Alternatives 1-2** are compared to **Alternatives 3-5** is, at most, 16.7%, shifting allocation from the commercial sector to the recreational sector to account for an increase in the estimated historical harvests attributable to the recreational sector.

In comparison to the MRIP FES equivalent total ACL of 5.26 mp gw under **Alternative 1**, **Alternatives 2-5** would result in a decrease of the total ACL. In comparison to **Alternative 1**, **Alternative 2** would result in an increase of the commercial sector ACL; **Alternatives 3-5** would result in a decrease of the commercial sector ACL. In comparison to the MRIP FES equivalent recreational sector ACL of 2.10 mp gw under **Alternative 1**, **Alternatives 2-5** would result in a decrease of the recreational sector ACL. The MRIP FES equivalent of total ACL and recreational sector ACL under **Alternative 1** is used for comparison with **Alternatives 2-5** in order to have equivalent currency.

Table 2.1.2. Commercial and recreational landings for red grouper in pounds gutted weight (gw) from SEDAR 12 (MRFSS) and the SEFSC ACL monitoring datasets (MRIP FES) used to calculate sector allocations.

Year	**SEDAR 12 Landings**		**SEFSC ACL Monitoring Landings**	
-	**Comm**	**Rec**	**Comm**	**Rec**
1986	6,312,986	2,400,380	6,222,162	3,348,897
1987	6,717,890	1,464,710	6,567,225	2,495,130
1988	4,742,496	2,476,070	4,559,441	4,652,818
1989	7,367,911	2,761,150	7,270,424	7,632,792
1990	4,809,282	1,131,710	4,744,711	3,565,320
1991	5,094,501	1,775,110	5,071,083	3,755,576
1992	4,463,277	2,658,180	4,456,473	6,046,978
1993	5,379,626	2,091,160	6,364,065	4,057,934

1994	4,902,862	1,808,240	4,890,106	3,827,267
Year	**SEDAR 12 Landings**		**SEFSC ACL Monitoring Landings**	
1995	4,746,140	1,862,570	4,652,487	3,496,544
1996	4,454,146	893,755	4,336,214	910,313
1997	4,848,486	562,328	4,673,786	1,142,958
1998	3,948,566	643,058	3,703,816	1,513,890
1999	5,974,706	1,152,810	5,800,592	3,428,553
2000	5,838,300	2,107,730	5,702,622	4,242,231
2001	5,964,506	1,327,770	5,802,442	2,435,456
2002	5,907,248	1,611,110	5,791,795	3,172,348
2003	4,937,970	1,275,830	4,832,294	2,201,496
2004	5,749,039	3,000,140	5,635,577	7,983,239
2005	5,410,594	1,630,140	5,380,603	3,081,979
2006			5,109,824	2,655,065
2007			3,650,777	2,031,867
2008			4,748,224	1,604,398
2009			3,698,227	1,600,063
2010			2,910,970	1,963,762
2011			4,783,668	1,534,113
2012			5,219,133	4,131,722
2013			4,599,001	4,990,310
2014			5,601,905	5,368,575
2015			4,798,007	3,790,614
2016			4,497,582	2,632,907
2017			3,328,271	1,692,513
2018			2,363,280	2,053,526
2019			2,037,046	1,638,076
Alternatives 1 and 2 (1986-2005)	76%	24%		
Alternative 3 (1986-2005)			59.3%	40.7%
Alternative 4 (1986-2009)			60.5%	39.5%
Alternative 5 (1986-2018)			59.7%	40.3%

Source: SEDAR 12 (2006) (http://sedarweb.org/sedar-12). 1986-2009 landings, SEFSC Commercial ACL dataset (11/15/19) and 2010-2019 landings, the IFQ database (accessed 5/20/20). SEFSC MRIP FES Recreational dataset (5/18/20).

2.2 Action 2 – Modify the Gulf Red Grouper Annual Catch Targets (ACTs)

Alternative 1: No Action – Maintain the current buffer between the ACL and ACT for each sector. The commercial buffer is 5%, and the recreational buffer is 8%.

Alternative 2: Apply the ACL/ACT Control Rule to revise the buffer between the ACL and ACT for each sector. The commercial buffer is 0%, and the recreational buffer is 9%.

Alternative 3: Maintain the current buffer between the ACL and ACT for the commercial sector, and apply the ACL/ACT Control Rule to revise the buffer between the ACL and ACT for the recreational sector. The commercial buffer is 5%, and the recreational buffer is 9%.

Discussion:

Alternative 1 (No Action) would maintain the current buffer between the ACL and ACT for the commercial and recreational sectors set in the April 2019 framework action (GMFMC 2019a). The application of the ACL/ACT Control Rule was used to set the buffer between the sector ACLs and ACTs. The recreational buffer in **Alternative 1** used MRFSS data, which are no longer in use for quota monitoring. Data from the IFQ program for red grouper were used for the commercial sector. Normally, a sector managed using an IFQ program without a quota overage during its reference period would yield a 0% buffer from the ACL/ACT Control Rule; however, this tool is advisory only and does not account for the overage allowance or gag multi-use provisions in the IFQ program. As such, following the SEDAR 42 (2015) stock assessment, the Council set the buffer for the recreational sector using the ACL/ACT Control Rule at 8% and the commercial sector's buffer at 5%, which accounts for the multi-use provision for the gag quota under the commercial IFQ program (GMFMC 2016a). Both the red grouper and gag share categories have a multi-use provision that allows a portion of the red grouper quota to be harvested under the gag allocation, and vice versa. Each year, the program assigns a portion of each shareholder's red grouper and gag as a multi-use allocation category. The intent of the multi-use provision is to provide for allocation if either gag or red grouper are landed as incidental catch. The formulas for determining red grouper multi-use (RGM) and gag multi-use (GGM) allocation is as follows:

$$RGM\ allocation = 100 * \frac{(Gag\ ACL - Gag\ Commercial\ Quota)}{Red\ Grouper\ Commercial\ Quota}$$

$$GGM\ allocation = 100 * \frac{(Red\ Grouper\ ACL - Red\ Grouper\ Commercial\ Quota)}{Gag\ Commercial\ Quota}$$

The Council's ACL/ACT Control Rule is used to determine the buffer (if any) between the ACL and the ACT, using a 4-year reference period of recent landings from each sector. The reference period selected for **Alternatives 2** and **3** was 2016 – 2019, with 2019 landings for the recreational sector still considered preliminary by the National Marine Fisheries Service (NMFS). The ACL/ACT Control rule adjusts the buffer between the ACL and ACT based on a

number of factors, including the number and magnitude of quota overages in the reference period, accountability measures in place to account for any quota overages, and the method by which the quota is monitored. Considering that the SEFSC ACL monitoring dataset using MRIP FES data more than doubles the MRIP CHTS landings estimates, increases in the ACT of greater than 50% may be necessary to allow the fishery to continue at current effort and catch levels.

Alternative 2 would use a buffer between the commercial ACL and ACT of 0%, and a buffer between the recreational ACL and ACT of 9%, based on the application of the Council's ACL/ACT Control Rule following SEDAR 61 in 2019. The data used by year for applying the ACL/ACT Control Rule for **Alternative 2** are shown in Table 2.2.1, and the tool as applied to each fishing sector is shown in Appendices F (recreational) and G (commercial). **Alternative 2** represents a strict application of the ACL/ACT Control Rule for the prescribed reference period, and does not account for multi-use provisions in the commercial gag IFQ program. With a commercial buffer of 0%, the gag multi-use allocation would be zero, and therefore, only gag could be landed with gag allocation. Table 2.2.2 displays the percentage of multi-use landings used for red grouper and for gag with the gag multi-use allocation from 2010 to 2019. From 2016 to 2018, 0.3% to 2% of the GGM was used to land red grouper; however, the preliminary 2019 data show an increase to 19% of the GGM being used for landing red grouper.

Table 2.2.1. ACL/ACT Control Rule data inputs for Alternative 2 of Action 2.

Year	Sector	Landings (lbs gw)*	PSE**	ACL	Exceeded ACL?	Buffer	Data Used
2016	Commercial	4,497,582	0 - IFQ	7,780,000	No	0%	IFQ
2017	Commercial	3,328,271	0 - IFQ	7,780,000	No		IFQ
2018	Commercial	2,363,280	0 - IFQ	7,780,000	No		IFQ
2019	Commercial	2,037,046	0 - IFQ	3,000,000	No		IFQ
Year	**Sector**	**Landings (lbs gw)***	**PSE****	**ACL**	**Exceeded ACL?**	**Buffer**	**Data Used**
2016	Recreational	1,373,337	21.6	2,580,000	No	9%	MRIP CHTS
2017	Recreational	739,073	21.0	2,580,000	No		MRIP CHTS
2018	Recreational	913,978	21.5	2,580,000	No		MRIP CHTS
2019***	Recreational	725,105	21.6	1,000,000	No		MRIP CHTS

Source: SERO ACL Monitoring dataset and SEFSC Commercial ACL dataset, retrieved 8 May 2020.
*2019 recreational data are preliminary.
*Pounds (lbs) gutted weight (gw).
**"PSE" stands for proportional standard error, which is a measure of the precision of the estimated landings for a given year.
***2019 recreational data are preliminary.

Table 2.2.2. Percentage (and weight in pounds [lbs]) of multi-use allocations used by fishermen for landing red grouper and gag.

Year	RGM		GGM	
-	Red Grouper (lbs)	Gag (lbs)	Red Grouper	Gag
2010	73% (13,833)	27% (5,091)	28% (2,203)	72% (5,654)
2011	NA*	NA	14% (1,474)	86% (8,700)
2012	NA	NA	6% (1,928)	94% (32,230)
2013	NA	NA	1% (4,329)	99% (376,528)
2014	NA	NA	35% (103,151)	65% (188,950)
2015	82% (98,466)	18% (20,998)	26% (33,165)	74% (92,661)
2016	8% (11,441)	92% (135,471)	1% (1,665)	99% (220,088)
2017	11% (6,145)	89% (51,137)	2% (2,198)	98% (116,163)
2018	4% (1,656)	96% (41,364)	0.3% (344)	99.7% (114,984)
2019	38% (43,610)	62% (71,349)	19% (9,209)	81% (39,266)

*2011-2014 did not have an RGM allocation because gag was under a rebuilding plan.
Sources: NMFS 2020.

Alternative 3 would use a buffer between the commercial ACL and ACT of 5% to account for the multi-use provision in the gag commercial IFQ program, and a buffer between the recreational ACL and ACT of 9%, based on the application of the Council's ACL/ACT Control Rule following SEDAR 61 in 2019. **Alternative 3** uses the same recreational buffer described in **Alternative 2,** but maintains the current commercial buffer as described in **Alternative 1**.

The commercial and recreational sector ACTs resulting from alternatives selected in Actions 1 and 2 are displayed in Table 2.2.3. The commercial buffer under **Alternative 2** of Action 2 would result in greater commercial ACTs than with the commercial buffers under **Alternatives 1** and **3**, for the corresponding alternative under Action 1 (across a given row in Table 2.2.3). The current recreational buffer under **Alternative 1** would result in greater recreational ACTs than with the recreational buffers under **Alternatives 2** and **3**, for the corresponding alternative under Action 1 (across a given row in Table 2.2.3).

Table 2.2.3. Commercial and recreational sector ACTs resulting from alternatives selected in Actions 1 and 2.

		Action 2					
	-	Alt 1		Alt 2		Alt 3	
		Comm	Rec	Comm	Rec	Comm	Rec
Action 1	Alt 1	3.00	0.92** (1.93)	N/A	N/A	N/A	N/A
	Alt 2	3.53	1.09	3.72	1.07	3.53	1.07
	Alt 3	2.40	1.59	2.53	1.57	2.40	1.57
	Alt 4	2.47	1.56	2.60	1.55	2.47	1.55
	Alt 5	2.43	1.58	2.56	1.57	2.43	1.57

* Values are in millions of pounds, gutted weight and in MRIP FES currency.
**The recreational sector ACT for Action 1, Alternative 1 is in CHTS currency; the recreational sector ACT in MRIP FES currency is in parentheses.

Changes in the recreational sector ACTs are predicted to impact the recreational sector's season length.[8] Landings data for Gulf red grouper obtained from the SEFSC recreational ACL dataset obtained in May of 2020 were used to model the resulting recreational sector's season length. The current ACT is being tracked using MRIP CHTS equivalent landings. However, this analysis uses MRIP FES data to match the same currency (MRIP FES) as the most recent assessment (SEDAR 61 2019). Future landings were determined from taking a three-year average of the three most recent years of complete MRIP FES data, as the most recent data are assumed to be the best approximation of future harvest. Additionally, the current 2-red grouper per angler bag limit became effective on May 7, 2015, precluding using landings prior to 2016 without adjusting for the previously higher bag limits. Recreational landings are collected in two-month increments called waves (e.g., January and February = wave 1, March and April = wave 2, etc.). Landings from 2017 through 2019 and a prediction of future landings (average landings from 2017-2019) by wave are shown in Figure 2.2.1. Season lengths were projected with upper and lower 95% confidence intervals for each recreational ACT being considered in Amendment 53 (Table 2.2.4). The predicted closure dates span from July 23 to no closure (Table 2.2.4). There is considerable uncertainty in the predictions since the confidence intervals range from early June to no closure needed (Table 2.2.4; Figure 2.2.2).

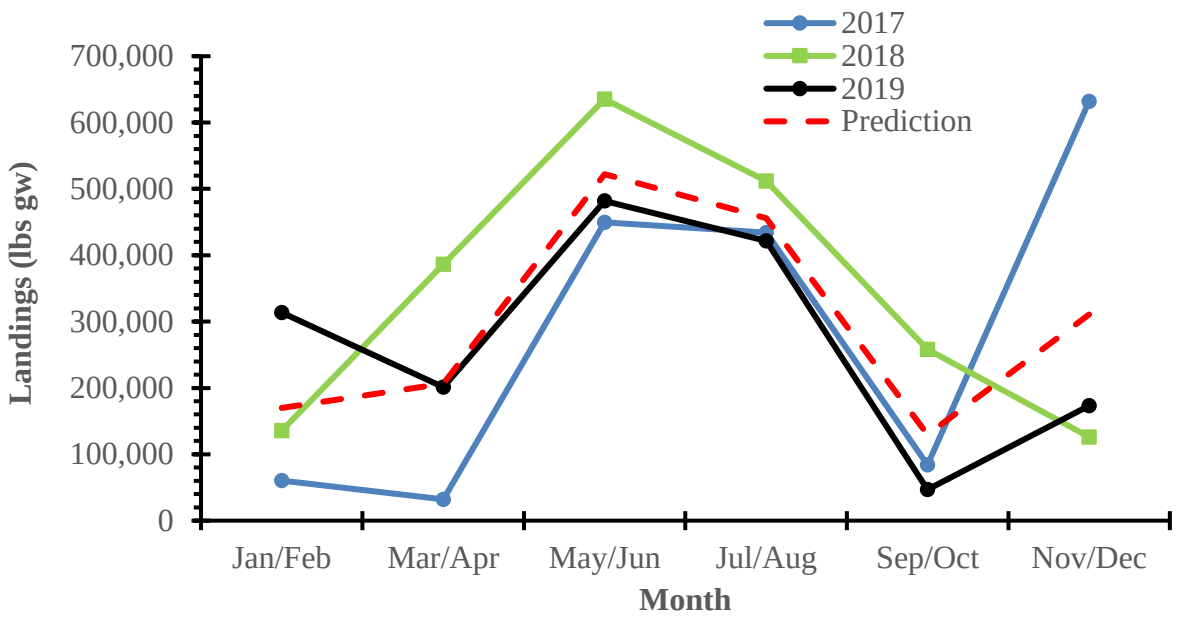

Figure 2.2.1. Gulf recreational landings by two-month wave and predicted future landings.
Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

[8] This information is also displayed in Appendix H, which was provided at the June 2020 Council meeting.

Table 2.2.4. The predicted closure dates for each recreational ACT (mp gw) currently in Amendment 53 generated from predicted landings and also predicted landings upper and lower 95% confidence intervals.

Alternatives (Action 2 – Action 1)	ACL	Buffer	ACT	Predicted Closure Date	Season Length (95% Confidence Interval)
1-1	2.10	8%	1.93	No Closure	259—365 Days
1-2	1.18	8%	1.09	July 26	157—365 Days
2-2; 3-2	1.18	9%	1.07	July 23	155—365 Days
1-3	1.73	8%	1.59	November 20	211—365 Days
2-3; 3-3	1.73	9%	1.57	November 16	208—365 Days
1-4	1.70	8%	1.56	November 14	207—365 Days
2-4; 3-4	1.70	9%	1.55	November 12	206—365 Days
1-5	1.72	8%	1.58	November 18	209—365 Days
2-5; 3-5	1.72	9%	1.57	November 16	208—365 Days

Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

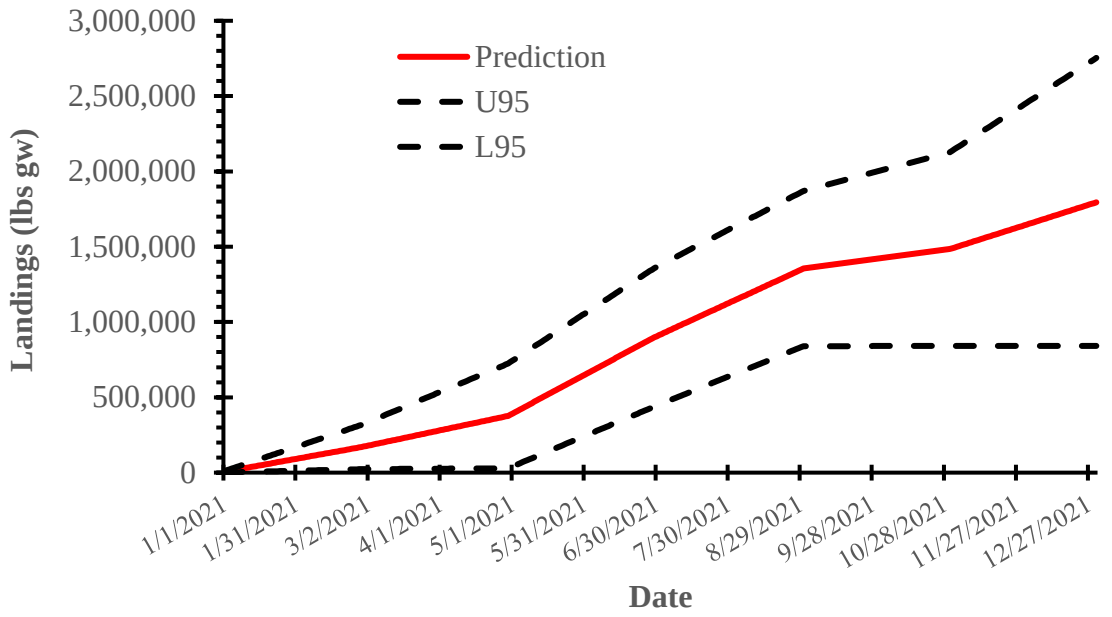

Figure 2.2.2. Cumulative predicted red grouper recreational landings with 95% confidence interval (dashed lines).
Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

As with most predictions, the reliability of the results is dependent upon the accuracy of their underlying data and input assumptions. The analyses have attempted to create a realistic baseline as a foundation for comparisons, under the assumption that projected future landings will accurately reflect actual future landings.

Data Currencies for Red Grouper Private Mode Landings

Although the Southeast Regional Office monitors the sector ACTs through MRIP FES, the Council requested, at its June 2020 meeting, that the red grouper private mode landings from Florida be provided in three currencies: Gulf Reef Fish Survey[9] (GRFS), MRIP CHTS, and MRIP FES. The request was based on the concept that the majority of private recreational landings of red grouper occur in Florida and that all landings data currencies should be considered to inform decisions on stock sustainability. These landings are displayed in Table 2.2.5. GRFS is conducted by the Florida Fish and Wildlife Conservation Commission, and is a catch and fishing effort monitoring program for 13 Gulf reef fish species (mutton snapper, yellowtail snapper, hogfish, red snapper, vermilion snapper, gag, red grouper, black grouper, greater amberjack, lesser amberjack, banded rudderfish, almaco jack, and gray triggerfish). The program was certified by NMFS, indicating that the methodologies proposed for use by the program to monitor catch and effort were statistically appropriate, and has been in use since 2015. GRFS uses dockside intercepts to monitor catch, and a mail survey to measure fishing effort, with the former augmenting APAIS and the latter FES. GRFS is considered a supplemental survey to MRIP, increasing spatiotemporal sample coverage of catch and effort for the subject reef fish species. GRFS was replaced on July 1, 2020, by the FWC's State Reef Fish Survey, which expanded the coverage area of GRFS to include the east coast of Florida. The first full year of data from GRFS sampling was 2016, so MRIP landings (CHTS and FES) from 2016-2019 are included for comparison.

Table 2.2.5. Red grouper private mode Florida landings (pounds whole weight) from GRFS, MRIP CHTS, and MRIP FES surveys.

Year	GRFS	MRIP CHTS	MRIP FES
2016	907,291	962,299	2,273,809
2017	497,239	385,577	1,377,751
2018	747,082	548,205	1,736,801
2019	679,529	421,351	1,378,144

*Landings exclude Monroe County and are in lbs ww.
Source: GRFS data provided July 6, 2020; SEFSC MRIP CHTS recreational ACL file (5/18/20); SEFSC MRIP FES recreational ACL file (6/22/20).

[9] On July 1, 2020, the State Reef Fish Survey replaced the Gulf Reef Fish Survey, and the survey expanded to cover the Atlantic coast of Florida in addition to the Gulf coast.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Fishery

Detailed descriptions of the red grouper component of the Gulf of Mexico (Gulf) reef fish fishery can be found in Reef Fish Amendments 38 (GMFMC 2012a) and 44 (GMFMC 2017c) to the Fishery Management Plan (FMP) for the Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP). Additionally, Sections 3.4 and 3.5 provide information on the respective economic and social environments of the fishery. Management of the commercial and recreational sectors fishing for reef fish in federal waters began in 1984 with the implementation of the Reef Fish FMP. This FMP has been continuously updated through plan amendments and framework actions (also known as regulatory amendments). Resultant regulatory measures are codified at 50 CFR 622. A summary of reef fish management actions can be found on the Gulf of Mexico Fishery Management Council's (Council) web page.[10] Management actions associated with red grouper can also be found in this document in Section 1.3.

The allocation between the commercial and recreational sector in the red grouper fishery is 76% and 24%, respectively. Total landings of red grouper have ranged from 4.4 to 13.6 million pounds (mp) gutted weight (gw) between 2001 and 2018 (Marine Recreational Information Program – Fishing Effort Survey [MRIP FES] data; Table 2.1.2).[11] The years with the lowest landings occurred in 2010 (4.9 mp gw - likely associated with the Deepwater Horizon oil spill) and 2018 (4.4 mp gw – likely associated with the large red tide event). The highest landings in this series occurred in 2004 at approximately 13.6 mp gw. In general, annual landings have been between 5 and 10 mp gw (MRIP FES data).

Historically, relative spawning biomass (i.e. spawning potential ratio [SPR]) of red grouper was below the 30% management target from 1990 through 1996, gradually increased as the 1998 cohort matured, but declined considerably in 2005 following a severe red tide event that killed an estimated 29.5% of the red grouper population. The spawning stock biomass (SSB) increased from 2006 and peaked in 2012, likely due to the large 2005 cohort moving through the population in combination with effective management measures (e.g., a reduction in the commercial size limit in 2009, implementation of the commercial individual fishing quota (IFQ) program in 2010, etc.). Relative spawning biomass has been decreasing since 2012, and reached a low of 0.246 in 2017. This decrease is due at least in part to the severe 2014 red tide event that killed an estimated 21.3% of the population (Southeast Data Assessment and Review [SEDAR] 61 Executive Summary 2019).

[10] http://gulfcouncil.org/fishery-management/

[11] Prior to 2013, red grouper recreational landings data were collected and monitored in Marine Recreational Fisheries Statistics Survey (MRFSS) currency. Data referenced here have been converted to MRIP FES currency for consistency and to match current collection and monitoring protocols.

Landings in both 2017 (~5.0 mp gw) and 2018 (~4.4 mp gw), were among the lowest in the time series presented in Table 2.1.2, and there was other evidence of declining Gulf red grouper stocks. Some fishermen testified to the Council in 2018 that red grouper were harder to catch and stated that the current acceptable biological catch (ABC) of 13.92 mp gw was too high. They expressed concern that the stock condition may be declining, citing an apparent lack of legal-size and larger individuals throughout the species' range on the West Florida shelf. In addition, there were severe red tide conditions that occurred in summer and fall of 2014 and 2018 off the Florida west coast that could have adversely affected the red grouper stock. Both the SEDAR 12 Update 2009 and SEDAR 42 2015 found that the large 2005 red tide event (likely similar in scope to the red tide events in 2014 and 2018) depressed the red grouper spawning stock biomass (SSB).

At present, it is not yet clear whether or to what extent the 2018 red tide event affected the red grouper stock, or why harvests have declined in recent years. The Council requested the National Marine Fisheries Service (NMFS) take emergency action in 2019 to reduce the annual catch limit (ACL) and annual catch target (ACT) for both the recreational and commercial red grouper fisheries. Based on the Council request, NMFS withheld distribution of the amount of IFQ allocation equal to the amount of anticipated reduction of the commercial quota (83 FR 64480). In May 2019, NMFS issued an emergency rule (84 FR 22389) temporarily reducing the stock ACL until a final rule could be implemented. In October 2019, NMFS implemented a framework action (84 FR 52036) setting the stock ACL at 4.16 mp gw -- equal to the 2017 combined red grouper commercial and recreational landings.

Commercial Sector

For the commercial sector, red grouper harvest is managed under an IFQ program administered through the Southeast Regional Office (SERO) of NMFS. Under the IFQ program, allocation is distributed annually on January 1 to IFQ shareholders with red grouper shares. The amount of allocation distributed is based on the annual quota and shares possessed by an entity (expressed as a percent of the quota). To harvest IFQ species, a vessel permit must be linked to an IFQ account and possess sufficient allocation for the species to be harvested. IFQ accounts can be opened and valid permits can be linked to IFQ accounts at any time during the year. Eligible vessels can receive allocation from other IFQ participants. For more information on the IFQ program, see the SERO webpage on limited access programs.[12]

Commercial operators harvesting reef fish from the Gulf exclusive economic zone (EEZ) must have a Gulf reef fish permit, which is a limited access permit. In 2018, a total of 845 vessels held Gulf commercial reef fish permits. Over 99% of those permits have the mailing recipient in a Gulf state (Table 3.1.1). These vessels combine to make up the federal Gulf reef fish fleet, and any vessel in the fleet must have a vessel monitoring system onboard.

[12] http://portal.southeast.fisheries.noaa.gov/cs/main.html

Table 3.1.1. Number and percentage of vessels with a Gulf reef fish permit by state, final totals for 2018.

State	Gulf Reef Fish Permits	
	Number	**Percent**
AL	38	4.5%
FL	677	80.1%
LA	43	5.1%
MS	7	0.8%
TX	74	8.8%
Subtotal	839	99.3%
Other	6	0.07%
Total	**845**	**100.0%**

Source: NMFS SERO PIMS.

The commercial red grouper fishery is open throughout the year to fishermen with Gulf commercial reef fish permits and red grouper allocation. The minimum commercial size limit is 18 inches total length, and there are no trip limits. Primary commercial gear types used to harvest red grouper include vertical lines (handlines and bandit gear) and BLLs (GMFMC 2016a). Traps are no longer a legally acceptable method for red grouper harvest.

Vessels fishing with BLLs off the coast of Florida generally target red grouper in shallower waters and yellowedge grouper, tilefish, and sharks in deeper waters. Vessels that use BLL gear in the Gulf EEZ east of 85º30'W must have a valid Eastern Gulf longline endorsement in addition to their valid Gulf reef fish permit. In 2018, 62 permit holders held the longline endorsement (61 valid and one renewable/transferrable), and all but one of the endorsement holders had a mailing address in Florida (1 in Texas).

Table 3.1.2. Red grouper landings in pounds gutted weight for the commercial sector.

Year	Landings	Quota	Percent of Quota
2000	5,702,622	N/A	N/A
2001	5,802,442	N/A	N/A
2002	5,791,795	N/A	N/A
2003	4,832,294	N/A	N/A
2004	5,635,577	5,310,000	106.1
2005	5,380,603	5,310,000	101.3
2006	5,109,824	5,310,000	96.2
2007	3,650,777	5,310,000	68.8
2008	4,748,224	5,310,000	89.4
2009	3,698,227	5,750,000	64.3
2010	2,910,970	5,750,000	50.6
2011	4,783,668	5,230,000	91.5
2012	5,219,133	5,370,000	97.2
2013	4,599,001	5,530,000	83.2
2014	5,601,905	5,630,000	99.5
2015	4,798,007	5,720,000	83.9
2016	4,497,582	7,780,000	57.8
2017	3,328,271	7,780,000	42.8
2018	2,363,280	7,780,000	30.4

Source. 2000 -2009: SEFSC Commercial ACL dataset (11/15/19) and, 2010-2019: IFQ database (accessed 8/19/19).

Current regulations prohibit a longline vessel from having more than 750 hooks rigged for fishing at any given time. In addition, longline vessels must abide by seasonal prohibitions as follows: 1) From June through August each year, bottom longlining for Gulf reef fish is prohibited in the portion of the Gulf EEZ east of 85°30' W longitude that is shoreward of rhumb lines as specified in 50 CFR 622.35(b)(1); 2) A person aboard a vessel that uses longline or buoy gear in the reef *longline and buoy gear restricted area* (as specified in Table 1 of Appendix B to §622) is limited on that trip to the bag limits for Gulf reef fish specified in §622.38(b) and, for Gulf reef fish for which no bag limit is specified in §622.38(b), the vessel is limited to 5 percent, by weight, of all fish on board or landed.

Estimates for longline sector characteristics and catch are based on a 2011 study of observer data (Scott-Denton et al., 2011). Average BLL trips in the Gulf are estimated to last 11.7 days. Longline vessels are estimated on average to set 5.6 nautical miles of mainline, and fish at a depth of 92 m (309 ft), with a soak time of 5.1 hours. Sets generally occur over rocky bottoms during daylight hours.

Data from Scott-Denton et al. indicate that approximately 46% of the BLL fish catch is kept, while the rest is discarded. Of the catch that is released alive, about 42% exhibit signs of stress including barotrauma symptoms (airbladder expansion and/or eyes protruding), while 46%

exhibit a normal appearance. In all, it is estimated that the immediate mortality for red grouper is approximately 20% in the longline sector. The most recent red grouper stock assessment (SEDAR 61 2019) assumed discard mortality for red grouper captured on BLLs at 41.4% prior to IFQ, and 44.1% post-IFQ.

The species predominantly caught in the longline fishery include red grouper (56% of catch), yellowedge grouper (10%), and blueline tilefish (5%). Red grouper, yellowedge grouper, golden tilefish, and blueline tilefish are the species most commonly kept (82% of total), while red grouper, Atlantic sharpnose shark, smooth dogfish, and red snapper are the most common species released alive (83%). Red grouper, blueline tilefish, Atlantic sharpnose shark, and red snapper comprise about 81% of the catch that is discarded dead, and red grouper comprise 77% of the fish released in unknown condition (Scott-Denton et al., 2011).

The longline component's catch of red grouper is largely indiscriminant of size, ranging from below 10 to above 35 inches, with a mode of 18 inches. Approximately 32% of red grouper captured are below the legal-size limit of 18 inches. Of the 68% of red grouper catch that is of legal size, 62% is kept (Scott-Denton et al., 2011).

Red grouper are also a primary target species in the commercial vertical line sector. Effort and catch in the red grouper vertical line sector are highest in the eastern Gulf. Scott-Denton et al. found that 71% of the individual fish captured in the vertical line component are kept, with red snapper ranked highest in catch composition (31% of catch), followed by vermilion snapper (29%) and red grouper (16%). Vermilion snapper, red snapper, red grouper, and red porgy comprise an estimated 86% of kept individuals. Of fish that are released alive, approximately 35% exhibit visual signs of stress, including barotrauma. Red snapper, vermilion snapper, and red grouper comprise 87% of the fish that are discarded dead, and the immediate mortality rate for red grouper for vertical line fishery is estimated at 11% (Scott-Denton et al., 2011). The two most recent stock assessments assumed discard mortality for red grouper in the commercial vertical line sector at 19.0% (SEDAR 42 2015; SEDAR 61 2019).

Gauging the scope of discarding of captured fish is a vital element in predicting overall fishery impacts on the red grouper population. Red grouper commercial dead discards were estimated beginning in 1990 with the implementation of federal minimum size limits. SEDAR 61 2019 assumed discard mortality rates of 41.4% for the pre-IFQ commercial BLL fleet, 44.1% for the post-IFQ commercial longline fleet, 19.0% for the commercial vertical line fleet, and 10.0% for the trap fishery (no longer operational). Commercial longline fleet discards averaged about 465,000 fish from 1993-2017, with a low of 153,000 fish in 2009 and a peak of 878,000 fish in 1997. Commercial vertical line fleet discards of red grouper averaged about 134,000 fish from 1993-2017, with a low of about 49,000 fish in 1995 and a peak of over 290,000 fish in 2011 (Table 3.1.3). Pulver and Stephen (2018) found that nearly 95 percent of reported red grouper discards were because of the minimum size limit.

Table 3.1.3. Red grouper commercial discards (number of fish) by gear.

Year	Vertical Line	Longline
1993	79,662	514,033
1994	94,368	668,159
1995	49,123	302,219
1996	112,944	667,938
1997	132,132	878,497
1998	127,683	718,051
1999	140,955	754,469
2000	142,683	633,778
2001	146,668	652,257
2002	151,052	579,902
2003	158,908	596,105
2004	151,788	567,853
2005	133,793	440,858
2006	146,203	506,568
2007	150,881	405,702
2008	127,661	480,530
2009	219,006	153,431
2010	198,729	177,525
2011	290,423	346,979
2012	178,703	402,936
2013	96,399	209,867
2014	59,449	324,659
2015	86,568	195,727
2016	96,899	242,272
2017	71,658	216,046

Source: SEDAR 61 Final Report (NMFS 2019)

Recreational Sector

For the recreational sector, red grouper harvest is managed with ACLs, ACTs, AMs, season/area closures, a minimum size limit, and a bag limit. The primary gear type in the recreational sector is vertical line gear (rod-and-reel). During the months of February and March, the possession of red grouper caught in waters beyond the 20 fathom (120 feet) contour is prohibited. This closure is to protect red grouper and other grouper species that are in spawning condition. Red grouper have a 20-inch total length recreational minimum size limit and are a part of the four-grouper aggregate recreational bag limit. However, only two of the fish in that aggregate bag limit can be red grouper. Private recreational fishing vessels are not required to have a federal permit to harvest individual species or species complexes in the reef fish fishery from the Gulf EEZ. Anglers aboard these vessels, however, must either be federally registered or licensed in states that have a system to provide complete information on that state's saltwater anglers to the national registry. Any for-hire fishing vessel that takes anglers into the Gulf EEZ to harvest species or complexes in the reef fish fishery must have a limited-access charter vessel/headboat

(for-hire) permit for reef fish that is specifically assigned to that vessel. State regulations are different from federal regulations in some cases. In those circumstances (e.g., red grouper closed season outside 20 fathom contour), private anglers must obey the regulations for the waters they are fishing in. For charter vessels and headboats, if federal regulations for Gulf reef fish are more restrictive than state regulations, operators must comply with those federal regulations regardless of where the fish are harvested. For federal waters, if landings meet or are projected to meet the red grouper ACL, then the season will be closed.

In 2018, there were 1,312 for-hire fishing vessels with a valid or renewable/transferrable for-hire permit for reef fish: 1,279 vessels with a for-hire permit and another 33 with a historical captain for-hire permit (Table 3.1.4). Approximately 61% (806) of the 1,312 for-hire vessel reef fish permits have mailing recipients in Florida. Texas recipients hold the second highest number of permits, with 16%. Collectively, approximately 99% of the permits have mailing recipients in one of the Gulf States.

Table 3.1.4. Number and percentage of for-hire reef fish permits by state of mailing recipient (of permit).

State	For-Hire Reef Fish Permits by State of Recipient	
	Number	Percentage
Alabama	137	10.4%
Florida	806	61.4%
Louisiana	121	9.2%
Mississippi	32	2.4%
Texas	206	15.7%
Other	10	0.8%
Total	1,312	100.0%

Source: Permit Information Management System (PIMS) final data for 2018.

Recreational total red grouper landings (Table 3.1.5) peaked in the Gulf in 2004 (8.0 mp), but were also high in 2013 (5.0 mp) and 2014 (5.4 mp). Recreational catch was low from 2007-2011 (range 1.6 mp – 2.1 mp) and again in 2017 (1.7 mp) and 2018 (2.1 mp). From 2001-2018, private anglers landed 85.9% of the total recreational landings, while charter boats landed 12.6%, and headboats 1.4% (Table 3.1.5).

Table 3.1.5. Red grouper landings in pounds gutted weight for recreational fleets.

Year	Charter	Headboat	Private	Total
2001	334,963	30,181	2,070,312	2,435,456
2002	268,079	23,508	2,880,760	3,172,348
2003	269,853	38,489	1,893,154	2,201,496
2004	519,621	65,145	7,398,473	7,983,239
2005	513,070	75,009	2,493,900	3,081,979
2006	262,350	25,479	2,367,236	2,655,065
2007	145,391	24,674	1,861,802	2,031,867
2008	293,645	37,604	1,273,149	1,604,398

Year	Charter	Headboat	Private	Total
2009	193,864	29,583	1,376,617	1,609,247
2010	326,603	26,064	1,611,095	1,963,762
2011	244,092	36,697	1,253,324	1,534,113
2012	575,589	83,324	3,472,809	4,131,722
2013	796,929	77,542	4,115,840	4,990,310
2014	586,680	45,107	4,737,128	5,368,916
2015	500,305	50,621	3,239,928	3,790,853
2016	406,066	56,851	2,169,801	2,632,718
2017	342,871	21,423	1,328,134	1,692,428
2018	362,021	22,310	1,669,115	2,053,446

Source. SEFSC MRIP FES (Fishing Effort Survey) Recreational dataset (11/26/19).

Red grouper recreational discards were derived from MRIP estimates of live released fish between 1993 and 2017 and self-reported discards in the Southeast Region Headboat Survey (SRHS) logbook since 2007. Red grouper discards from headboats for years prior to 2007 in Florida were estimated using the MRIP Charter: SRHS discard ratio as a proxy. SEDAR 61 2019 assumed recreational discard mortality at 11.6%. Red grouper recreational discard estimates averaged 4.25 million fish from 1993 to 2017, with a low of 1.53 million fish in 1996 and a peak of 8.10 million fish in 2004 (Table 3.1.8).

Table 3.1.6. Red grouper recreational discards (number of fish).

Year	Charter	Headboat	Private	Total
1993	86,379	78,702	3,158,040	3,323,121
1994	146,510	84,039	3,236,051	3,466,600
1995	236,720	107,149	3,835,677	4,179,546
1996	114,829	163,725	1,246,516	1,525,070
1997	127,887	78,504	2,014,957	2,221,348
1998	202,616	83,492	3,337,806	3,623,914
1999	375,157	180,087	5,405,117	5,960,361
2000	471,536	98,791	4,227,094	4,797,421
2001	272,157	72,878	3,502,720	3,847,755
2002	228,016	63,624	3,909,476	4,201,116
2003	343,210	136,745	3,752,560	4,232,515
2004	423,964	160,995	7,512,527	8,097,486
2005	248,419	92,489	2,701,327	3,042,235
2006	123,352	32,695	2,220,260	2,376,307
2007	111,913	17,365	1,599,693	1,728,971
2008	367,994	89,615	6,294,612	6,752,221
2009	398,022	153,829	6,276,296	6,828,147
2010	497,987	117,879	5,379,955	5,995,821
2011	433,964	134,114	6,021,306	6,589,384

Year	Charter	Headboat	Private	Total
2012	464,256	117,809	4,392,740	4,974,805
2013	620,479	112,266	4,895,361	5,628,106
2014	435,470	84,237	4,293,342	4,813,049
2015	326,901	74,376	2,550,817	2,952,094
2016	322,165	79,409	2,164,044	2,565,618
2017	299,920	73,658	2,202,611	2,576,189

Source: SEDAR 61 Final Report (NMFS 2019)

3.2 Description of the Physical Environment

General Description of the Physical Environment

The physical environment for Gulf reef fish and red drum is detailed in the Environmental Impact Statement for the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004a), Generic Amendment 3 (GMFMC 2005), and the Generic ACL/Accountability Measures (AM) Amendment (GMFMC 2011a), 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 3.2.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). Gulf water temperatures range from 54º F to 84º F (12º C to 29º C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73 º F through 83º F (23-28º C) including bays and bayous (Figure 3.1.1) between 1982 and 2009, according to satellite-derived measurements (NODC 2011)[13]. In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

General Description of the Reef Fish Physical Environment

In general, reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. A planktonic larval stage lives in the water column and feeds on zooplankton and phytoplankton (GMFMC 2004a). Juvenile and adult reef fish are typically demersal and usually associated with bottom topographies on the continental shelf (less than 100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. For example, juvenile red snapper are common on mud bottoms in the northern Gulf, particularly off Texas through Alabama. Also, some juvenile snapper (e.g., mutton, gray, red, dog, lane, and yellowtail snappers) and grouper (e.g., goliath,

[13] NODC 2011: http://accession.nodc.noaa.gov/0072888

red, gag, and yellowfin groupers) are associated with inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems.

Red grouper are known to alter the offshore hard bottom areas. They remove sand and other debris from limestone solution holes using their mouths and fins. The removal of the sediment creates sites for organisms such as sponges and corals to colonize, which in turn provides shelter for small sessile creatures like shrimp and small fish. Coleman et al. (2010) labeled red grouper as ecological engineers as their habitat modification increases biodiversity around the holes and depressions they associate with.

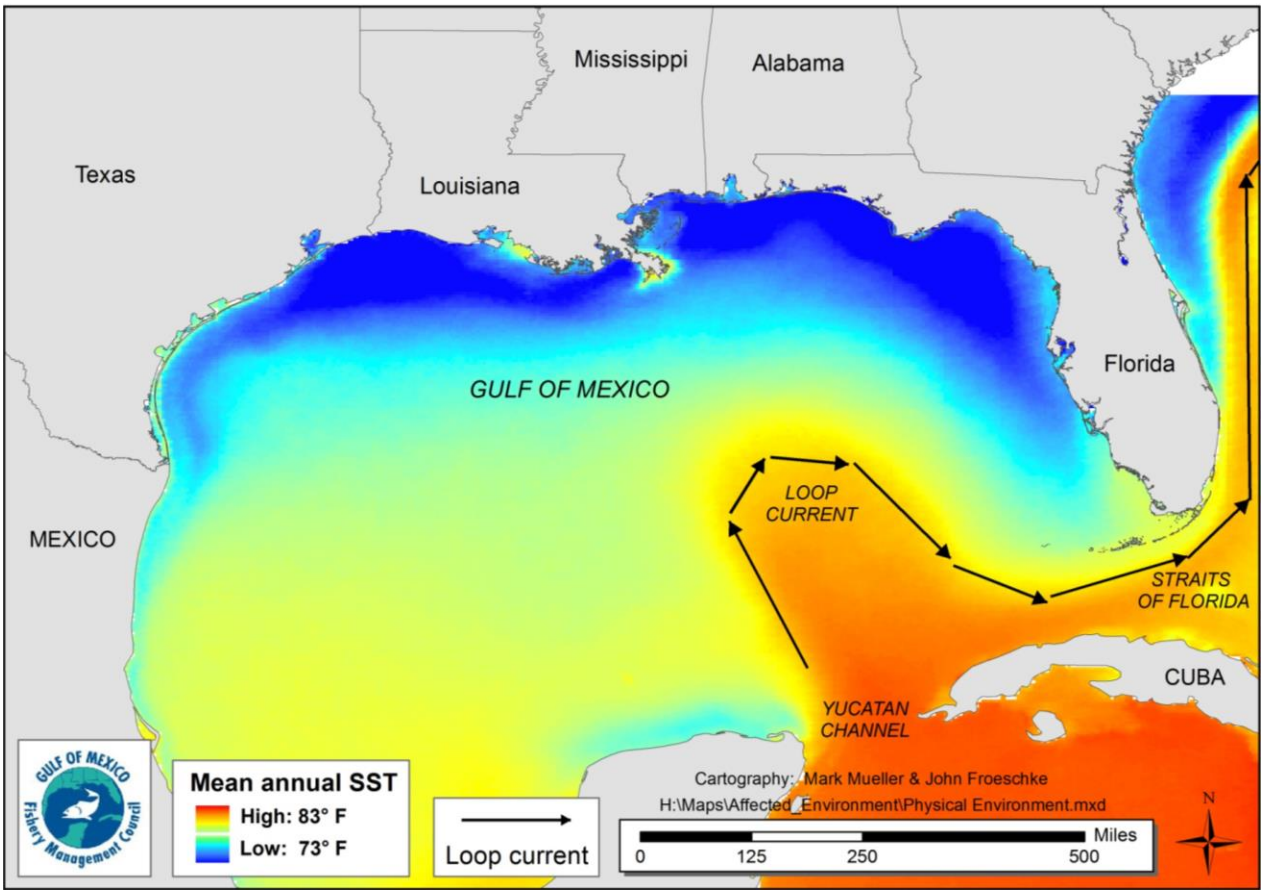

Figure 3.2.1. Physical environment of the Gulf, including major feature names and mean annual sea surface temperature as derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://accession.nodc.noaa.gov/0072888)

Historic Places

With respect to the National Register of Historic Places, there is one site listed in the Gulf. This is the wreck of the *U.S.S. Hatteras*, located in federal waters off Texas. Historical research indicates that over 2,000 ships have sunk on the Federal Outer Continental Shelf in the Gulf 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[14].

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 2019, the extent of the hypoxic area was estimated to be 6,952 square miles and ranks as the eighth largest event over the past 33 years the area has been mapped.[15] The hypoxic conditions in the northern Gulf directly affect 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., gray snapper) are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Greenhouse Gases

The Intergovernmental Panel on Climate Change[16] has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2014) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.2.1 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 3.2.1. Total Gulf greenhouse gas emissions estimates (tons per year) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*. Data are for 2011 only.

[14] http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx.
[15] http://gulfhypoxia.net
[16] https://www.ipcc.ch/srocc/

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. (2014). **The CO_2 equivalent (CO_2e) emission estimates represent the number of tons of CO_2 emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH_4 and N_2O). Conversion factors to CO_{2e} are 21 for CH_4 and 310 for N_2O.

3.3 Description of the Biological/Ecological Environment

The biological environment of the Gulf, including the species addressed in this amendment, is described in detail in the Generic EFH Amendment (GMFMC 2004a), Generic ACL/AM Amendment (GMFMC 2011a), and Reef Fish Amendments 30B (GMFMC 2008c) and 32 (GMFMC 2011b) and is incorporated here by reference and further summarized below.

Red Grouper Life History and Biology

Larval red grouper are found in the plankton across the west-Florida shelf (SEDAR 42 2015). Juvenile red grouper are generally found in shallow waters around structures and patch reefs. When juveniles reach approximately 16 inches (40 cm), after they have become sexually mature, they move offshore (Moe 1969). Red grouper reach a maximum length and weight of 43 inches (110 cm total length) and 50.7 pounds. (23 kg) (Robins et al. 1986). Maximum age of red grouper in the Gulf of Mexico has been estimated at 29 years (SEDAR 61 2019). Clear determinations of size and age of maturity have been difficult for red grouper (Fitzhugh et al. 2006 and references cited therein). Fitzhugh et al. (2006) estimated the size and age at 50% maturity was 11 inches (27 cm fork length [FL]) and age 2. For SEDAR 42 2015, the values were approximated at 11.5 inches (292 mm FL) and 2.8 years following the addition of samples collected from the West Florida Shelf by Florida Fish and Wildlife Conservation Commission (FWCC)/Fish and Wildlife Research Institute (FWRI) (Lowerre-Barbieri et al. 2014): however, the inclusion of 2014-2017 data led to a slightly younger age of 2.2 years in SEDAR 61 2016. Red grouper are protogynous hermaphrodites, transitioning from females to males at older ages, and form harems for spawning (Dormeier and Colin 1997). Age and size at sexual transition is approximately 10.5 years and 30 inches total length (76.5 cm total length) (Fitzhugh et al. 2006). Size and age at sexual transition was re-estimated both for SEDAR 42 2015 and SEDAR 61 2019. These were estimated at 11.2 and 11.4 years and 707 and 708-mm FL, respectively. Red grouper spawn from February until mid-July with peak spawning occurring in the eastern Gulf of Mexico during March through May (Fitzhugh et al. 2006). Over the last 25-30 years, there has

been little change in the sex ratio of red grouper, likely because they do not aggregate (Coleman et al. 1996).

Status of the Red Grouper Stock

A summary of the red grouper benchmark stock assessment (SEDAR 12 2006) and 2009 update stock assessment (SEDAR 12 Update 2009) can be found in GMFMC (2010a) and is incorporated here by reference. These assessments showed that the red grouper stock was neither overfished nor undergoing overfishing. The 2009 update stock assessment did suggest the stock had declined since 2005, much of which was attributed to an episodic mortality event in 2005 (most likely associated with red tide). In late 2010, the assessment was revised to incorporate new information on historical discards in the commercial sector and updated projections considering the reduction in the commercial size limit from 20 inches to 18 inches total length (Walter 2011). Given these changes, the assessment rerun resulted in a slightly improved estimate of the stock status for the last year of the assessment (2008) and indicated the total allowable catch in the near term could be substantially increased. Therefore, the SSC recommended that the overfishing limit (OFL) for red grouper be set at 8.10 mp (the equilibrium yield at the fishing mortality rate associated with harvesting the equilibrium maximum sustainable yield) and the ABC be set at 7.93 mp (the equilibrium yield at the fishing mortality rate associated with harvesting the equilibrium optimum sustainable yield).

SEDAR 42 Assessment
In October 2015, the SEDAR 42 2015 stock assessment for red grouper was completed using the Stock Synthesis model. SEDAR 42 2015 found the red grouper stock was not undergoing overfishing and was not overfished. Given this determination (as of 2013), SSC members determined that it was appropriate to provide OFL and ABC recommendations for a 5-year period beginning in 2016. However, a decision was needed on how to handle landings for the years 2014-2015, which were not in the assessment. For 2014, final landings were available and used, but for 2015, the SSC recommended that the assessment group use landings estimates based on the current quotas and ACLs.

The SSC recommended that the annual OFL for Gulf red grouper for years 2016-2020 be set at the 50th percentile of the OFL probability distribution function (PDF), assuming estimated landings for 2014 and 2015 fishing years. This value was 14.16 mp gw. The annual ABC for years 2016-2020 was computed as the 43rd percentile of the OFL PDF, which was 13.92 mp.

2018 Red Grouper Interim Analysis
The SEFSC conducted an interim analysis on red grouper to assist the Council in developing harvest advice for 2019 because red grouper was between assessments (NMFS 2018a). The interim analysis prepared by the SEFSC developed a harvest control rule (HCR), which uses an index from a fishery-independent survey to compare where the stock seems to be now (observed index value) with where the stock should be (forecast index value). The chosen HCR adjusts the ABC recommendation based on variation between projected and observed index values. The SEFSC found that the fishery-independent BLL index was the best index for use in the HCR.

The SSC reviewed the SEFSC's interim analysis at its October 2018 meeting and concluded it

was suitable for interim catch advice. However, because the method had not been fully tested and required a number of assumptions, the SSC considered this method inappropriate to rely on to provide an ABC recommendation. The SSC did determine the analysis could support a recommendation that the Council reduce the 2019 ACL to 4.6 mp gw.

SEDAR 61 Assessment

Similar to SEDAR 42 2015, SEDAR 61 2019 was completed using the Stock Synthesis model. The base model time series began in 1986 with 2017 as the terminal year and length-based selectivity was modeled for fishing fleets and fishery-independent surveys. Age composition data began in 1991. Model fits to input data streams were similar to the SEDAR 42 2015 model, with some, such as commercial and recreational discard data, fitting better. Recruitment remains highly variable for red grouper with strong recruitment events observed in 1995, 1998, 2001, 2005, and 2013. In reviewing the assessment, the SSC noted that as of the end of 2017, the stock is not overfished (SSB_{2017}/MSST = 1.64; MSST = 0.5*B_{MSY}) and is not undergoing overfishing ($F_{Current\ (2015\text{-}2017)}$/MFMT = 0.784; MFMT = $F_{30\%SPR}$). However, this determination does not account for the 2018 red tide episodic mortality event, which was known to be a significant mortality event in the eastern Gulf. The SSC also noted that under the old definition of minimum stock size threshold (MSST) (1-M*B_{MSY}), the stock would have been considered overfished as of 2017 ($SSB_{2017}/MSST_{OLD}$ = 0.96).

General Information on Reef Fish Species

The National Ocean Service (NOS) collaborated with NMFS and the Council to develop distributions of reef fish (and other species) in the Gulf (SEA 1998). The NOS obtained fishery-independent data sets for the Gulf, including Southeast Area Monitoring and Assessment Program and state trawl surveys. Data from the Estuarine Living Marine Resources Program (ELMRP) contain information on the relative abundance of specific species (highly abundant, abundant, common, rare, not found, and no data) for a series of estuaries, by five life stages (adult, spawning, egg, larvae, and juvenile) and month for five seasonal salinity zones (0-0.5, 0.5-5, 5-15, 15-25, and greater than 25 parts per thousand). NOS staff analyzed these data to determine relative abundance of the mapped species by estuary, salinity zone, and month. For some species not in the ELMRP database, distribution was classified as only observed or not observed for adult, juvenile, and spawning stages.

Reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. Habitat types and life history stages can be found in more detail in GMFMC (2004a). In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Exceptions to these generalizations include gray triggerfish, which lay their eggs in depressions in the sandy bottom (Simmons and Szedlmayer 2012), and gray snapper whose larvae are found around submerged aquatic vegetation. Juvenile and adult reef fish are typically demersal, and are usually associated with bottom topographies on the continental shelf (less than 328 feet; less than 100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. Juvenile red snapper are common on mud bottoms in the northern Gulf, particularly from Texas to Alabama. Also, some juvenile snappers (e.g., mutton, gray, red, dog, lane, and yellowtail snappers) and groupers

(e.g., goliath grouper, red, gag, and yellowfin groupers) have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems (GMFMC 1981). More detail on hard bottom substrate and coral can be found in the FMP for Corals and Coral Reefs (GMFMC and SAFMC 1982).

Status of Reef Fish Stocks

The Reef Fish FMP currently encompasses 31 species (Table 3.3.1). Eleven other species were removed from the FMP in 2012 through the Generic ACL/AM Amendment (GMFMC 2011a). The NMFS Office of Sustainable Fisheries updates its Status of U.S. Fisheries Report to Congress[17] on a quarterly basis utilizing the most current stock assessment information. Stock assessments and status determinations have been conducted and designated for 14 stocks and can be found on the Council[18] and SEDAR[19] websites. Of the 14 stocks for which stock assessments have been conducted and accepted by the SSC, the second quarter report of the 2020 Status of U.S. Fisheries classifies only one as overfished (greater amberjack) and two stocks undergoing overfishing (greater amberjack and gray triggerfish). The status of both assessed and unassessed stocks, as of the writing of this amendment is provided in Table 3.3.1. However, it should be noted that greater amberjack, gray triggerfish, and red snapper are under rebuilding plans.

A stock assessment was 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 Tool (DLMTool; 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. Data were requested for almaco jack, lesser amberjack, snowy grouper, speckled hind, and yellowmouth grouper but it was determined not enough information was available to complete an assessment even using the DLMTool. These stocks are not experiencing overfishing based on annual harvest remaining below the OFL, but no overfished status determination has been made (Table 3.3.1). Lane snapper was the only stock with adequate data to be assessed using the DLMTool 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 3.3.1). For those species that are listed as not undergoing overfishing, that determination has been made based on the annual harvest remaining below the OFL. Scamp is undergoing a research track assessment at this time.

Table 3.3.1. Status of species in the Reef Fish FMP grouped by family.

[17] https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates
[18] www.gulfcouncil.org
[19] http://sedarweb.org/

Common Name	Scientific Name	Stock Status		Most recent assessment or SSC workshop**
		Overfishing	Overfished	
Family Balistidae – Triggerfishes				
gray triggerfish	*Balistes capriscus*	Y	N	SEDAR 43
Family Carangidae – Jacks				
greater amberjack	*Seriola dumerili*	Y	N	SEDAR 33 Update
lesser amberjack	*Seriola fasciata*	N	Unknown	SEDAR 49
almaco jack	*Seriola rivoliana*	N	Unknown	SEDAR 49
banded rudderfish	*Seriola zonata*	N	Unknown	
Family Labridae – Wrasses				
hogfish	*Lachnolaimus maximus*	N	N	SEDAR 37
Family Malacanthidae – Tilefishes				
tilefish (golden)	*Lopholatilus chamaeleonticeps*	N	N	SEDAR 22
blueline tilefish	*Caulolatilus microps*	N	Unknown	
goldface tilefish	*Caulolatilus chrysops*	N	Unknown	
Family Serranidae – Groupers				
gag	*Mycteroperca microlepis*	N	N	SEDAR 33 Update
red grouper	*Epinephelus morio*	N	N	SEDAR 61
Scamp	*Mycteroperca phenax*	Unknown	Unknown	
black grouper	*Mycteroperca bonaci*	N	N	SEDAR 19
yellowedge grouper	*Hyporthodus flavolimbatus*	N	N	SEDAR 22
snowy grouper	*Hyporthodus niveatus*	N	Unknown	SEDAR 49
speckled hind	*Epinephelus drummondhayi*	N	Unknown	SEDAR 49
yellowmouth grouper	*Mycteroperca interstitialis*	N	Unknown	SEDAR 49
yellowfin grouper	*Mycteroperca venenosa*	Unknown	Unknown	
warsaw grouper	*Hyporthodus nigritus*	N	Unknown	
**Atlantic goliath grouper	*Epinephelus itajara*	N	Unknown	SEDAR 47
Family Lutjanidae – Snappers				
queen snapper	*Etelis oculatus*	N	Unknown	
mutton snapper	*Lutjanus analis*	N	N	SEDAR 15A Update
blackfin snapper	*Lutjanus buccanella*	N	Unknown	
red snapper	*Lutjanus campechanus*	N	N	SEDAR 52
cubera snapper	*Lutjanus cyanopterus*	N	Unknown	
gray snapper	*Lutjanus griseus*	N	N	
lane snapper	*Lutjanus synagris*	N	Unknown	SEDAR 49
silk snapper	*Lutjanus vivanus*	N	Unknown	
yellowtail snapper	*Ocyurus chrysurus*	N	N	SEDAR 27A
vermilion snapper	*Rhomboplites aurorubens*	N	N	SEDAR 45
Wenchman	*Pristipomoides aquilonaris*	N	Unknown	SEDAR 49

Note: **Atlantic goliath grouper is a protected grouper (i.e., ACL is set at zero) and benchmarks do not reflect appropriate stock dynamics.
** Southeast Data, Assessment, Review (SEDAR) may be viewed at http://sedarweb.org/.

Bycatch of Managed Finfish Species

Many of the reef fish species co-occur with each other and can be incidentally caught when fishermen target certain species. In some cases, these fish may be discarded for regulatory reasons and thus are considered bycatch. Bycatch practicability analyses have been completed for red snapper (GMFMC 2004b, GMFMC 2007, GMFMC 2014a, GMFMC 2015), grouper (GMFMC 2008a, GMFMC 20010b, GMFMC 2011a, GMFMC 2011b, GMFMC 2012a),

vermilion snapper (GMFMC 2004c, GMFMC 2017a), greater amberjack (GMFMC 2008b, GMFMC 2012b, GMFMC 2015b), gray triggerfish (GMFMC 2012c), and hogfish (GMFMC 2016b). These analyses examined the effects of fishing on these species. In general, these analyses have found that reducing bycatch provides biological benefits to managed species as well as benefits to the fishery through less waste, higher yields, and less forgone yield. However, in some cases, actions are approved that can increase bycatch through regulatory discards such as increased minimum sizes and closed seasons. Under these circumstances, there is some biological benefit to the managed species that outweigh any increases in discards from the action.

Protected Species

NMFS manages marine protected species in the Southeast region under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). A very brief summary of these two laws and more information is available on NMFS Office of Protected Resources website[20]. There are 21 ESA-listed species of marine mammals, sea turtles, fish, and corals that may occur in the EEZ of the Gulf. There are 91 stocks of marine mammals managed within the Southeast region plus the addition of the stocks such as North Atlantic right whales, humpback, sei, fin, minke, and blue whales that regularly or sometimes occur in Southeast region managed waters for a portion of the year (Hayes et al. 2018). All marine mammals in U.S. waters are protected under the MMPA.

Of the four marine mammals that may be present in the Gulf (sperm, sei, fin, and Gulf Bryde's), the sperm, sei, and Gulf of Mexico Bryde's whale are listed as endangered under the ESA. Bryde's whales are the only resident baleen whales in the Gulf. Manatees, listed as threatened under the ESA, also occur in the Gulf and are the only marine mammal species in this area managed by the U.S. Fish and Wildlife Service.

The gear used by the Gulf reef fish fishery is classified in the MMPA 2019 List of Fisheries as a Category III fishery (84 FR 22051). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Dolphins are the only species documented as interacting with the reef fish fishery. Bottlenose dolphins prey upon bait, catch, and/or released discards of fish from the reef fish fishery. They are also a common predator around reef fish vessels, feeding on the discards. Marine Mammal Stock Assessment Reports and additional information are available on the NMFS Office of Protected Species website.[21]

Sea turtles, fish, and corals that are listed as threatened or endangered under the ESA occur in the Gulf. These include the following: six species of sea turtles (Kemp's ridley, loggerhead (Northwest Atlantic Ocean distinct population segment (DPS)), green (North Atlantic and South Atlantic DPSs), leatherback, and hawksbill); five species of fish (Gulf sturgeon, smalltooth sawfish, Nassau grouper, oceanic whitetip shark and giant manta ray); and six species of coral

[20] https://www.fisheries.noaa.gov/topic/laws-policies#endangered-species-act
[21] http://www.nmfs.noaa.gov/pr/sspecies/

(elkhorn, staghorn, lobed star, mountainous star, boulder star, and rough cactus). Critical habitat designated under the ESA for smalltooth sawfish, Gulf sturgeon, and the Northwest Atlantic Ocean DPS of loggerhead sea turtles occur in the Gulf, though only loggerhead critical habitat occurs in federal waters.

The most recent biological opinion (BiOp) for the FMP was completed on September 30, 2011. The BiOp determined the operation of the Gulf reef fish fishery managed under the Reef Fish FMP is not likely to adversely affect ESA-listed marine mammals or coral, and was not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish. 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 and four species of corals (lobed star, mountainous star, boulder star, and rough cactus). On September 29, 2016, NMFS requested re-initiation of Section 7 consultation on the operation of reef fish fishing managed by the Reef Fish FMP because new species (i.e., Nassau grouper [81 FR 42268] and green sea turtle North Atlantic and South Atlantic DPSs [81 FR 20057]) were listed under the ESA that may be affected by the proposed action. NMFS documented a determination that the operation of the fishery to continue during the re-initiation period is not likely to adversely affect these species.

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 request for re-initiation of consultation on the Reef Fish FMP to address the listings of the giant manta and oceanic whitetip. In that memorandum, NMFS also determined that fishing under the Reef Fish FMP during the extended re-initiation period will not jeopardize the continued existence of the giant manta ray, oceanic whitetip shark, Nassau grouper, or the North Atlantic and South Atlantic DPSs of green sea turtles.

NMFS published a final rule on April 15, 2019, listing the Gulf Bryde's whale as endangered. In a memorandum dated June 20, 2019, NMFS revised the re-initiation request to include the Gulf Bryde's whale and determined that fishing under the Reef Fish FMP during the re-initiation period will not jeopardize the continued existence of any of the newly listed species discussed above.

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.[22] These changes are likely to affect plankton biomass and fish larvae abundance that could adversely affect 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. This could change the water balance of coastal ecosystems; altering patterns of wind and water

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

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[23] 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) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. The smooth puffer and common snook are examples of species for which there has been a distributional trend to the north in the Gulf. For other species, such as red snapper and the dwarf sand perch, there has been a distributional trend towards deeper waters. For other fish species, such as the dwarf goatfish, there has been a distributional trend both to the north and to deeper waters. These changes in distributions have been hypothesized as a response to environmental factors, such as increases in temperature.

The distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the occurrence and intensity of toxic algae blooms. Hollowed et al. (2013) provided a review of projected effects of climate change on the marine fisheries and dependent communities. Integrating the potential effects of climate change into the fisheries assessment is currently difficult due to the time scale differences (Hollowed et al. 2013). The fisheries stock assessments rarely project through a time span that would include detectable climate change effects. However, some stocks have shown increases in abundance in the northern Gulf (Fodrie et al. 2010). This may be a result of increasing water temperatures in coastal environments.

Deepwater Horizon MC252 Oil Spill

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. 2012). 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 red drum and many reef fish species, may be negatively affected by episodic events resulting in high-mortality years or low recruitment. These episodic events could leave gaps in the age structure of the population, thereby affecting future reproductive output (Mendelssohn et al. 2012). Other studies have described the vulnerabilities of various marine finfish species, with morphological and/or life history characteristics similar to species found in the Gulf, to oil spills and dispersants (Hose et al. 1996; Carls et al. 1999; Heintz et al. 1999; Short 2003).

Increases in histopathological lesions were found in red snapper 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

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

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 wellhead (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.

Red Tide

Red tide is a common name for harmful algal blooms caused by species of dinoflagellates and other organisms that cause the water to appear to be red. Red tide blooms occur in the Gulf almost every year, generally in late summer or early fall. They are most common off the central and southwestern coasts of Florida between Clearwater and Sanibel Island but may occur anywhere in the Gulf. More than 50 species capable of causing red tides occur in the Gulf, but one of the best-known species is *Karenia brevis*. This organism produces toxins capable of killing fish, birds and other marine animals.[24]

The effects of red tide on fish stocks have been well established. In 2005, a severe red tide event occurred in the Gulf along with an associated large decline in multiple abundance indices for red grouper, gag, red drum, and other species thought to be susceptible to mortality from red tide events. It is unknown whether mortality occurs via absorption of toxins across gill membranes (Abbott et al. 1975, Baden 1988), ingestion of toxic biota (Landsberg 2002), or from some indirect effect of red tide such as hypoxia (Walter et al. 2013). In 2018, a severe red tide event occurred off the southwest coast of Florida from Monroe County to Sarasota County that persisted for more than 10 months; the impacts on fish stocks will likely be considered in future stock assessments.

3.4 Description of the Economic Environment

A description of the red grouper stock affected by the actions considered in this amendment is provided in Section 3.3. Additional details on the economic environment of the recreational and commercial sectors of the red grouper component of the Gulf reef fish fishery are provided in the Framework Action to Modify Red Grouper Annual Catch Limits and Annual Catch Targets (GMFMC 2019b), Reef Fish Amendment 36A (GMFMC 2017b) and the Framework Action to Adjust Red Grouper Allowable Harvest (2016a).

This amendment contains management measures that would directly or indirectly affect Gulf red grouper dealers, and thus additional details on the economic environment of that component of the commercial sector are also provided. Sections 3.4.1 and 3.4.2 contain additional information

[24] http://myfwc.com/research/redtide/general/about/

on the economic environment of the commercial sector and the for-hire and private recreational components of the recreational sector in the Gulf reef fish fishery, with a specific focus on the red grouper portion of the fishery.

3.4.1 Commercial Sector

Permits

Any fishing vessel that harvests and sells any of the reef fish species, including red grouper, managed under the reef fish FMP from the Gulf EEZ must have a valid Gulf commercial reef fish permit. The commercial sector of the reef fish fishery has been managed under a limited access program since 1992, which in turn capped the number of commercial reef fish permits. Therefore, new entrants must buy a permit in order to participate in the commercial sector. As shown in Table 3.4.1.1, the number of permits that were valid or renewable in a given year has continually decreased in the years after the RS-IFQ program was implemented in 2007. This decline has continued since the GT-IFQ program was implemented in 2010, but at a slower rate. As of February 27, 2020, there were 834 valid or renewable commercial reef fish permits, 763 of which were valid. A renewable permit is an expired limited access permit that cannot be actively fished, but can be renewed for up to one year after expiration.

Table 3.4.1. Number of valid or renewable commercial reef fish permits, 2008-2019.

Year	Number of Permits
2008	1,099
2009	998
2010	969
2011	952
2012	917
2013	895
2014	882
2015	868
2016	852
2017	850
2018	845
2019	842

Source: NMFS SERO Sustainable Fisheries (SF) Access permits database.

A single permit is attached to a single vessel and many businesses only own one vessel. However, some businesses hold or own multiple permits and vessels. Multiple vessels owned by a single business are often referred to as a "fleet." Although each vessel is often legally organized under an individual corporate or other business name, for economic purposes, the fleet is treated as a single business because the same, or mostly the same, individuals are determining how those vessels operate. A single business may include other types of operations that possess shares in addition to fishing vessels.

As illustrated in Table 3.4.1.2, at the end of 2018, which is essentially equivalent to Jan. 1, 2019, 94 businesses owned two or more valid or renewable reef fish permits. Although these businesses represented only 14.8% of the businesses with permits, they held 35.5% of the permits, which illustrates some degree of concentration in the ownership of permitted vessels. The maximum number of permitted vessels held by a single business was 16.

Table 3.4.1.2. Vessels and businesses with a commercial reef fish permit, end of year (EOY) 2018.

No. of Vessels Owned by a Business	No. of Businesses	No. of Total Permitted Vessels	% of Businesses	% of Permitted Vessels
1	543	543	85.2%	64.5%
2	60	120	9.4%	14.3%
3	15	45	2.4%	5.3%
4	8	32	1.3%	3.8%
5-6	3	17	.5%	2.0%
7-10	6	53	.9%	6.3%
15-16	2	32	.3%	3.8%
Total	**637**	**842**	**100%**	**100.0%**

Source: NMFS SERO permits and IFQ databases, March 23, 2020.

Although all permitted vessels may harvest non-IFQ reef fish species (e.g., vermilion snapper), not all permitted vessels are eligible to harvest RG. A permitted vessel must be linked to an active IFQ account in order to be eligible to harvest RG and IFQ species.[25] Thus, because some vessels are not linked to an active IFQ account, fewer permitted vessels are eligible to harvest IFQ species and, in turn, fewer businesses may accrue revenue from the harvest of IFQ species.

Table 3.4.1.3. IFQ eligible vessels and businesses with a Gulf reef fish permit, EOY 2018.

No. of Vessels Owned by a Business	No. of Businesses	No. of Total Permitted Vessels	% of Businesses	% of Permitted Vessels
1	450	450	84.6%	63.1%
2	52	104	9.8%	14.6%
3	13	39	2.4%	5.5%
4	6	24	1.1%	3.4%
5-6	3	17	.6%	2.4%
7-10	6	48	1.1%	6.7%
15-16	2	31	.4%	4.3%
Total	**532**	**713**	**100%**	**100.0%**

Source: NMFS SERO permits and IFQ databases, March 23, 2020.

[25] The vessel account must have a valid permit and be linked to an active IFQ account. The vessel account must also have annual allocation in it in order for the permitted vessel to harvest IFQ species. Vessel accounts are considered active when a permit is valid. A renewable permit status is not an active status. An IFQ account status is active if the account holder submitted an affirmative answer to the bi-annual citizenship requirement.

Table 3.4.1.3 shows that, at the end of 2018, only 713 permitted vessels were linked to an IFQ account, and these vessels were owned by 532 businesses. Thus, 129 permitted vessels were not eligible to harvest IFQ species and 105 businesses with reef fish permits could not accrue revenue from the harvest of IFQ species. The degree of concentration among IFQ-eligible permitted vessels is slightly greater than with all permitted vessels, as businesses owning multiple IFQ-eligible vessels represent only 15.4% of the businesses, but hold 36.9% of the permitted vessels that can harvest IFQ species.

IFQ Accounts with RG Shares

As of February 19, 2020, there were 684 IFQ accounts with shares in one or more share categories. Of these accounts, 495 held red grouper shares. The total percentage of red grouper (RG) shares held by accounts with RG shares does not sum to 100% in Table 3.4.1.4 because a small percentage of RG shares were reclaimed under Reef Fish Amendment 36A.[26] The total percentages for other share categories also do not sum to 100% because some accounts with RG shares do not possess shares in other categories, though a small amount of shares in the other categories were also reclaimed under Reef Fish Amendment 36A.

On average (mean), each of these 495 accounts holds just over 0.2% of the RG shares. However, as discussed in Reef Fish Amendment 36A, the distribution of shares within the RG share category, and in fact all categories, is highly skewed. In other words, some accounts have a relatively high percentage of the shares in a category while others have no or a very low percentage of the shares. For accounts that hold RG shares, the largest or maximum percent of shares held by a single account in each category ranges from 2.33% for gag grouper (GG) to 4.265% for RG, 4.433% for other shallow-water grouper (SWG), 4.139% for red snapper (RS), 12.212% for tilefish (TF), and 14.704% for deep water grouper (DWG). The account that has the highest percentages of DWG and TF shares are at the share cap for those categories. The account that has the highest percentage of RG shares is near the 4.331% share cap for RG. Thus, in percentage terms, these estimates indicate there are some relatively large shareholders in the DWG and TF categories in particular. This finding is consistent with findings in GMFMC (2018) which indicate the concentration of shares is greatest in the TF and DWG categories and least in the GG category. Even though the concentration of shares is relatively high for TF and DWG, concentration levels in those and other categories, as well as for all categories combined, are still considered to be "unconcentrated" and thus quota share markets are considered to be competitive (i.e., no business or other entity has the ability to exercise market power by controlling an "excessive" amount of the shares and thereby share prices).[27]

[26] Shares were reclaimed from accounts that had never been activated since the start of the GT-IFQ program.
[27] These conclusions hold regardless of the measure of concentration (e.g., the Herfindahl-Hirschman Index (HHI), C5, or C3) or the unit of analysis (e.g., IFQ account, lowest known entity (LKE), and affiliated accounts/businesses). The Horizontal Merger Guidelines from the US Department of Justice and the Federal Trade Commission identify markets with an HHI below 1,500 to be Unconcentrated (no concerns over the exercise of market power), HHI between 1,500 and 2,500 to be Moderately Concentrated (possible concern with market power being exercised given a sufficient increase in concentration), and above 2,500 to be Highly Concentrated (exercise of market power is likely, particularly if concentration increases further).

Table 3.4.1.4. Quota share statistics (in percent) for accounts with RG shares, Feb. 19, 2020.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Maximum	14.704	4.265	2.330	4.433	12.212	4.139
Total	88.587	99.900	93.519	90.852	83.187	59.887
Mean	0.179	0.202	0.189	0.184	0.168	0.121

As with permitted vessels, although it is common for a single IFQ account with shares to be held by a single business, some businesses have multiple IFQ accounts with shares. The 495 IFQ accounts with RG shares are owned by 436 businesses.

Further, although some IFQ accounts with RG shares are linked to a single permitted vessel, others are linked to multiple permitted vessels or are not linked to a permitted vessel at all. The latter accounts are held by businesses that are likely to sell their annual allocation rather than harvest it. Of the 495 IFQ accounts with RG shares, 290 accounts were linked to one or more permitted vessels, while 205 accounts were not linked to a permitted vessel. The 290 accounts were linked to a total of 365 permitted vessels and these accounts and vessels were owned by 260 businesses. Most businesses only own one or two accounts and permitted vessels. But, one business has 12 accounts and 3 businesses own 10 or more permitted vessels. The 205 accounts that were not linked to a vessel were owned by 176 businesses and all of these businesses only held one or two accounts with RG shares.

As shown in Table 3.4.1.5, the 260 businesses that own RG shares and permitted vessels hold the vast majority of shares held by businesses that own RG shares in all share categories, ranging from a low of just over 50% of the RS shares to a high of over 84% of the RG shares. On average, these 260 businesses own between 0.19%-0.32% of the shares in each category. The maximum percentage of shares owned by a business varies considerably, ranging from about 3.86% of the GG shares to 19.7% of the DWG shares.[28]

As shown in Table 3.4.1.6, the 176 businesses that own RG shares, but do not own permitted vessels, own less shares in total compared to the businesses that own permitted vessels. Specifically, these businesses own slightly more than 4% of the TF shares but just above 17% of the DWG shares. These businesses own between 0.02% and 0.1% of the shares in each category on average. The maximum percentage of shares owned by one of these businesses varies somewhat, ranging from about 1.14% of the TF shares to 2.33% of the GG shares.

In general, the information in Tables 3.4.1.5 and 3.4.1.6 can be used to determine the distribution of annual allocation, the market value of shares, the market value of annual allocation, and the potential ex-vessel value of annual allocation if used for harvesting between businesses with RG shares that own permitted vessels and businesses with RG shares that do not own permitted vessels. However, ex-vessel value would not accrue to businesses that do not possess a permit because a permit is needed to harvest IFQ species, including RG.

[28] Share caps are applied at the IFQ account and LKE levels, but not at the business level as defined here. Thus, it is possible for a business to control a share percentage above the cap.

Table 3.4.1.5. Quota share statistics (in percent) for businesses with RG shares and permitted vessels, Feb. 19, 2020.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Maximum	19.719	6.262	3.857	5.136	14.743	5.076
Total	78.536	84.166	76.507	77.175	79.155	50.204
Mean	0.302	0.324	0.294	0.297	0.304	0.193

Source: NMFS SERO IFQ database accessed 2/19/2020.

Table 3.4.1.6. Quota share statistics (in percent) for businesses with RG shares and no permitted vessels, Feb. 19, 2020.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Maximum	1.991	1.745	2.330	1.536	1.136	2.346
Total	10.051	15.734	17.012	13.677	4.032	9.683
Mean	0.057	0.089	0.097	0.078	0.023	0.055

Source: NMFS SERO IFQ database accessed 2/19/2020.

The amount of annual allocation (quota pounds) that an account holder receives each year is not only conditional on the percentage of shares held in a category, but also the commercial quota applicable to that category. The 2019 quotas for each share category were as follows: 6,937,838 lbs gw for RS, 3 mp gw for RG, 1.024 million lbs gw for DWG, 582,000 lbs gw for TF, and 525,000 lbs gw for SWG. Table 3.4.1.7 presents statistics regarding annual allocation to IFQ accounts based on the share statistics in Table 3.4.1.4 and these quotas. Based on this information, the average account holder with RG shares received 6,055 lbs gw of RG allocation in 2019, while the largest account holder received almost 128,000 lbs gw. Across all categories, the average account holder with RG shares received about 20,000 lbs gw of allocation in 2019.

Table 3.4.1.7. Annual allocation statistics for accounts with RG shares, Feb. 19, 2020.

Statistic	DWG Allocation	RG Allocation	GG Allocation	SWG Allocation	TF Allocation	RS Allocation
Maximum	150,572	127,945	21,879	23,275	71,076	287,124
Total	907,132	2,996,996	878,139	476,974	484,149	4,154,869
Mean	1,833	6,055	1,774	964	978	8,394

Table 3.4.1.8 provides statistics regarding the amount of allocation held by the 260 businesses that possess RG shares and at least one permit. Information in this table reflects that these businesses control just over 84% of the RS allocation, or around 2.54 mp gw. The largest amount of RG allocation controlled by a single business with RG shares and a permit is almost 180,000 lb gw, while the average amount of RG allocation held by a business with a permit is about 9,700 lb gw.

Table 3.4.1.9 provides statistics regarding the amount of allocation held by the 176 businesses that possess shares but are not associated with a permit. Information in this table reflects that these businesses control almost 16% of the RG allocation, or around 472,000 lb gw. The largest amount of allocation controlled by a single business with RG shares but without a permit is

slightly more than 52,300 lb gw, while the average amount of RG allocation held by a business without a permit is almost 2,700 lb gw.

Table 3.4.1.8. Annual allocation statistics for businesses with RG shares and permitted vessels, February 19, 2020.

Statistic	DWG	RG	GG	SWG	TF	RS
Maximum	201,920	187,868	36,216	26,965	85,803	352,131
Total	804,209	2,524,968	718,400	405,168	460,681	3,483,095
Mean	3,093	9,711	2,763	1,558	1,772	13,397

Source: NMFS SERO IFQ database accessed 2/19/2020).

Table 3.4.1.9. Annual allocation statistics for businesses with RG shares and no permitted vessels, February 19, 2020.

Statistic	DWG	RG	GG	SWG	TF	RS
Maximum	20,386	52,359	21,879	8,064	6,613	162,774
Total	102,923	472,028	159,739	71,806	23,468	671,773
Mean	585	2,682	908	408	133	3,817

Source: NMFS SERO IFQ database accessed 2/19/2020).

Quota shares have value in multiple ways. First, shares have value because they are an asset. The asset value of each account's shares is determined by the market price of the shares and the amount of shares it contains. Statistics regarding the value of the shares held by accounts with RG shares are in Table 3.4.1.10. The total value of all shares held by accounts with RG shares is just over $212 million (2019$), with the bulk of that value coming from ownership of RS shares, which accounts for more than 80% of the combined total value. This is also true for the average account that holds RG shares. The average value of an account that holds RG shares is about $428,000, though only about 8% of that value is based on RG shares. The account with the largest asset value of shares is worth about $12.1 million, with RS shares representing the bulk of that value (98%).

Table 3.4.1.10. Quota share value statistics for accounts with RG shares (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$1,376,230	$728,007	$208,945	$130,804	$675,221	$11,820,887	$12,100,160
Total	$8,291,186	$17,052,906	$8,386,229	$2,680,593	$4,599,417	$171,055,937	$212,066,267
Mean	$16,750	$34,450	$16,942	$5,415	$9,292	$345,568	$428,417

Note: Share value estimates are based on average 2019 share prices per pound (IFQ database accessed 2/11/2020).

The information in Table 3.4.1.10 reflects the asset value of shares based on 2019 share prices. However, with the exception of RS shares, and TF shares to a lesser extent, average share prices for other share categories have continuously declined over the past 5 years, as illustrated in Table 3.4.1.11. Specifically, RG and GG share prices have declined by 59% during this time. The declines for DWG and TF prices have been less, but are still noticeable. TF share prices have been relatively steady, while RS share prices have increased by more than 14%. Compared to conditions in 2015, RG shares currently represent a far smaller percentage of an RG share account holder's IFQ asset portfolio, which was around 29% at that time. The same is true for the other GT share categories, with RS shares now dominating that portfolio.

Table 3.4.1.11. Average share prices by share category, 2015-2019 (2019$).

Share category	2015	2016	2017	2018	2019
RS	$36.07	$32.56	$36.27	$36.90	$41.17
RG	$13.80	$10.74	$5.39	$4.17	$5.69
GG	$23.58	$15.18	$16.55	$9.95	$9.55
DWG	$13.67	$13.25	$13.16	$11.11	$9.14
SWG	$7.23	$6.20	$9.06	$4.96	$5.62
TF	$9.85	$10.64	$9.07	$10.89	$9.50

Source: IFQ database accessed 2/11/2020.

Table 3.4.1.12 provides statistics regarding the value of the shares held by the 260 businesses that possess RG shares and at least one permit. Information in this table again reflects that these businesses control just over 84% of the total RG share value. The largest RG share value controlled by a single business with a permit is almost $1.07 million, while the average value of RG shares held by a business with a permit is just over $55,200. RG shares only represent about 8% of the total share value held by these businesses, while RS shares represent about 80% of the total share value held by these businesses.

Table 3.4.1.12. Quota share value statistics for businesses with RG shares and permitted vessels, February 19, 2020 (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$1,845,546	$1,068,972	$345,865	$151,544	$815,125	$14,497,248	$18,724,299
Total	$7,350,467	$14,367,067	$6,860,720	$2,277,046	$4,376,474	$143,399,025	$178,630,799
Mean	$28,271	$55,258	$26,387	$8,758	$16,833	$551,535	$687,042

Note: Share value estimates are based on average 2019 share prices per pound (NMFS SERO IFQ database accessed 2/11/2020).

Table 3.4.1.13 provides statistics regarding the value of the shares held by the 176 businesses that possess RG shares but are not associated with a permit. Information in this table again reflects that these businesses control about 16% of the total RG share value. The largest RG share value controlled by a single business without a permit is about $298,000, while the average value of shares held by a business with RG shares but without a permit is just over $15,200. RG shares only represent about 8% of the total share value held by these businesses, while RS shares represent almost 83% of the total share value held by these businesses.

Table 3.4.1.13. Quota share value statistics for businesses with RG shares but no permitted vessels, February 19, 2020 (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$186,331	$297,923	$208,945	$45,319	$62,823	$6,701,407	$7,502,747
Total	$940,718	$2,685,839	$1,525,509	$403,547	$222,943	$27,656,913	$33,435,468
Mean	$5,345	$15,260	$8,668	$2,293	$1,267	$157,142	$189,974

Note: Share value estimates are based on average 2019 share prices per pound (NMFS SERO IFQ database accessed 2/11/2020).

In addition to their asset value, shares have value because they result in annual allocation, which can either be sold or used for harvesting purposes (i.e., landings). Annual allocation that is sold

results in revenue for the business holding the allocation. This revenue likely represents an equivalent amount of profit as the business does not pay cost recovery fees when selling allocation and any other monetary costs associated with selling allocation are likely trivial. Statistics regarding the potential market value associated with the annual allocation for each account with RG shares are provided in Table 3.4.1.14.

The average market value of annual allocation should approximate the expected net revenue or economic profit of the annual allocation in the short-term (i.e., in a given year). Thus, if the annual allocation held by accounts with RG shares was harvested, economic profits from those landings would be expected to be about $19.4 million, with the bulk of those profits (79%) arising from the harvest of RS while RG would only account for about 9%. Although one account would be expected to earn about $1.1 million in short-term profits, if the account holders with RG shares retain their initial annual allocations, the average short-term profit per account would only be expected to be around $39,000.[29] Realized value in the form of actual annual revenue and profits is likely less from RG allocation and other allocation in the GT-IFQ program as quota utilization for those species is typically well below 100% in those categories (70% for RG in 2019). Thus, annual profit from the sale of RG allocation is more likely to be around $1.24 million in total and $2,500 per business on average.

Table 3.4.1.14. Potential market value of annual allocation in 2020 for all accounts with RG shares (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$158,101	$75,488	$18,597	$51,175	$13,732	$1,059,487	$1,089,420
Total	$952,488	$1,768,227	$746,418	$348,587	$281,415	$15,331,465	$19,428,601
Mean	$1,924	$3,572	$1,508	$704	$569	$30,973	$39,250

Note: Annual allocation lease value estimates are based on average 2019 allocation prices (IFQ database accessed 2/11/2020)

The information in Table 3.4.1.14 reflects the market value of allocation based on 2019 allocation prices. However, with the exception of RS allocation, allocation prices for other share categories have declined over the past 5 years, as illustrated in Table 3.4.1.15. Specifically, RG and GG allocation prices have declined by 49% and 58% during this time. The decline in the RG allocation price is most likely due to the significant commercial quota increase in late 2016. The declines for DWG and TF allocation prices have been less, but are still noticeable. If these trends continue, then the estimate in Table 3.4.1.14 may overestimate the market value of these allocations in 2020. Conversely, RS allocation price has increased by more than 14%. Thus, if the upward trend in the RS allocation price continues, the estimated lease value of RS allocation in Table 3.4.1.14 may underestimate actual market value in 2020. Compared to conditions in 2015, RG allocation currently represent a far smaller percentage of an RG share account holder's allocation portfolio, which was around 29% at that time. The same is true for the other GT-IFQ share categories, with RS allocation now dominating that portfolio.

[29] "Accounts" do not actually harvest landings and thus do not earn profits per se; rather, vessels and the businesses that own them do. Further, annual allocation is often transferred, so the actual distribution of short-term profits would likely differ from the potential distribution based on the distribution of annual allocation at the beginning of the year. The purpose of these estimates is to characterize the distribution of annual allocation and its value across accounts in the short-term.

Table 3.4.1.15. Average allocation prices by share category, 2015-2019 (2019$).

Share category	2015	2016	2017	2018	2019
RS	$3.31	$3.41	$3.46	$3.46	$3.69
RG	$1.15	$0.95	$0.44	$0.33	$0.59
GG	$2.03	$1.47	$1.51	$1.03	$0.85
DWG	$1.26	$1.23	$1.23	$1.01	$1.05
SWG	$0.64	$0.59	$0.60	$0.54	$0.59
TF	$0.83	$0.71	$0.75	$0.73	$0.72

Source: IFQ database accessed 2/11/2020.

Similar to shares, annual allocation tends to be "unconcentrated" across accounts. According to GMFMC (2018), concentration is low across all share categories combined and for most share categories, with the exception of TF which is typically "moderately concentrated." Also, concentration of annual allocation is the lowest at the beginning of each year, when it is based on the distribution of shares. Concentration in all categories is seasonal and increases as the year progresses or stabilizes in the 3rd or 4th quarter, but the markets are still largely "unconcentrated" with the exception of TF. But even at moderate levels of concentration, there is no evidence of market power being exercised in any of the markets for annual allocation (i.e., markets for annual allocation are competitive).

Table 3.4.1.16 provides statistics regarding the value of the allocation held by the 260 businesses that possess RG shares and at least one permit. Information in this table again reflects that these businesses control just over 84% of the total value of RG allocation. The largest RG allocation value controlled by a single business with a permit is worth almost $111,000, while the average value of RG allocation held by a business with a permit is just over $5,700. Realized value in the form of actual annual revenue and profits is likely less from RG allocation as quota utilization is typically well below 100% (70% in 2019). Thus, annual profit for these businesses from the sale of RG allocation is more likely to be around $1.04 million in total and $4,000 per business on average.

Table 3.4.1.16. Allocation value statistics for businesses with RG shares and permitted vessels, February 19, 2020 (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$212,016	$110,842	$30,784	$15,909	$61,778	$1,299,365	$1,334,171
Total	$844,419	$1,489,731	$610,640	$239,049	$331,691	$12,852,621	$16,368,151
Mean	$3,248	$5,730	$2,349	$919	$1,276	$49,433	$62,954

Note: Allocation value estimates are based on average 2019 allocation prices per pound (NMFS SERO IFQ database accessed 2/11/2020).

Table 3.4.1.17 provides statistics regarding the value of the allocation held by the 176 businesses that possess shares but are not associated with a permit. Information in this table again reflects that these businesses control about 16% of the total value of RG allocation. The largest allocation value controlled by a single business without a permit is worth almost $278,500, while the average value of allocation held by a business without a permit is almost $1,600. Again,

realized value in the form of actual annual revenue and profits is likely less from RG allocation as quota utilization is typically well below 100% (70% in 2019). Thus, annual profit for these businesses from the sale of RG allocation is more likely to be around $195,000 in total and $1,100 per business on average.

Table 3.4.1.17. Allocation value statistics for businesses with RG shares but no permitted vessels, February 19, 2020 (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$21,406	$30,892	$18,597	$4,758	$4,761	$600,636	$603,859
Total	$108,069	$278,496	$135,778	$42,365	$16,897	$2,478,844	$3,060,450
Mean	$614	$1,582	$771	$241	$96	$14,084	$17,389

Note: Allocation value estimates are based on average 2019 allocation prices per pound (NMFS SERO IFQ database accessed 2/11/2020).

These same general findings regarding the market value of annual allocation also apply to the potential ex-vessel value of that annual allocation. The markets for landed product largely have the same characteristics as the markets for annual allocation (i.e., unconcentrated overall and for most categories, except landings of TF which are "moderately concentrated"). Thus, markets for landed product of IFQ species are thought to be competitive. Even if market power is not detected in these markets, the Council may have distributional or "fairness" concerns as the distributions of shares, allocation, landings, and revenue in the Gulf IFQ programs are highly unequal. In fact, they are the most unequal of any catch share program in the U.S. (GMFMC, 2018).

Table 3.4.1.18. Potential ex-vessel value of annual allocation in 2020 for accounts with RG shares (2019$).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Maximum	$844,710	$675,549	$132,149	$129,408	$204,699	$1,516,014	$2,057,576
Total	$5,089,010	$15,824,137	$5,303,960	$2,651,974	$1,394,349	$21,937,706	$52,201,137
Mean	$10,281	$31,968	$10,715	$5,358	$2,817	$44,319	$105,457

Note: Potential ex-vessel value estimates are based on 2019 average ex-vessel prices (IFQ database accessed 2/11/2020).

The information in Table 3.4.1.18 reflects the potential ex-vessel value of allocations in 2020 based on 2019 ex-vessel prices and commercial quotas in 2020. Again, realized ex-vessel value will likely be less for RG and other species in the GT-IFQ program as quota utilization rates are typically well below 100%. Only businesses with IFQ accounts that are linked to a permit are allowed to harvest IFQ species. Therefore, estimates of ex-vessel value are not germane to businesses that do not possess permits.

As illustrated in Table 3.4.1.19, with the exception of TF, and RS to some extent, ex-vessel prices at the share category level have steadily increased from 2015 through 2019. For example, ex-vessel prices for gag, SWG, DWG, and TF have increased by 11%, 12%, 13%, and 13%, respectively. Although not shown here, this increase is also seen at the individual species level within the DWG, SWG, and TF categories, with the exception of yellowmouth grouper in the SWG category, which declined by 9%, and goldface tilefish in the TF category, which declined by 10%. The ex-vessel price for RS has only increased by 2%, and that increase almost entirely

occurred in 2019. The ex-vessel price for RG has increased by almost 26%. These trends are nearly the opposite of the trends for allocation prices, suggesting that it is likely becoming relatively more profitable for those with shares to harvest their allocation rather than sell it, all other things being equal.[30]

Table 3.4.1.19. Average ex-vessel prices by share category, 2015-2019 (2019$).

Share category	2015	2016	2017	2018	2019
RS	$5.18	$5.17	$5.18	$5.19	$5.28
RG	$4.23	$4.26	$4.45	$4.83	$5.31
GG	$5.44	$5.45	$5.47	$5.76	$6.04
DWG	$4.96	$4.91	$4.93	$5.17	$5.61
SWG	$4.95	$4.92	$4.96	$5.30	$5.56
TF	$3.11	$3.12	$3.10	$2.87	$2.88

Source: IFQ database accessed 2/11/2020.

Vessels

The information in Table 3.4.1.20 describes the landings and revenue for vessels that harvested RG in each year from 2014 through 2018, as well as their revenue from other IFQ species, Gulf non-IFQ fisheries, and South Atlantic non-IFQ fisheries. Although a majority of these vessels' gross revenue came from harvesting IFQ species, a significant portion came from harvesting non-IFQ species in the Gulf, with a minor amount coming from harvests in the South Atlantic.

Some important trends can be seen in Table 3.4.1.20. In general, vessel participation in the IFQ programs tends to be very fluid. However, the number of vessels that harvested RG in each year from 2015 through 2018 was relatively stable, ranging between 374 and 384 vessels, with only a small decrease occurring from 2015 to 2016. Contrary to the upward trends for the IFQ fisheries as a whole from 2011 through 2015 (GMFMC 2017b), red grouper landings and revenue have decreased significantly from 2014 through 2018, with landings falling by 57% and revenue decreasing by 49%. The revenue decrease was slightly less because of the increase in ex-vessel price that occurred during this time. However, not only did revenue from RG landings decrease, so did revenue from other IFQ species and even from non-IFQ species in the Gulf, which declined by about 23% and 26%, respectively. As a result, total revenue for these vessels declined by almost 35% from 2015 through 2018.

[30] Preliminary information suggests that the recent pandemic has caused ex-vessel prices for most IFQ species to decline, thus reversing the previous trend. As effects on allocation prices have not yet been determined, whether it is currently more profitable for IFQ account holders to sell or use allocation for landings purposes is unknown.

Table 3.4.1.20. Landings and revenue statistics for vessels harvesting RG by year, 2014-2018 (2019$).

Year	Number of Vessels	Statistic	RG Landings (gw)	RG Revenue	Other IFQ Revenue	Gulf Non-IFQ Revenue	South Atlantic Revenue	Total Revenue
2014	384	Maximum	149,013	$612,691	$2,384,847	$300,104	$120,440	$2,387,842
		Total	5,497,993	$22,461,241	$24,116,831	$7,903,415	$581,764	$55,063,252
		Mean	14,318	$58,493	$62,804	$20,582	$1,515	$143,394
2015	376	Maximum	102,900	$430,908	$900,697	$287,607	$112,904	$949,740
		Total	4,665,528	$19,690,531	$21,836,770	$6,111,639	$530,598	$48,169,538
		Mean	12,408	$52,368	$58,077	$16,254	$1,411	$128,110
2016	375	Maximum	113,282	$471,797	$1,070,173	$242,494	$99,390	$1,081,789
		Total	4,484,476	$18,899,691	$21,676,244	$7,403,384	$568,194	$48,547,514
		Mean	11,959	$50,399	$57,803	$19,742	$1,515	$129,460
2017	374	Maximum	92,586	$416,127	$1,024,611	$216,904	$149,465	$1,031,572
		Total	3,319,928	$14,675,817	$18,159,067	$6,717,016	$606,509	$40,158,409
		Mean	8,877	$39,240	$48,554	$17,960	$1,622	$107,375
2018	376	Maximum	64,498	$312,486	$1,033,603	$190,863	$107,512	$1,038,980
		Total	2,361,280	$11,367,060	$18,456,902	$5,809,073	$440,279	$36,073,314
		Mean	6,280	$30,232	$49,088	$15,450	$1,171	$95,940

Source: NMFS SERO IFQ database accessed 2/19/2020 and SEFSC Socioeconomic Panel (Version 10).

It is counterintuitive that the fleet size would remain stable given such declines, and this result deserves further research. Nonetheless, these findings reflect the interdependency between species harvested in the commercial sector of the reef fish fishery (i.e., biological or economic factors that affect the commercial harvest of one species can and often do affect the commercial harvest of other species). Further, these declines occurred even though the RG commercial quota increased from 5.63 mp in 2014 to 7.78 mp by late 2016, and remained at that level through 2018. Also, the RS commercial quota increased from approximately 5.054 mp gw in 2014 to 6.312 mp gw through mid-2017, and remained at that level through 2018. Landings and revenue would be expected to increase, likely significantly, with such increases under stable biological and economic conditions. Thus, it is clear that biological and/or economic conditions for red grouper, and the reef fish fishery as a whole, are not stable.

The maximum annual gross revenue earned by a single vessel during this time was about $2.39 million (2019$) in 2015, though the average gross revenue per vessel was only about $143,000 that year. Similar to the trends in total revenue for RG vessels, these values had decreased to $1.04 million and about $96,000 by 2018, representing a 33% decline in total revenue per vessel. Average red grouper landings and revenue per vessel also decreased from 14,318 lbs and $58,493 to 6,280 lbs and $30,232 per vessel or by about 56% and 45%, respectively.

Estimates of economic returns have not been available historically for the commercial sector of the Gulf reef fish fishery. Recent reports (Overstreet, Perruso, and Liese 2017, Overstreet and Liese 2018a, and Overstreet and Liese 2018b) provided the first such estimates. These estimates are specific to economic performance in 2014, 2015 and 2016, respectively. Overstreet and Liese (2018b) also provides average estimates of economic returns across 2014-2016, which are the most useful for current purposes, and thus findings from that report are summarized below. Given the declines in landings and revenue for RG vessels discussed above, it is quite likely that economic returns were likely different by 2018 than they were in 2016, and thus the estimates below should be used with some caution. However, some of the findings for 2014-2016 seem to be consistent with the results above for 2014-2016.

Estimates in these reports are based on a combination of Southeast Coastal logbook data, a supplemental economic add-on survey to the logbooks, and an annual economic survey at the vessel level. The economic surveys collect data on gross revenue, variable costs, fixed costs, as well as some auxiliary economic variables (e.g., market value of the vessel). The report provides estimates of critical economic variables for the commercial sector of the Gulf reef fish fishery as a whole, but also provides estimates by "subsets" within this sector. These subsets are referred to as Segments of Interest (SOI). SOIs are generally defined at the individual species (e.g., red snapper), species group (e.g., Jacks), and/or gear-level (e.g., longline). In addition, estimates are provided at the trip level and the annual vessel level for each SOI. For current purposes, the most important results are those for vessels that harvested RG.

From an economic returns perspective, the two most critical results at the trip level are the estimates of trip net cash flow and trip net revenue. Trip net cash flow is trip revenue minus the costs for fuel, bait, ice, groceries, miscellaneous, hired crew, and purchases of annual allocation from other allocation holders. Thus, this estimate represents the amount of cash generated by a typical reef fish trip over and above the cash cost of taking the trip (i.e., variable costs of the trip) and is a proxy for producer surplus (PS) at the trip level. Trip net revenue is trip revenue minus the costs for fuel, bait, ice, groceries, miscellaneous, hired crew, and the opportunity cost of owner's time as captain. By including opportunity cost of the owner's time and excluding purchases of annual allocation, trip net revenue is a measure of the commercial fishing trip's economic profit.

Table 3.4.1.21 illustrates the economic "margins" generated on red grouper trips, i.e., trip net cash flow and trip net revenue as a percentage of trip revenue. As shown in this table, 30%, 18%, and 18% (or 67% in total) of the average revenues generated on RG trips were used to pay for crew costs, fuel/supplies costs, and purchases of annual allocation, while the remaining 33% was net cash flow back to the owner(s). The margin associated with trip net revenue was higher at 44%. Thus, trip cash flow and trip net revenue were both positive on average from 2014 through 2016, generally indicating that red grouper trips were profitable during this time.

Table 3.4.1.22 provides estimates of the important economic variables at the annual level for all vessels that had RG landings from 2014 through 2016. Similar to the trip level, the three most important estimates of economic returns are net cash flow, net revenue from operations,[31] and

[31] Net revenue from operations accrues to the vessel owner and, when applicable, the IFQ shareholder, who may not be the same entity.

economic return on asset value. Of these measures, net revenue from operations most closely represents economic profits to the owner(s). Net cash flow is total annual revenue minus the costs for fuel, other supplies, hired crew, vessel repair and maintenance, insurance, overhead, loan payments, and purchases of annual allocation. Net revenue from operations is total annual revenue minus the costs for fuel, other supplies, hired crew, vessel repair and maintenance, insurance, overhead, and the opportunity cost of an owner's time as captain as well as the vessel's depreciation. Economic return on asset value is calculated by dividing the net revenue from operations by the vessel value.

Table 3.4.1.21. Economic characteristics of RG trips 2014-2016 (2019$).

	2014	2015	2016	Average
Number of Observations	829	1,066	1,228	
Response Rate (%)	78%	85%	94%	
SOI Trip				
Owner-Operated	68%	62%	64%	64.7%
Fuel Used per Day at Sea (gallons/day)	41	39	37	39
Total Revenue	100%	100%	100%	100%
Costs (% of Revenue)				
Fuel	8%	6.3%	5.1%	6.5%
Bait	3.7%	4%	4.1%	3.9%
Ice	1.5%	1.6%	1.7%	1.6%
Groceries	3%	3.2%	4.1%	3.4%
Miscellaneous	2.2%	3%	3.5%	2.9%
Hired Crew	30%	31%	30%	30.3%
IFQ Purchase	15.4%	21.8%	17.7%	18.3%
OC Owner-Captain Time	7.5%	6.9%	8.1%	7.5%
Trip Net Cash Flow	36%	29%	34%	33%
Trip Net Revenue	44%	44%	43%	44%
Labor - Hired & Owner	37%	38%	38%	37.7%
Fuel & Supplies	18%	18%	19%	18%
Input Prices				
Fuel Price (per gallon)	$4.06	$2.93	$2.28	$3.10
Hire Crew Wage (per crew-day)	$313	$292	$257	$288
Productivity Measures				
Landings/Fuel Use (lbs./gallon)	11.9	10.5	9.7	11
Landings/Labor Use (lbs./crew-day)	183	160	140	161

Net cash flow and net revenue from operations at the annual vessel level were both positive from 2014-2016, generally indicating that RG vessels in the commercial sector were profitable, though some vessels earned much greater profits than others. More specifically, net cash flow and net revenue from operations averaged 24% and 39%, respectively, while the economic return on asset value was approximately 40% during this time.

Overstreet and Liese (2018b) only provide estimates of economic returns from 2014 through 2016, and thus it cannot be used to assess how economic returns and related measures have changed since the implementation of the IFQ programs. However, Liese (pers. communication, Nov. 22, 2017) has conducted an analysis that compares economic returns and related measures in 2006 and 2014, and thus examines how they have changed since the implementation of the GT

and RS-IFQ programs. Because of the years chosen, the changes in economic performance indicated by these results can only, at best, be attributed to the combination of the two IFQ programs as opposed to one or the other. Also, these results apply to all trips that landed Gulf reef fish species as opposed to landings of species managed under one or both of the IFQ programs. Further, as these results are preliminary, only a generally qualitative overview can be provided.

Table 3.4.1.22. Economic characteristics of RG vessels from 2014-2016 (2019$).

	2014	2015	2016	Average
Number of Observations	66	81	97	
Response Rate (%)	65%	78%	84%	
SOI Vessel				
Owner-Operated	75%	66%	79%	73%
For-Hire Active	6%	19%	11%	12%
Vessel Value	$135,478	$105,527	$80.428	$107,144
Total Revenue	100%	100%	100%	100%
Costs (% of Revenue)				
Fuel	8.2%	7.6%	6.8%	7.5%
Other Supplies	10.6%	11.1%	13.2%	11.6%
Hired Crew	26.5%	29.4%	26.5%	27.5%
Vessel Repair & Maintenance	7.2%	8.6%	9.1%	8.3%
Insurance	0.5%	1.1%	0.9%	0.8%
Overhead	4.2%	6.3%	5.8%	5.4%
Loan Payment	0.9%	1.8%	1.3%	1.3%
IFQ Purchase	11.4%	15.4%	14.9%	13.9%
OC Owner-Captain Time	5.6%	5.6%	7.1%	6.1%
Net Cash Flow	30%	19%	22%	24%
Net Revenue for Operations	33%	27%	27%	29%
Depreciation	3.8%	3.7%	3.3%	3.6%
Fixed Costs	12%	16%	16%	15%
Labor - Hired & Owner	32%	35%	34%	34%
Fuel & Supplies	19%	19%	20%	19%
Economic Return (on asset value)	44.2%	36%	41%	40.4%

First, effort in the commercial sector of the fishery has decreased significantly according to multiple measures. Specifically, the number of vessels, trips, and days at sea decreased by 31%, 38%, and 28%, respectively, between 2006 and 2014. At the same time, landings of Gulf reef fish were relatively unchanged, decreasing by about 4% during that time. Thus, output per unit of input (one measure of productivity) has increased significantly since the IFQ programs were implemented. Further, even though landings have remained about the same, the average ex-vessel price of Gulf reef fish landings increased by 20% during this time, resulting in a 16% increase in total annual revenues from these landings.

Because productivity increased, costs decreased. Specifically, crew costs decreased by 6%, other variable costs (supplies, fuel, etc.) decreased by 33%, and fixed costs decreased by 19%. The decrease in crew costs was driven by a decrease in crew days of 26%, as crew compensation per day actually increased by 24% (i.e., the amount of labor used decreased somewhat significantly, but “wages” increased somewhat significantly as well). Similarly, even though fuel prices

increased by 25%, a 49% decrease in fuel usage was the primary driver of the decline in other variable costs. In addition, the opportunity costs associated with the owner's labor time and capital invested in the vessel decreased by 16% and 31%, respectively.

Because costs decreased, significantly lower percentages of the total revenues had to be used to cover these costs, in turn resulting in much higher economic returns and margins. Net cash flow to the owner(s) increased by more than 300% while net revenue from operations increased by more than 400%. Trip net revenue as a percentage of total trip revenue increased by 94% while, at the vessel level, net revenue from operations as a percentage of total revenues increased by 180%. While such increases may appear to be exorbitant, it must be kept in mind that, in 2006, net cash flows were only slightly above the break-even point and net revenues from operations were negative (i.e., commercial reef fish levels were earning economic losses on average).

Dealers

The information in Table 3.4.1.23 illustrates the purchasing activities of dealers that bought RG landings from vessels from 2014 through 2018.[32] Like vessels, dealer participation in the RG component of the GT-IFQ program is fluid and not all dealers purchased RG in each year during this time. Unlike the number of vessels harvesting RG during this time, the number of dealers that purchased RG landings steadily decreased from 110 in 2014 to 89 in 2018, or by 19%, with an average of 101 dealers purchasing RG landings each year.

Table 3.4.1.23. Dealer statistics for dealers that purchased RG landings by year, 2014-2018. All dollar estimates are in 2019$.*

Year	Number Dealers	Statistic	RG Purchases	Other IFQ Purchases	Gulf Non-IFQ Purchases	South Atlantic Purchases	Total Purchases
2014	110	Maximum	$4,194,263	$3,522,317	$4,122,768	$4,128,319	$7,400,909
		Total	$22,771,884	$22,999,036	$39,753,737	$16,730,832	$102,255,489
		Mean	$207,017	$209,082	$361,398	$152,098	$929,595
2015	107	Maximum	$3,342,217	$7,737,791	$3,651,599	$3,406,249	$8,412,438
		Total	$20,133,195	$29,815,086	$38,083,517	$12,362,712	$100,394,510
		Mean	$188,161	$278,646	$355,921	$115,539	$938,266
2016	101	Maximum	$3,717,521	$9,873,515	$8,079,619	$3,848,256	$10,541,374
		Total	$18,874,947	$32,555,979	$44,293,742	$16,839,568	$112,564,236
		Mean	$186,881	$322,336	$438,552	$166,728	$1,114,497
2017	96	Maximum	$2,794,976	$8,060,687	$6,374,817	$5,151,898	$8,741,043
		Total	$14,655,988	$26,557,008	$41,215,887	$23,485,925	$105,914,808
		Mean	$152,667	$276,635	$429,332	$244,645	$1,103,279
2018	89	Maximum	$1,615,223	$2,592,992	$6,247,425	$4,403,264	$8,219,395
		Total	$11,343,604	$19,471,016	$42,731,861	$20,120,140	$93,666,621
		Mean	$127,456	$218,775	$480,133	$226,069	$1,052,434

Source: SEFSC Fishing Communities Web Query Tool, Version 1.

[32] The estimates in this table are based on Accumulated Landings System (ALS) data, which tends to produce slightly different estimates of ex-vessel landings and value for RG due to waterbody code assignment issues in the Keys.

In addition, although the trend in purchases of RG landings by dealers necessarily mimics the trend in RG vessel revenues, the trends in purchases of other IFQ species as well non-IFQ species in the Gulf and South Atlantic do not mirror the trends for vessels. For example, purchases of other IFQ landings in the Gulf by RG dealers increased significantly (over 41%) from 2014 through 2016. Further, purchases of non-IFQ species in the Gulf also increased by 11% during this time. These increases generally reflect increases in the commercial quotas for other species. Thus, even though purchases of RG were declining, the value of all the RG dealers' purchases increased. However, these trends did not continue after 2016 as purchases of other IFQ and non-IFQ species in the Gulf declined in addition to the continuing decline of RG purchases. Greater purchases of landings from the South Atlantic partially offset these declines, but the total value of the RG dealers' purchases declined by 17% from 2016 through 2018. Still, this decline is less than the decline in revenues experienced by RG vessels, reflecting the greater diversity in the purchasing portfolios of RG dealers, which in turn allowed them to be more flexible and adaptive to changes in the RG component of the GT-IFQ program. In combination with the decline in the number of RG dealers, the average value of purchases per RG dealer actually increased by 13% from 2014 through 2018, unlike the RG vessels which experienced a noticeable decline in their average total revenue per vessel during this time.

Imports

Imports of seafood products compete in the domestic seafood market and have in fact dominated many segments of the seafood market. Imports aid in determining the price for domestic seafood products and tend to set the price in the market segments in which they dominate. Seafood imports have downstream effects on the local fish market. At the harvest level for red grouper, imports affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production of reef fish, imports tend to cushion the adverse economic effects on consumers resulting from a reduction in domestic landings. The following describes the imports of fish products which directly compete with domestic harvest of red grouper. All monetary estimates are in 2019 dollars.

Total imports of snapper increased significantly (36%) from 2014 through 2016, increasing from about 33 mp product weight (pw) to 45 mp pw during this time. However, snapper imports declined slightly thereafter to about 43 mp pw in 2018. Revenue from snapper imports followed a similar pattern, increasing from almost $105 million in 2014 to $136 million in 2016, but then falling to about $134 million in 2018. Although the average price per pound fluctuated somewhat between 2014 and 2018, moving inversely to volume, it generally vacillated around $3.05/lbs. Imports of fresh snapper increased steadily from 23.6 mp pw in 2014 to 31.2 mp pw in 2017, before declining slightly to 31.2 mp pw in 2018. Total revenue from fresh snapper imports increased from $78 million in 2014 to an all-time high of $98.5 million in 2018. The average price decreased from $3.32/lbs. to $3/lbs between 2014 and 2017 as volume increased, but rose to $3.21/lbs in 2018 when volume declined. Imports of fresh snappers primarily originated in Mexico, Panama, and Nicaragua, and entered the U.S. through the port of Miami. Imports of frozen snapper were substantially less than imports of fresh snapper from 2014 through 2018. Frozen snapper imports ranged from 9.3 mp pw worth $26.5 million in 2014 to 14.4 mp pw worth $40.2 million in 2018. The average price fluctuated around $2.85/lbs during

this time. Imports of frozen snapper primarily originated in Brazil. The majority of frozen snapper imports entered the U.S. through the ports of Miami and New York.

Total imports of grouper increased significantly (64%) from 10.4 mp pw in 2014 to 17.1 mp pw in 2018. Total revenue from grouper imports also increased significantly (43%) from $42.3 million to $60.3 million during this time period. Revenue from grouper imports did not increase as significantly as the volume due to a 15% decrease in the average price per pound of grouper imports. Imports of frozen grouper were minimal from 2014 through 2016, decreasing from 1.75 mp pw in 2014 to only 0.81 mp pw in 2016. However, frozen grouper imports increased significantly in 2018, up to 4.6 mp pw. As a result, frozen grouper composed 27% of total grouper imports in 2018 compared to only 17% in 2014. Further, the average price per pound of frozen imports decreased significantly, from $2.67/lbs to only $1.27/lbs between 2015 and 2018. Similarly, total revenue from frozen grouper decreased from $3.8 million to $1.5 million from 2014 to 2016, but then increased to $5.8 million in 2018. The decline in the average price of frozen grouper in combination with frozen product making up a higher proportion of total imports explains why revenue from grouper imports, frozen and in total, did not increase as significantly as volume from 2014 through 2018. The volume and revenue from fresh grouper imports also increased from 2014 through 2018, increasing from 8.6 mp pw and $38.5 million in 2014 to 12.5 mp pw and $54.5 million in 2018, respectively. Average price was relatively stable at around $4.38/lbs. Thus, the price premium attached to fresh grouper relative to frozen grouper is much greater than the premium attached to fresh snapper compared to frozen snapper. The bulk of fresh and frozen grouper imports originated in Mexico and entered the U.S. through Miami and Tampa.

Economic Impacts

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

In addition to these types of impacts, economic impact models can be used to determine the sources of the impacts. Each impact can be broken down into direct, indirect, and induced economic impacts. “Direct” economic impacts are the results of the money initially spent in the study area (e.g., country, region, state, or community) by the fishery or industry being studied. This includes money spent to pay for labor, supplies, raw materials, and operating expenses. The direct economic impacts from the initial spending create additional activity in the local economy, i.e., “indirect” economic impacts. Indirect economic impacts are the results of business-to-business transactions indirectly caused by the direct impacts. For example, businesses initially benefiting from the direct impacts will subsequently increase spending at other local businesses.

The indirect economic impact is a measure of this increase in business-to-business activity, excluding the initial round of spending which is included in the estimate of direct impacts. "Induced" economic impacts are the results of increased personal income caused by the direct and indirect economic impacts. For example, businesses experiencing increased revenue from the direct and indirect impacts will subsequently increase spending on labor by hiring more employees, increasing work hours, raising salaries/wage rates, etc. In turn, households will increase spending at local businesses. The induced impact is a measure of this increase in household-to-business activity.

Table 3.4.1.24. Average annual economic impacts of red grouper in the commercial sector of the Gulf reef fish fishery. All monetary estimates are in thousands of 2018 dollars[33] and employment is measured in full-time equivalent jobs.

Harvesters	**Direct**	**Indirect**	**Induced**	**Total**
Employment impacts	382	59	79	520
Income impacts	$9,241	$1,716	$4,149	$15,106
Total value-added impacts	$9,850	$6,177	$7,099	$23,126
Output Impacts	$17,116	$13,925	$13,781	$44,822
Primary dealers/processors	**Direct**	**Indirect**	**Induced**	**Total**
Employment impacts	80	32	55	167
Income impacts	$3,015	$2,779	$2,628	$8,422
Total value-added impacts	$3,214	$3,546	$4,948	$11,708
Output impacts	$9,705	$7,310	$9,672	$26,687
Secondary wholesalers/distributors	**Direct**	**Indirect**	**Induced**	**Total**
Employment impacts	37	8	36	81
Income impacts	$1,796	$534	$1,889	$4,220
Total value-added impacts	$1,915	$896	$3,227	$6,038
Output impacts	$4,811	$1,754	$6,276	$12,841
Grocers	**Direct**	**Indirect**	**Induced**	**Total**
Employment impacts	158	18	35	211
Income impacts	$3,695	$1,228	$1,855	$6,777
Total value-added impacts	$3,939	$1,978	$3,140	$9,057
Output impacts	$6,315	$3,213	$6,164	$15,693
Restaurants	**Direct**	**Indirect**	**Induced**	**Total**
Employment impacts	986	66	161	1,213
Income impacts	$14,822	$4,495	$8,490	$27,808
Total value-added impacts	$15,800	$8,036	$14,305	$38,141
Output impacts	$28,890	$12,574	$28,228	$69,693
Harvesters and seafood industry	**Direct**	**Indirect**	**Induced**	**Total**
Employment impacts	1,643	183	366	2,191
Income impacts	$32,570	$10,752	$19,011	$62,333
Total value-added impacts	$34,718	$20,632	$32,719	$88,069
Output impacts	$66,837	$38,777	$64,121	$169,735

[33] The commercial economic impact model has not been updated yet to produce estimates in 2019$.

Estimates of the U.S. average annual business activity associated with the commercial harvest of red grouper in the Gulf were derived using the model developed for and applied in NMFS (2018)[34] and are provided in Table 3.4.1.24. Specifically, these impact estimates reflect the expected impacts from average annual gross revenues generated by landings of Gulf red grouper from 2014 through 2018. This business activity is characterized as jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), value-added impacts (the difference between the value of goods and the cost of materials or supplies), and output impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting.

The results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species; specifically reef fish in this case. Separate models for individual species such as red grouper are not available. Between 2014 and 2018, landings of Gulf red grouper resulted in approximately $17.12 million (2018$) in gross revenue on average. In turn, this revenue generated employment, income, value-added, and output impacts of 2,191 jobs, $62.3 million, $88.1 million, and $169.7 million per year, respectively, on average.

3.4.2 Recreational Sector

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

Landings

Private vessels accounted for the majority of red grouper landings on average (2014 through 2018), followed by charter vessels and headboats, with no recorded landings from shore (Table 3.4.2.1). Charter vessels were responsible for an increasingly higher percentage of red grouper landings during this period, accounting for only 11% of the landings in 2014 but 20% and 18% of the landings in 2017 and 2018, respectively. Although not shown in the table, approximately 99.7% of red grouper landings on average were recorded in the state of Florida.[35] As a result, landings in some states may be confidential and landings by state and mode outside of Florida are confidential in most instances. Therefore, landings by state or by state and mode are not presented.

[34] A detailed description of the input/output model is provided in NMFS (2011).
[35] Prior to 2013, Northwest Florida and Alabama headboat landings were reported together so it is not possible to disaggregate them.

Landings in the recreational sector largely mirror the downward trend seen in the commercial sector from 2014-2018, with the exception of a relatively small increase (21%) in 2018. However, landings in 2018 were still 62% below their level in 2014, which is very similar to the reduction in the commercial sector. Significant reductions were experienced in all modes, though the largest reduction in absolute and percentage terms was in the private angling mode (65%). A portion of the decrease in landings over this time is due to the reduction in the bag limit from four fish to two fish per person per day in May 2015, but the at least some of the decrease is likely due to the declining health of the stock.

Table 3.4.2.1. Recreational landings (lbs gw) and percent distribution of red grouper across all states by mode for 2014-2018.

	Landings (pounds gw)					**Percent Distribution**			
	Charter vessel	**Headboat**	**Private**	**Shore**	**Total**	**Charter vessel**	**Headboat**	**Private**	**Shore**
2014	586,714	45,107	4,737,128	0	5,368,949	11%	1%	88%	0%
2015	500,305	50,621	3,239,928	0	3,790,853	13%	1%	85%	0%
2016	406,088	56,851	2,169,801	0	2,632,740	15%	2%	82%	0%
2017	342,871	21,423	1,328,134	0	1,692,428	20%	1%	78%	0%
2018	362,101	22,310	1,669,115	0	2,053,526	18%	1%	81%	0%
AVG	**439,616**	**39,262**	**2,628,821**	**0**	**3,107,699**	**14%**	**1%**	**85%**	**0%**

Source: Southeast Fisheries Science Center MRIP FES recreational ACL dataset (1/2/2020) and LA Creel.

Angler Effort

Recreational effort derived from the MRIP database can be characterized in terms of the number of angler trips as follows:

- Target effort - The number of individual angler trips, regardless of duration, where the intercepted angler indicated that the species or a species in the species group was targeted as either the first or the second primary target for the trip. The species did not have to be caught.
- Catch effort - The number of individual angler trips, regardless of duration and target intent, where the individual species or a species in the species group was caught. The fish did not have to be kept.
- Total recreational trips - The total estimated number of recreational trips in the Gulf, regardless of target intent or catch success.

Other measures of effort are possible, such as directed trips (the number of individual angler trips that either targeted or caught a particular species). All of the estimated target trips and almost all of the estimated catch trips for Gulf red grouper occurred in Florida from 2014 through 2018 (Table 3.4.2.2 and Table 3.4.2.3). The majority of estimated target and catch effort came from the private angling mode. Although there were a small number of red grouper target and catch trips estimated for the shore mode, there were no actual landings reported from 2014 through

2018, suggesting only discards were encountered. The trend in total target effort was very similar to the trend in total landings, decreasing by 44% from 2014 through 2018. However, target effort in the charter mode only fell by about 13%. Catch effort also consistently decreased in total and by mode from 2014 through 2016, but increased in the private angling mode in 2017 and 2018. Thus, the reduction in catch effort was relatively less (21%) from 2014 through 2018, though catch effort in the charter mode fell by 36%. Estimates of red grouper target or catch effort for additional years, and other measures of directed effort, are available on the NOAA website.[36]

Table 3.4.2.2. Number of red grouper recreational target trips, by mode and state, 2014-2018.*

Mode	Year	Alabama	Florida	Total
Shore	2014	0	79,563	79,563
	2015	0	0	0
	2016	0	22,513	22,513
	2017	0	0	0
	2018	0	44,346	44,346
	Average	0	29,284	29,284
Charter	2014	0	40,144	40,144
	2015	0	44,460	44,460
	2016	0	51,275	51,275
	2017	0	33,915	33,915
	2018	0	34,797	34,797
	Average	0	40,918	40,918
Private	2014	0	703,390	703,390
	2015	0	493,326	493,326
	2016	0	443,244	443,244
	2017	1,470	281,783	283,253
	2018	0	380,124	380,124
	Average	294	460,373	460,677
All	2014	0	823,098	823,098
	2015	0	537,786	537,786
	2016	0	517,032	517,032
	2017	1,470	315,699	317,169
	2018	0	459,267	459,267
	Average	294	530,576	530,870

Source: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads.
* Headboat information is unavailable. LA effort estimates are not currently available. However, landings were negligible and thus target effort is likely zero. No target effort occurred in Mississippi or Texas.

[36] https://www.st.nmfs.noaa.gov/recreational-fisheries/data-and-documentation/queries/index

Table 3.4.2.3. Number of red grouper recreational catch trips, by mode and state, 2014-2018.*

Mode	Year	Alabama	Florida	Total
Shore	2014	0	12,246	12,246
	2015	0	33,439	33,439
	2016	0	18,563	18,563
	2017	0	38,470	38,470
	2018	0	15,177	15,177
	Average	0	23,579	23,579
Charter	2014	124	134,904	135,028
	2015	2,083	125,388	127,471
	2016	2,053	141,114	143,167
	2017	1,762	102,737	104,499
	2018	187	86,800	86,987
	Average	1,242	118,189	119,430
Private	2014	5,182	1,201,577	1,206,759
	2015	2,169	894,001	896,170
	2016	0	751,858	751,858
	2017	3,666	754,646	758,312
	2018	7,723	957,299	965,022
	Average	3,748	911,876	915,624
All	2014	5,306	1,348,727	1,354,033
	2015	4,252	1,052,828	1,057,080
	2016	2,053	911,535	913,588
	2017	5,428	895,853	901,281
	2018	7,910	1,059,276	1,067,186
	Average	4,990	1,025,421	1,058,625

Source: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads.
* Headboat information is unavailable. LA effort estimates are not currently available. However, landings were negligible and thus catch effort is likely negligible. No catch effort occurred in Mississippi or Texas.

As shown in tables 2.4.2.4 and 2.4.2.5, across all modes, target and catch effort was the highest in the 4th (July-Aug) and 3rd (May-June) waves. Target effort is the lowest in wave 6 (Nov-Dec) and wave 5 (Sept-Oct) while catch effort is the lowest in wave 1 (Jan-Feb) across all modes. For

the private mode, target effort was highest in wave 4 and lowest in wave 1. For the charter mode, target effort was highest in wave 3 and lowest in wave 1.

Table 3.4.2.4. Red grouper target trips by wave and mode, 2014 – 2018.*

	1 (Jan-Feb)	2 (Mar-Apr)	3 (May-Jun)	4 (Jul-Aug)	5 (Sep-Oct)	6 (Nov Dec)	Total
	Shore						
2014	0	32,901	8,659	38,003	0	0	79,563
2015	0	0	0	0	0	0	0
2016	0	0	0	0	0	22,513	22,513
2017	0	0	0	0	0	0	0
2018	0	0	0	44,346	0	0	44,346
Average	0	6,580	1,732	16,470	0	4,503	29,285
	Charter						
2014	6,266	5,440	8,317	9,776	9,607	736	40,144
2015	6,926	10,765	14,007	10,016	2,277	469	44,460
2016	11,488	7,134	15,384	7,302	3,329	6,639	51,275
2017	5,826	3,155	9,327	8,646	1,615	5,345	33,915
2018	6,529	3,783	17,217	1,907	2,957	2,404	34,797
Average	7,407	6,055	12,850	7,530	3,957	3,119	40,918
	Private/Rental						
2014	40,458	68,852	155,561	342,796	52,558	43,165	703,390
2015	73,196	47,748	135,343	181,621	40,374	15,044	493,326
2016	78,235	54,576	89,379	101,146	72,121	47,787	443,244
2017	15,120	33,740	59,038	86,551	30,233	58,570	283,253
2018	39,119	67,214	70,317	98,735	50,903	53,837	380,124
Average	49,226	54,426	101,928	162,170	49,238	43,681	460,668
	All						
2014	46,725	107,193	172,538	390,575	62,166	43,901	823,098
2015	80,122	58,513	149,350	191,637	42,651	15,513	537,786
2016	89,722	61,710	104,763	108,448	75,450	76,939	517,032
2017	20,947	36,895	68,366	95,198	31,848	63,915	317,169
2018	45,648	70,996	87,535	144,988	53,859	56,241	459,267
Average	56,633	67,062	116,510	186,169	53,195	51,302	530,870

Source: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads

* Texas and headboat information unavailable. LA effort estimates are not currently available. However, landings were negligible and thus target effort is likely zero.

Table 3.4.2.5. Red grouper catch trips by wave and mode, 2014 – 2018.*

	1 (Jan-Feb)	2 (Mar-Apr)	3 (May-Jun)	4 (Jul-Aug)	5 (Sep-Oct)	6 (Nov Dec)	Total
	Shore						
2014	0	2,585	0	0	0	9,661	12,246
2015	0	24,580	5,230	0	3,629	0	33,439
2016	0	0	16,658	0	1,906	0	18,563
2017	0	4,921	0	26,137	0	7,806	38,865
2018	0	15,177	0	0	0	0	15,177
Average	0	9,453	4,378	5,227	1,107	3,493	23,658
	Charter						
2014	15,529	23,143	36,296	37,648	13,643	8,769	135,028
2015	10,565	37,494	36,151	28,297	8,560	6,405	127,471
2016	22,832	19,559	51,443	26,243	11,157	11,934	143,168
2017	22,274	12,394	24,913	17,482	5,243	22,193	104,499
2018	18,346	11,500	39,557	8,645	3,223	5,717	86,987
Average	17,909	20,818	37,672	23,663	8,365	11,004	119,431
	Private/Rental						
2014	44,011	181,549	215,978	519,085	72,589	173,548	1,206,760
2015	93,354	75,375	178,400	272,836	142,895	133,309	896,170
2016	91,774	57,198	199,822	212,818	88,587	101,660	751,858
2017	48,708	84,566	222,760	157,890	45,657	198,293	757,874
2018	73,295	129,137	278,331	233,233	178,261	72,764	965,022
Average	70,228	105,565	219,058	279,172	105,598	135,915	915,537
	All						
2014	59,540	207,277	252,274	556,733	86,232	191,978	1,354,034
2015	103,919	137,449	219,781	301,133	155,084	139,714	1,057,080
2016	114,606	76,757	267,923	239,061	101,650	113,594	913,589
2017	70,982	101,881	247,673	201,509	50,900	228,292	901,238
2018	91,641	155,814	317,888	241,878	181,484	78,481	1,067,186
Average	88,138	135,836	261,108	308,063	115,070	150,412	1,058,625

Source: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads

* Texas and headboat information unavailable. LA effort estimates are not currently available. However, landings were negligible and thus catch effort is likely negligible. No catch effort occurred in Mississippi or Texas.

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

Headboat angler days were fairly stable across the Gulf states from 2014 through 2018 (Table 3.4.2.6). There was, however, a noticeable peak in reported angler days in Florida in 2016 and modest fluctuations elsewhere. On average (2014 through 2018), Florida accounted for the majority of headboat angler days reported, followed by Texas and Alabama; whereas, Mississippi and Louisiana combined accounted for only a small percentage.

Table 3.4.2.6. Gulf headboat angler days and percent distribution by state (2014-2018).

	Angler Days				Percent Distribution			
	FL	**AL**	**MS-LA****	**TX**	**FL**	**AL**	**MS-LA**	**TX**
2014	174,599	16,766	3,257	51,231	71.0%	6.8%	1.3%	20.8%
2015	176,375	18,008	3,587	55,135	69.7%	7.1%	1.4%	21.8%
2016	183,147	16,831	2,955	54,083	71.3%	6.5%	1.1%	21.0%
2017	178,816	17,841	3,189	51,575	71.1%	7.1%	1.3%	20.5%
2018	171,996	19,851	3,235	52,160	69.6%	8.0%	1.3%	21.1%
Average	176,987	17,859	3,245	52,837	70.5%	7.1%	1.3%	21.1%

Source: NMFS SRHS.
**Headboat data from Mississippi and Louisiana are combined for confidentiality purposes.

Permits

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

A federal charter/headboat (for-hire) vessel permit is required for fishing in federal waters for Gulf reef fish. Gulf reef fish for-hire permits are limited access permits. From a historical perspective, the number of permits that were valid in a given year has continually decreased over the past several years, as illustrated in Table 3.4.2.5. However, the rate of attrition with for-hire reef fish permits has been relatively slow and far less compared to commercial reef fish permits.

As of February 27, 2020, there were 1,270 valid or renewable for-hire reef fish permits, 1,179 of which were valid. A renewable permit is an expired limited access permit that cannot be actively fished, but is renewable for up to one year after expiration.

Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel and vessels may operate in both capacities. However, if a vessel meets the selection criteria used by the SRHS and is selected to report by the Science Research Director of the SEFSC, it is determined to operate primarily as a headboat and is required to submit harvest and effort information to the SRHS.

Table 3.4.2.7. Number of valid or renewable for-hire Gulf reef fish permits, 2008-2019.

Year	Number of Permits
2008	1,458
2009	1,417
2010	1,385
2011	1,353
2012	1,336
2013	1,323
2014	1,310
2015	1,294
2016	1,282
2017	1,280
2018	1,279
2019	1,277

Source: NMFS SERO SF Access Permits Database.

The number of federally permitted Gulf headboats in the SRHS ranged from 68 in 2014 and 2015 to 72 in 2018 (K. Fitzpatrick, NMFS SEFSC, pers. comm.). Souza and Liese (2019) estimate that approximately 10% of all permitted Southeast (Gulf and South Atlantic) for-hire vessels determined to be headboats were not actively fishing in 2017.[37] Further, of those that were active, 14% were not active in offshore waters. Thus, approximately 23% of the permitted Southeast headboats were likely not active in the EEZ. With respect to permitted Gulf charter vessels, they estimate that 24% were not active in 2017, while 10% of those that were active were not active in offshore waters. Thus, approximately 34% of the permitted Gulf charter vessels were likely not active in the EEZ in 2017.

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

Economic Value

[37] Sample sizes were too small to generate reliable estimates for Gulf and South Atlantic headboats separately.

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The economic value of this satisfaction is referred to as consumer surplus (CS). The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips. For example, the estimated value of the CS for catching and keeping a second red snapper[38] on an angler trip is approximately $85 (2019$), and decreases thereafter (approximately $57 for a third red snapper, $42 for a fourth red snapper, and $34 for a fifth red snapper) (Carter and Liese 2012). In comparison, the estimated value of the CS for catching and keeping a grouper is approximately $110 for the second fish, $73 for the third fish, $54 for the fourth fish, and $43 for the fifth fish (Carter and Liese 2012).

Estimates of average annual gross revenue for charter vessels in 2009 are provided in Savolainen, et al. (2012). According to Savolainen, et al. (2012), the average annual gross revenue for a Gulf headboat is $271,794 while the average annual gross revenue for a Gulf charter vessel is $89,670 (2019$). More recent estimates of average annual gross revenue for Gulf headboats are provided in Abbott and Willard (2017) and D. Carter (pers. comm., March 15, 2018). Abbott and Willard (2017) suggest that Savolainen, et al.'s estimate of average annual gross revenue for headboats may be an underestimate as data in the former suggest that average gross revenue in 2009 for the vessels in their sample was about $480,000 (2019$). Further, their data suggests average annual gross revenue per vessel had increased to about $580,000 (2019$) by 2014. However, Abbott and Willard's estimates are based on a sample of 17 headboats that chose to participate in the Headboat Collaborative Program in 2014 while Savolainen, et al.'s are based on a random sample of 20 headboats. The headboats that participated in the Collaborative may be economic highliners, in which case Abbott and Willard's estimates would overestimate average annual gross revenue for Gulf headboats. D. Carter (2018) recently estimated that average annual gross revenue for Gulf headboats were approximately $427,600 (2019$) in 2017. This estimate is likely the best current estimate of annual gross revenue for Gulf headboats as it is based on a relatively large sample of 63 boats, or more than 90% of the active fleet, and is more recent.

However, gross revenues overstate the annual economic value and profits generated by for-hire vessels. Economic value for for-hire vessels can be measured by annual PS. In general, PS is the amount of money a vessel owner earns in excess of variable (trip) costs. Economic profit is the amount of money a vessel owner earns in excess of variable and fixed costs, inclusive of all implicit costs, such as the value of a vessel owner's time as captain and as entrepreneur, and the cost of using physical capital (i.e., depreciation of the vessel and gear). In 2019$, Savolainen, et al. (2012) estimated the annual PS for Gulf headboats and charter vessels was approximately $190,167 and $58,990, respectively. Their best estimates of economic profit were $79,340 and $26,514 (2019$), respectively.[39] Estimates of PS and economic profit for headboats is not available from Abbott and Willard (2017) or D. Carter (2018) as they did not collect

[38] The study only considered trips with at least one fish caught and kept in its experimental design; thus, an estimate for the first caught and kept fish is not available.
[39] Although Savolainen, et al. (2012) account for all explicit variable and fixed costs, they do not account for implicit costs, and thus they over-estimate actual economic profits for these vessels.

comprehensive cost data at the vessel level.[40]

With regard to for-hire trips, economic value can be measured by PS per angler trip, which represents the amount of money that a vessel owner earns in excess of the cost of providing the trip. Estimates of revenue, costs, and trip net revenue trips taken by headboats and charter vessels in 2017 are available from Souza and Liese (2019). They also provide estimates of trip net cash flow per angler trip, which are approximates of PS per angler trip. As shown in Table 3.4.2.5, after accounting for transactions fees, supply costs, and labor costs, net revenue per trip was 42% of revenue for Gulf charter vessels and 54% of revenue for Southeast headboats, or $780 and $1,812 (2019$), respectively. Given the respective average number of anglers per trip for each fleet, PS per trip is estimated to be $141 for charter vessels and $64 for headboats.

Table 3.4.2.8. Trip economics for offshore trips by Gulf charter vessels and Southeast headboats in 2017 (2019$).

	Gulf Charter Vessels	Southeast Headboats
Revenue	100%	100%
Transaction Fees (% of revenue)	3%	6%
Supply Costs (% of revenue)	27%	19%
Labor Costs (% of revenue)	27%	22%
Net Revenue per trip including Labor costs (% of revenue)	42%	54%
Net Revenue per Trip	$780	$1,812
Average # of Anglers per Trip	5.5	28.2
Trip Net Cash Flow per Angler Trip	$141	$64

Economic Impacts

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

Estimates of the economic impacts (business activity) associated with recreational angling for Gulf reef fish were calculated using average trip-level impact coefficients derived from the 2016 Fisheries Economics of the U.S. report (NMFS 2018b) and underlying data provided by the NOAA Office of Science and Technology. Economic impact estimates were adjusted to 2018 dollars using the annual, not seasonally adjusted gross domestic product implicit price deflator provided by the U.S. Bureau of Economic Analysis.[41]

Recreational fishing generates economic impacts (business activity). Business activity for the recreational sector is characterized in the form of jobs (full- and part-time), income impacts

[40] Abbott and Willard (2017) do report revenue net of fuel costs, but this ignores important costs such as processing fees, commissions, ice, bait, tackle, and labor.
[41] The recreational economic impact model has not yet been updated to generate estimates in 2019$.

(wages, salaries, and self-employed income), value-added impacts (the difference between the value of goods and the cost of materials or supplies), and output impacts (gross business sales). Estimates of the average red grouper target effort by mode and state (2014 through 2018) and the associated business activity are provided in Table 3.4.2.9.

Table 3.4.2.9. Estimated economic impacts from average annual Gulf red grouper recreational target trips by state and mode (2014-2018), using state-level multipliers. All monetary estimates are in thousands of 2018$ and employment is in full-time equivalent jobs.*

Mode		FL	AL
Shore	Target Trips	29,284	0
	Value Added Impacts	$1,040	$0
	Sales Impacts	$1,625	$0
	Income Impacts	$548	$0
	Employment (Jobs)	15	0
Charter	Target Trips	40,918	0
	Value Added Impacts	$13,879	$0
	Sales Impacts	$23,307	$0
	Income Impacts	$8,111	$0
	Employment (Jobs)	221	0
Private	Target Trips	460,373	294
	Value Added Impacts	$16,091	$13
	Sales Impacts	$24,940	$20
	Income Impacts	$8,443	$5
	Employment (Jobs)	235	0
All	Target Trips	530,576	294
	Value Added Impacts	$31,010	$13
	Sales Impacts	$49,872	$20
	Income Impacts	$17,102	$5
	Employment (Jobs)	472	0

Source: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-data-downloads.
* Headboat information is unavailable. LA effort estimates are not currently available. However, landings were negligible and thus target effort is likely zero. No target effort occurred in Mississippi or Texas.

The estimates provided in Table 3.4.2.9 use state-level multipliers and thus only apply at the state-level. For example, estimates of business activity in Florida represent business activity in Florida only and not to other states (for e.g., a good purchased in Florida may have been manufactured in a neighboring state) or the nation as a whole. The same holds true for each of the other states. Income impacts should not be added to output (sales) impacts because this would result in double counting. The results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species.

Addition of the state-level estimates to produce a regional (or national) total may underestimate the actual amount of total business activity because state-level impact multipliers do not account for interstate and interregional trading. National-level multipliers must be used to account for interstate and interregional trading. Between 2014 and 2018, and using national-level multipliers, red grouper target effort generated employment, income, value-added, and output (sales) impacts of 570 jobs, $27 million, $47.7 million, and $83.9 billion per year, respectively, on average. These estimates are considerably less than the economic impacts in GMFMC (2016) based on target effort from 2011-2015, which reflects the significant decline in red grouper target effort after 2015.

Estimates of the economic impacts resulting from headboat target effort for reef fish are not available. Headboat vessels are not covered in MRIP so, in addition to the absence of estimates of target effort, estimates of the appropriate business activity coefficients for headboat effort have not been generated.

3.5 Description of the Social Environment

This section provides community background and current descriptions of red grouper fishing for which the proposed actions will be evaluated in Chapter 4. The following description focuses on both the commercial and recreational sector fishing communities that can be identified as having some relationship to the red grouper fishery. Recent amendments, Reef Fish Amendment 36A (GMFMC 2017b) and the Framework Action to Adjust Red Grouper Allowable Harvest (2016), include additional detailed descriptions of both sectors.

3.5.1 Commercial Sector

As mentioned earlier, red grouper is one species in a multispecies IFQ program established through Amendment 29 to the reef fish management plan (GMFMC 2008a) which means that commercial red grouper is required to be landed through IFQ dealers only. The commercial fishing community description is predicated on landings by vessel homeport which provide one perspective on the importance of the species within a community. As mentioned, information on commercial fishing communities was included in the Reef Fish Amendment 36A (GMFMC 2017b) that includes community demographics and discussions of historic participation with the red grouper component of the reef fish fishery.

Another important factor in the harvest of commercial red grouper is the longline endorsement (Reef Fish Amendment 31, 2010) which requires reef fish BLL fishing to be restricted to outside the 35-fathom depth contour from June – August without an endorsement. Some vessels switched gear types to use bandit reels to fish within the restricted area while others either sought to purchase the limited access endorsements or fished further offshore (see GMFMC 2010a for discussion of impacts). Since most red grouper is harvested off the west coast of Florida, the majority of communities that are involved in the fishery are located there and will be discussed in the following description of the commercial sector.

Another recent factor that has affected red grouper harvest are the red tide events that have occurred over the past few years, with red tide affecting the Middle Grounds in 2015 and Southwest Florida in 2018. According to interviews conducted with fishermen (Karnauskas et al., 2019) red tide events seemed shorter and patchier in their appearance from year to year in the past. More recently these events seem to be more widespread and occur for longer periods of time. These events seem to affect red grouper more than other species and have forced fishermen to change fishing behavior by switching to other species or changing their fishing location.

Vessels

As mentioned earlier, the majority of red grouper landings are along the west coast of Florida. That is reflected in Table 3.5.1.1 where the top ten counties with vessels having red grouper landings in 2018 are all in Florida. Pinellas County has the most vessels with landings, while Bay County is second with less than half the number of vessels in Pinellas. Lee County is third, with Franklin County fourth, followed by Manatee County.

Table 3.5.1.1. Number of vessels landing red grouper by top 10 county homeports.

State	County	Vessels
FL	Pinellas	94
FL	Bay	43
FL	Lee	28
FL	Franklin	21
FL	Manatee	17
FL	Monroe	16
FL	Okaloosa	14
FL	Wakulla	13
FL	Citrus	10
FL	Collier	9

Source: IFQ database accessed 2/20/2020 NOAA Fisheries, NMFS, SERO.

The number of vessels with red grouper landings by community (Figure 3.5.1.2) shows that Panama City has the most vessels, with Madeira Beach second. Tarpon Springs is third, with Apalachicola fourth, and Key West follows within the top five communities.

Table 3.5.1.2. Number of vessels landing red grouper by top 10 community homeports.

State	Community	Vessels
FL	Panama City	37
FL	Madeira Beach	23
FL	Tarpon Springs	18
FL	Apalachicola	14
FL	Key West	14
FL	Cortez	12
FL	Destin	10
FL	Panacea	8
FL	Fort Myers	8
FL	Crystal River	8

Source: IFQ database accessed 2/20/2020 NOAA Fisheries, NMFS, SERO.

In Figure 3.5.1.1 the regional quotient (rq) for pounds of red grouper landed is provided for 2018 by county homeport. The rq is the amount of red grouper landed within a particular geographical location out of all red grouper landed within the region. All of the top ten counties are in Florida as would be expected, in fact the top twenty counties are all in Florida. Pinellas County remains the top county and has been throughout the recent history of the fishery. Manatee County follows in second, with Lee County third, and Franklin and Sarasota rounding out the top five counties.

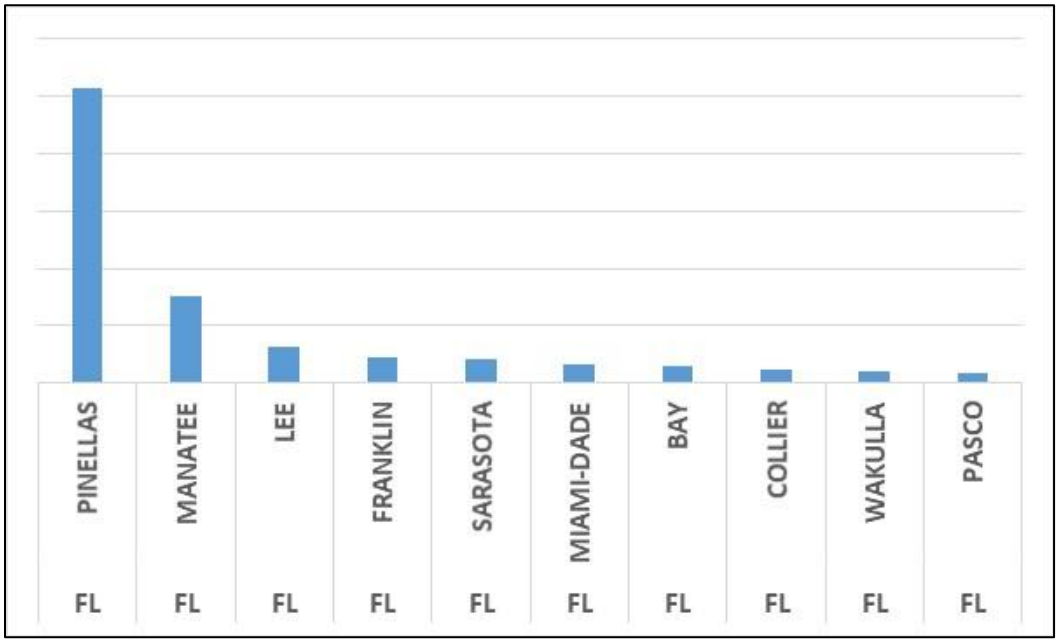

Figure 3.5.1.1. Red grouper regional quotient by top 10 homeport counties.
Source: IFQ database accessed 2/20/2020 NOAA Fisheries, NMFS, SERO.

Madeira Beach and Cortez are the leading communities in terms of rq for red grouper (Figure 3.5.1.2). The communities of Largo, Redington Shores and Tarpon Springs are next in terms of rq with nearly equal amounts. The difference in terms of rq and the number of vessels within a homeport is likely due to differences in predominant gear type used by the vessels within a community, e.g. bandit reel vs longline. The community of Cortez has fewer vessels and ranks

sixth in number of vessels landing red grouper, but ranks second in terms of regional quotient. This is likely due to the fact that most vessels in Cortez are longline vessels which make longer trips and land more red grouper per trip. Other ports may have a mix of vessel types.

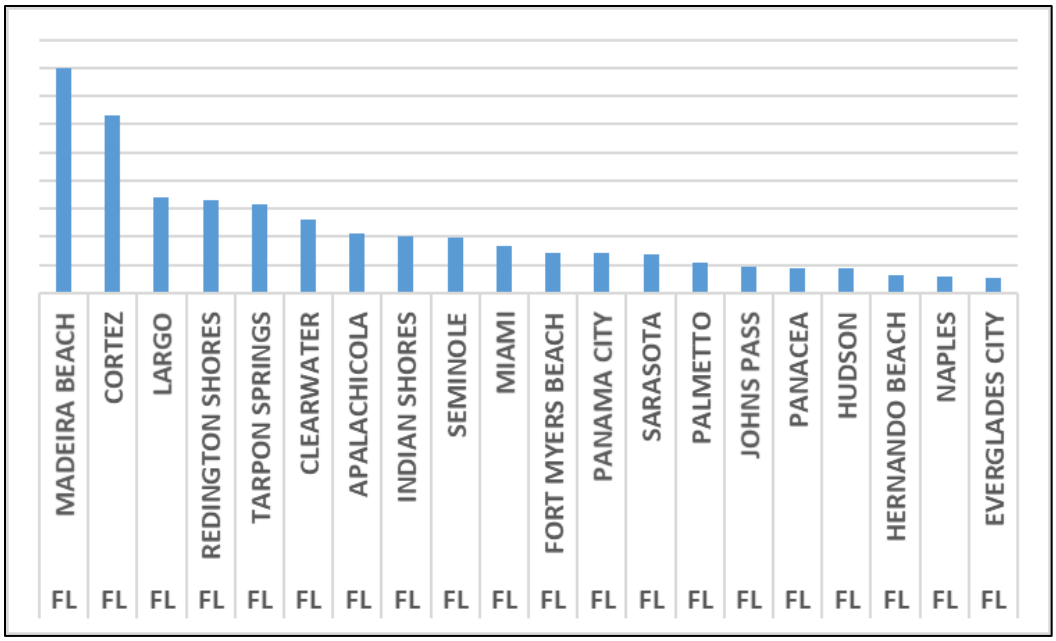

Figure 3.5.1.2. Red grouper regional quotient by top 20 homeport communities.
Source: IFQ database accessed 2/20/2020 NOAA Fisheries, NMFS, SERO.

Commercial fishing engagement

Figure 3.5.1.3 is an overall measure of a community's commercial fishing engagement. Most communities in Figure 3.5.1.3 would be considered to be highly or moderately engaged in commercial fishing as many are at or above 1 standard deviation of the mean factor score and all have been at ½ standard deviation at one point in time. Redington Shores, Indian Shores, and Palmetto show the least amount of engagement in commercial fishing overall, while most of the others are highly engaged, having engagement scores over 1 standard deviation if not over ½ standard deviation. Few communities are highly reliant, although communities like Panacea, Apalachicola and Cortez seem to exhibit fairly high reliance with moderate to high engagement.

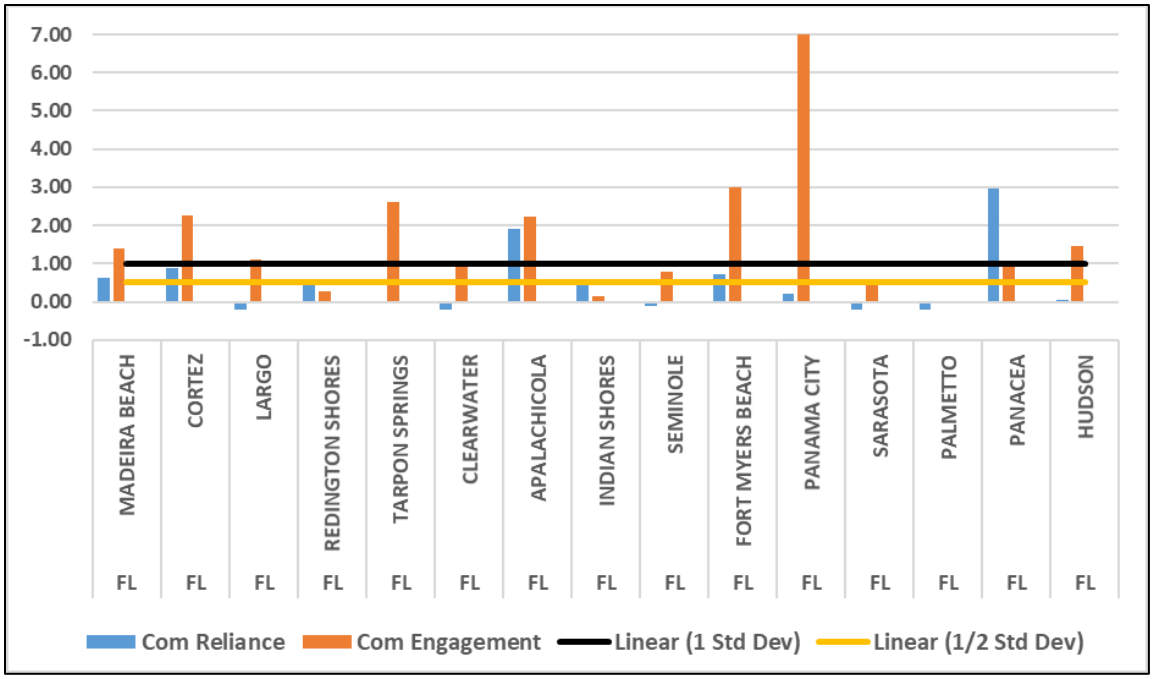

Figure 3.5.1.3. Commercial fishing engagement and reliance of the top 15 red grouper homeports for 2017.

Source: Social Indicators Database, NOAA Fisheries, NMFS, SERO.

3.5.2 Recreational Sector

Although we do not have data that would allow for a recreational rq, we do have an overall measure of recreational fishing engagement and reliance for communities along Florida's west coast. The communities were chosen because of their location and likely participation in the red grouper component of the reef fish fishery. This engagement and reliance measures consist of recreational permit and infrastructure counts (boat ramps and marinas) within a community to gauge absolute recreational fishing activity and relative to its population. These measures are not specific to red grouper, but a measure of overall recreational fishing. Figure 3.5.2.1 indicates that most of these communities have a high engagement in recreational fishing as most are at or above the 1 standard deviation threshold, with Destin having the highest engagement score. Horseshoe Beach is not highly or moderately engaged but does demonstrate high reliance on recreational fishing. This is due to its small population and probably a small amount of infrastructure related to recreational fishing, but substantial enough for a small community to depend on it for a good portion of its local economy. Other smaller communities like St. Marks, Cedar Key, Apalachicola and Carrabelle also demonstrate high reliance on recreational fishing.

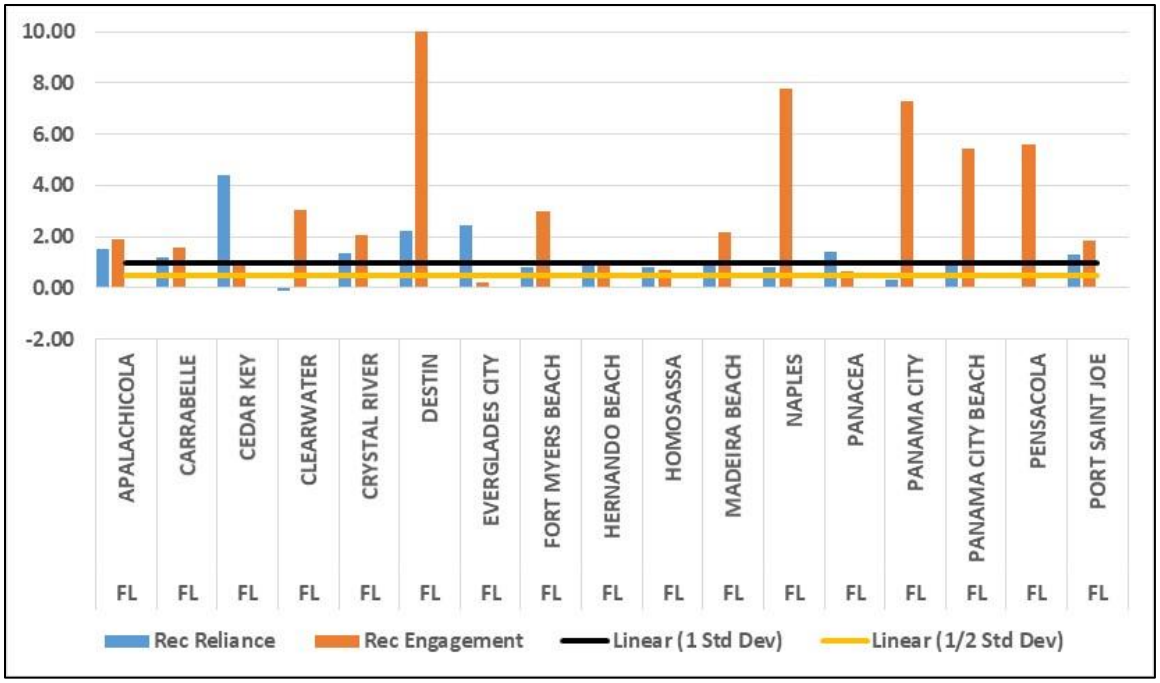

Figure 3.5.2.1. Recreational fishing engagement and reliance for communities on Florida's west coast for 2017.
Source: Social Indicators Database 2017, NOAA Fisheries, NMFS, SERO.

The brief description of fishing activities presented here highlights which communities may be most involved in red grouper fishing. It is expected that the impacts from the regulatory action in this amendment, whether positive or negative, will most likely affect those communities identified above. At this time, it is not possible to provide a more detailed description of vessel involvement at the community level. It is likely that certain vessels within a community are more dependent upon red grouper than others, as are particular households. Until those types of data become accessible, the impacts upon either vessels or households within communities cannot be determined.

3.5.3 Environmental Justice Considerations

Executive Order 12898 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. This executive order is generally referred to as environmental justice (EJ).

Commercial and recreational anglers 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 community's overall status with regard to minorities and poverty (e.g., census data), such information is not available specific to anglers and those involved in the industries and activities, themselves. To

help assess whether any EJ concerns arise from the actions in this amendment, a suite of indices was 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 3.5.3.1 provides the social vulnerability index scores of the top commercial and recreational communities that have been identified as having some association with red grouper. Some communities appear in both figures to allow comparison with other communities included in that sector. The communities of Carrabelle and Crystal River both exceed the threshold of 1 standard deviation for poverty, with Cedar Key close to that threshold, demonstrating some vulnerability when combined with other index scores. Several communities exceed the threshold of 1/2 standard deviation above the mean for more than one index (Carrabelle, Crystal River and Panama City). These fishing communities would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change. Most communities on Florida's west coast exhibit few vulnerabilities.

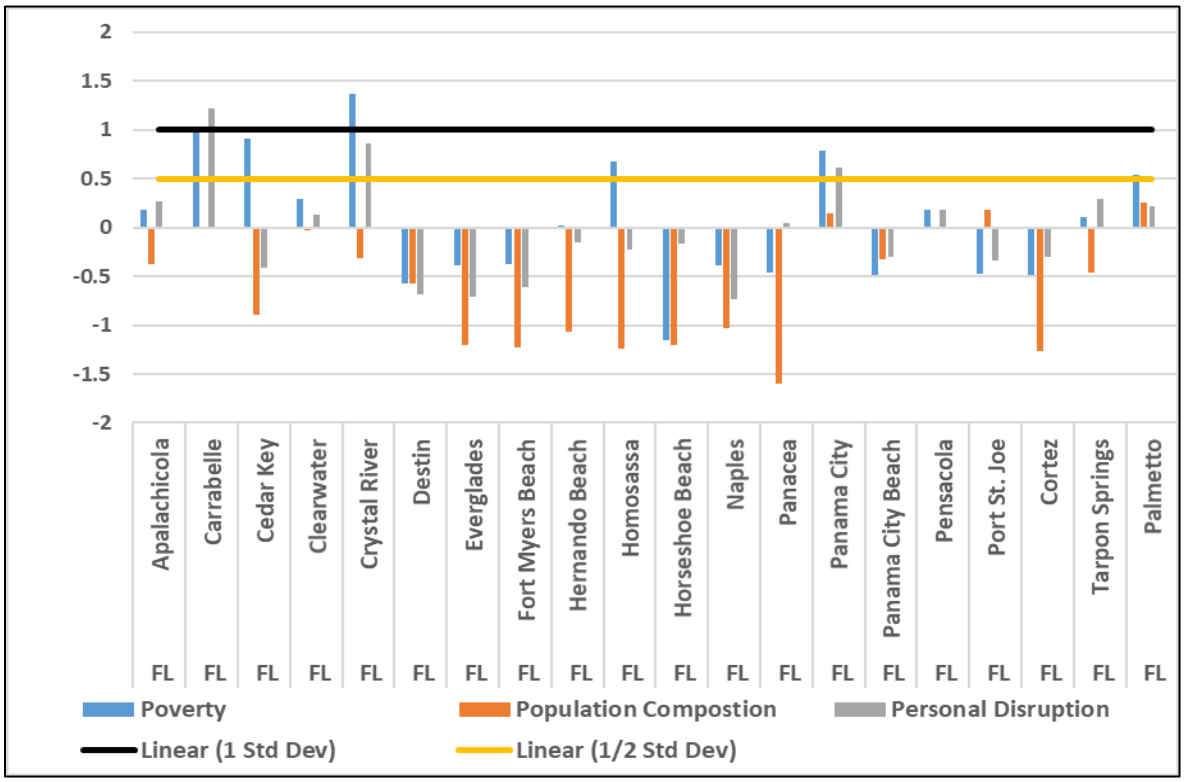

Figure 3.5.3.1. Community social vulnerability indices for communities on Florida's west coast.
Source: Social Indicators Database 2020 (ACS 2016), NOAA Fisheries, SERO.

Although no EJ issues have been identified or are expected to arise, information on the race and income status for groups at the different participation levels (for-hire captains and crew, and employees of associated support industries, etc.) is not available. There is no known subsistence consumption of red grouper, nor are there any claims to customary subsistence consumption of red grouper by any indigenous or tribal group in the Gulf. One aspect that should be noted is that the community of Cortez, Florida is recognized as being on the National Register of historic places. The working waterfront where many fish houses and boat yards are located are within that historic district.

3.6 Description of the Administrative Environment

3.6.1 Federal Fishery Management

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

Responsibility for federal fishery management is shared by the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix A. In most cases, the Secretary has delegated this authority to NMFS.

The Council is responsible for fishery resources in federal waters of the Gulf. These waters extend to 200 nautical miles offshore from the seaward boundaries of the Gulf States 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 of 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

The Council consists of seventeen voting members: 11 public members appointed by the Secretary; one each from the fishery agencies of Texas, Louisiana, Mississippi, Alabama, and Florida; and one from NMFS. The public is also involved in the fishery management process through participation on advisory panels and through Council meetings that, with few exceptions for discussing personnel matters, are open to the public. The regulatory process is also in accordance with the Administrative Procedures Act, in the form of "notice and comment"

rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

Regulations contained within FMPs are enforced through actions of NOAA's Office of Law Enforcement, the United States Coast Guard, and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. These activities are being coordinated by the Council's Law Enforcement Technical Committee and the Gulf States Marine Fisheries Commission's Law Enforcement Committee, which have developed joint enforcement agreements and cooperative enforcement programs.[42]

Reef fish stocks are assessed through the SEDAR process. As species are assessed, stock condition and acceptable biological catch levels are evaluated. As a result, periodic adjustments to stock ACLs and other management measures are deemed needed to prevent overfishing. Management measures are implemented through plan or regulatory amendments.

3.6.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf States exercises legislative and regulatory authority over their respective state's natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided on their respective web pages (Table 3.6.2.1).

Table 3.6.2.1. 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/

[42] www.gsmfc.org

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1 – Modify the Sector Allocations, OFL, ABC, and ACLs for Gulf of Mexico (Gulf) Red Grouper

4.1.1 Direct and Indirect Effects on the Physical Environment

A brief summary of red grouper use of the physical environment is provided in Section 3.2. A more detailed description is included in the Generic Essential Fishery Habitat (EFH) Amendment (GMFMC 2004a) and Amendment 32 (GMFMC 2011b) which are incorporated by reference. The effects of fishing gears used in the reef fish fishery on the physical environment are also briefly described in Section 3.2 and in more detail in Amendment 32.

The degree to which a habitat is affected by fishing gear depends largely on the vulnerability of the affected habitat to disturbance, and on the rate that the habitat can recover from disturbance (Barnette 2001). For example, the complex structure and vertical growth pattern of coral reef species makes reef habitat more vulnerable to adverse impacts from fishing gear and slower to recover from such impacts than sand and mud bottom habitat (Barnette 2001). Red grouper is also associated with hard bottom habitat, but tend to prefer lower relief habitat than other grouper species such as gag.

The primary effects of grouper fishing on the physical environment generally result from fishing gear interactions with the sea floor. Most grouper are caught with hook-and-line fishing gear, although some spearfishing does occur. Fishing gear can damage or disturb bottom structures, and occasionally incidentally harvest such habitat.

Longlines

Commercial longline gear is deployed over hard bottom habitats when targeting red grouper using weights to keep the gear in direct contact with the bottom. Its potential for adverse impact is dependent on the type of habitat it is set on, the presence or absence of currents, and the behavior of fish after being hooked. In addition, this gear upon retrieval can abrade, snag, and dislodge smaller rocks, corals, and sessile invertebrates (Bohnsack in Hamilton, 2000; Barnette 2001). Direct underwater observations of longline gear in the Pacific halibut fishery by High (1998) noted that the gear could sweep across the bottom. Some halibut were observed pulling portions of longlines 15 to 20 feet over the bottom. Although the gear was observed in contact with or snagged on a variety of objects including coral, sturdy flexible corals usually appeared unharmed while hard corals often had portions broken off. However, another study that directly observed deployed longline gear (Atlantic tilefish fishery) found no evidence that the gear shifted significantly, even when set in currents. This was attributed to anchors set at either end of the longline as well as sash weights along the line to prevent movement (Grimes et al. 1982). Based on the direct observations, it is logical to assume that bottom longline gear would have a minor impact on sandy or muddy habitat areas. However, due to the vertical relief that hard

bottom and coral reef habitats provide, it would be expected that bottom longline gear may become entangled, resulting in potential negative impacts to habitat (Barnette 2001).

Vertical lines

Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus vertical line gear fishing generally occurs over hard bottom areas (GMFMC 2004a). Vertical lines include multi-hook lines known as bandit gear, handlines, and rod-and-reels. Vertical-line gear is less likely to contact the bottom than longlines, but still has the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001). In using bandit gear, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). The gear is in direct contact with the bottom for only a short period of time. Barnette (2001) suggests that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers). Commercial or recreational fishing with rod-and-reel and handlines also puts gear on the bottom. The terminal part of the gear is either lifted off the bottom like fishing with bandit gear, or left contacting the bottom. Sometimes the fishing line can become entangled on coral and hard bottom outcroppings. The subsequent algal growth can foul and eventually kill the underlying coral (Barnette 2001). Researchers conducting studies in the Madison-Swanson Marine Protected Area reported seeing lost fishing line on the bottom, much of which appeared to be fairly old and covered with growth (A. David, pers comm), a clear indication that bottom fishing has had an impact on the physical environment prior to fishing being prohibited in the area (GMFMC 2003). The National Fish and Wildlife Foundation, in issuing grants to remove marine debris, established monofilament fishing line is a priority marine debris issue.

Anchor damage is also associated with vertical-line fishing vessels, particularly by the recreational sector where fishermen may repeatedly visit well marked fishing locations. Bohnsack in Hamilton (2000) showed that “favorite” fishing areas such as reefs are targeted and revisited multiple times, particularly with the advent of global positioning technology. The cumulative effects of repeated anchoring could damage the hard bottom areas where fishing for grouper occurs.

Spear and Powerhead

Spear guns and slings are used in both commercial and recreational grouper fishing but are a relatively minor component of both. Barnette (2001) cited a study by Gomez et al. (1987) that concluded that spearfishing on reef habitat may result in some coral breakage, but damage is probably negligible. In addition, there could be some impacts from divers touching coral with hands or from resuspension of sediment by fins (Barnette 2001). Such impacts should be negligible to non-existent for well-trained and experienced spear fishermen who stay in the water column and avoid contact with the bottom, but would be expected to occur among spear fisherman who are less experienced, which would include more recreational fishermen.

Effects

This action could affect the physical environment (directly and indirectly) if changes in the allocation result in a shift in the use of fishing gear types used to harvest the stock annual catch

limits (ACLs). Under **Alternatives 2-5**, all the yield streams that provide overfishing limits (OFLs) are based on a fixed level of fishing mortality ($F_{30\%SPR}$). The difference is that the application of the sector fishing selectivities to the different allocations yields different OFLs, and subsequent acceptable biological catches (ABCs). Under the stock ACLs, **Alternative 1**, no action, would likely have the greatest effect on the physical environment (5.26 mp gw using the recreational Fishing Effort Survey-adjusted Marine Recreational Information Program [MRIP-FES] equivalent units). This alternative is then followed by **Alternative 2** (4.90 mp gw), **Alternative 4** (4.30 mp gw), **Alternative 5** (4.28 mp gw), and **Alternative 2** (4.26 mp gw) in descending order of ACLs and effects. **Alternatives 3-5** have very similar stock ACLs (4.26-4.30 mp gw) and any effects would be expected to be very similar.

In general, the effects from the recreational and commercial sectors on the physical environment would be opposite. Where commercial ACLs increase, recreational ACLs decrease. Thus, the effects from the sectors on this environment likely offset each other to a certain extent. Given longlines are a commercial gear type, where the commercial ACL is greater, the effects from longlines would be expected to be greater. The recreational sector primarily uses vertical gear, so where recreational ACLs are greater, effects on the physical environment from this gear type would be expected to be greater.

4.1.2 Direct and Indirect Effects on the Biological Environment

Direct and indirect effects from fishery management actions have been discussed in detail in Amendments 30B (GMFMC 2008c) and 32 (GMFMC 2011b) as well as in several red grouper framework actions (GMFMC 2010b, 2012d, 2014b, 2016a, 2019a) and are incorporated here by reference. Potential impacts of the 2010 *Deepwater Horizon MC252* oil spill and red tide on the biological/ecological environment are discussed in Section 3.3, the aforementioned references, and are incorporated here by reference. These impacts may include recruitment failure and reduced fish health. Management actions that affect this environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size. Fishing gears have different selectivity patterns which refer to a fishing method's ability to target and capture organisms by size and species. This would include the size distribution of fish caught by the gear as well as the number of discards, mostly sublegal fish or fish caught during seasonal closures, and the mortality associated with releasing these fish.

Fishing can affect life history characteristics of reef fish such as growth and maturation rates. For example, Lombardi-Carlson et al. (2006) found that the mean size of gag at age was larger pre-1990 than in post-1990 years and suggests this decrease may be due to fishing. In red snapper, Fischer et al. (2004) and Nieland et al. (2007) found that the average size-at-age of red snapper had declined and associated this trend with fishing pressure. However, this trend has not been linked to fishing effort for Gulf red grouper (Lombardi-Carlson et al., 2008). The reef fish fishery can also affect species outside the reef fish complex. Section 3.3 discusses determinations by NMFS with how the fishery interacts listed and endangered species. Specifically, sea turtles have been observed to be directly affected by the longline component of the Gulf reef fish fishery resulting with some incidental captures and are summarized in

GMFMC (2010a and 2019b). The last biological opinion by the National Marine Fisheries Service (NMFS) concluded the Gulf reef fish fishery as managed by the Reef Fish FMP is not likely to jeopardize the continued existence of sea turtles, smalltooth sawfish, or table coral species (NMFS 2011). NMFS has requested a re-initiation of consultation on the Reef Fish FMP.

This action could affect the biological/ecological environment (directly and indirectly) because changes in the allocation result in a shift in sector selectivity patterns, which influences the resulting OFL, ABC, and stock ACL. **Alternative 1**, no action, would have the greatest adverse effect on the red grouper population as the commercial ACL and recreational ACL (using MRIP-FES units for comparison purposes) would allow for harvests above **Alternative 2**'s ABC even though both alternatives have the same allocation. Thus, the likelihood of overfishing under **Alternative 1** would be greater than **Alternative 2**, assuming NMFS can constrain harvests to the sector ACLs. The likelihood of overfishing under **Alternatives 2-5** would be similar as the management goal is the same. Under **Alternatives 2-5**, all the OFLs are based on a fixed level of fishing mortality ($F_{30\%SPR}$), and thus each of these alternatives would result in a similar stock size ($B_{30\%SPR}$). The difference in the alternatives is where more fish are allocated to the recreational sector, total landings have to be constrained more to account for the greater dead discards from recreational red grouper fishing.

The relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict with any accuracy. It is possible that forage species and competitor species could increase or decrease in abundance in response to a decrease or increase in red grouper abundance. However, the relationships between red grouper and non-target species caught on trips where red grouper are directly targeted are not fully understood. Further, substantial changes in the prosecution of the reef fish fishery are not expected from this action because the fishery is comprised of many species and so fishermen have harvesting choices. As a result, no additional effects to non-target species or protected resources (see Section 3.3) are anticipated.

4.1.3 Direct and Indirect Effects on the Economic Environment

Commercial Sector

Alternative 1 (No Action) would maintain the current commercial sector allocation of 76% of the total ACL, as well as the current OFL, ABC, and recreational ACL. Alternative 1 would maintain a commercial sector ACL of 3.16 mp gw. Therefore, changes in economic value would not be expected to result from this alternative. While not legally viable as a preferred alternative, the landings expected to occur under **Alternative 1** and the associated economic value are still used in this analysis as the benchmark for changes in economic value for the other alternatives. The changes in producer surplus (PS) estimated in Table 4.1.3.1 capture the annual potential changes in PS from the commercial sector and assumes that the commercial sector lands the entire allocated ACT.

The economic impacts expected to result from **Alternatives 2-5** are analyzed as a function of the ACT. For Action 1, the current commercial buffer of 5% between the ACL and ACT is used to determine the ACT. An average dockside price from 2018 of $4.83 (2019 dollars) is used from Table 3.4.1.19 to calculate the change in PS, as displayed in Table 4.1.3.1.

Table 4.1.3.1. Expected change in landings for the red grouper commercial sector, expected change in revenue, and expected change in PS for **Alternatives 2-5**, relative to **Alternative 1**.

	Expected change in landings (mp gw)	Expected change in revenue	Expected change in PS
Alternative 2	0.53	$2,559,900	$614,376
Alternative 3	-0.60	-$2,898,000	-$695,520
Alternative 4	-0.53	-$2,559,900	-$614,376
Alternative 5	-0.57	-$2,753,100	-$660,744

Alternative 2 would be expected to result in an increase in revenue of $2,559,900, compared to **Alternative 1**, due to the increase in ACT. **Alternatives 3-5** would be expected to result in a decrease in revenue, relative to **Alternative 1**. Using the estimate of 24% as the average net cash flow from 2014-2016 in Table 3.4.1.22, **Alternative 2** would be expected to result in an increase in PS of $614,376, compared to **Alternative 1**. **Alternatives 3-5** would be expected to result in a decrease in PS, relative to **Alternative 1**.

The expected change in revenue in Table 4.1.3.1 also reflects the expected change in red grouper purchases by dealers. The average of the total red grouper purchases from 2014-2018 from Table 3.4.1.23 is $17,557,924. The expected change in revenue with **Alternative 2** would be expected to result in an increase of 14.58% of the average total red grouper purchases, compared with **Alternative 1**. The expected changes in revenue with **Alternatives 3-5** would be expected to result in, respectively, a decrease of 16.51%, 14.58%, and 15.68% of the average total red grouper purchases, compared with **Alternative 1**.

With the current commercial buffer of 5% between the ACL and ACT, the proposed increase in the ACL with **Alternative 2** would increase the availability of annual IFQ allocation for sale, compared with **Alternative 1**. As the supply of annual IFQ allocation increases, the allocation price would be expected to decrease. As shares reflect annual allocation, the expected decrease in allocation price under **Alternative 2** would be expected to result in a decrease in red grouper share price. In contrast, the proposed decrease in the ACL with **Alternatives 3-5** would decrease the availability of annual IFQ allocation for sale, compared with **Alternative 1**, and the allocation price would be expected to increase in response. The expected increase in allocation price under **Alternatives 3-5** would be expected to result in an increase in red grouper share price.

Changes in red grouper harvests, as a result of the change in ACT, could result in additional economic effects because of the potential effects on ex-vessel prices due to less (or more) red grouper on the markets. The potential effects to the consumer surplus are based on work on supply chains and markets by Asche (2020) and price flexibilities by Keithly and Tabarestani (2018). An average dockside price from 2018 of $4.83 (2019 dollars) is used from Table 3.4.1.12. An own-price flexibility of -0.533 is used from the Habit Formation model (Keithly and Tabarestani 2018) to derive the average price loss and change in CS for **Alternatives 2-5** in comparison to **Alternative 1** as seen in Table 4.1.3.2.

Table 4.1.3.2. Alternatives 2-5 - Proposed change in the red grouper commercial sector ACT (relative to **Alternative 1**) and associated estimated average price loss ($/lb) and change in CS.

Alternative	Change in ACT (mp gw)	Expected average price loss ($/lb)	Expected change in CS
Alternative 2	0.53	-$0.45	$1,605,475
Alternative 3	-0.60	$0.51	-$1,235,707
Alternative 4	-0.53	$0.45	-$1,123,378
Alternative 5	-0.57	$0.49	-$1,188,596

Under **Alternative 2**, the red grouper commercial sector ACT would increase by 0.53 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to increase by $1.605 million under **Alternative 2**, compared to **Alternative 1**. **Alternatives 3-5** result in decreases to the commercial sector ACT, relative to **Alternative 1**, resulting in decreases in CS. Compared to **Alternative 1**, the red grouper commercial sector ACT would decrease by 0.60 mp gw under **Alternative 3**, resulting in a decrease of the CS by $1.236 million. Under **Alternative 4**, the red grouper commercial sector ACT would decrease by 0.53 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to decrease by $1.123 million under **Alternative 4**, compared to **Alternative 1**. Compared to **Alternative 1**, the red grouper commercial sector ACT would decrease by 0.57 mp gw under **Alternative 5**, resulting in a decrease of the CS by $1.189 million.

Recreational Sector

Alternative 1 (No Action) would maintain the current recreational sector allocation of 24% of the total ACL, as well as the current OFL, ABC, and recreational ACL. Alternative 1 would maintain a recreational sector ACL of 1.00 mp gw (MRIP FES equivalent of 2.10 mp gw). Therefore, changes in economic value would not be expected to result from this alternative. While not legally viable as a preferred alternative, the landings expected to occur under **Alternative 1** and the associated economic value are still used in this analysis as the benchmark for changes in economic value for the other alternatives.

The economic impacts expected to result from **Alternatives 2-5** are analyzed as a function of the ACT. For Action 1, the current recreational buffer of 8% between the ACL and ACT is used to determine the ACT. The MRIP FES equivalent of the recreational sector ACL and ACT for **Alternative 1** is used in this analysis, in order to be in the same currency as the recreational sector ACLs and ACTs for **Alternatives 2-5**. The evaluation of changes in economic value

expected to result from ACT increases for the recreational sector is based on work by Carter and Liese (2012). The CS value per fish for a second red grouper kept is estimated at $110.00 (2019 dollars). A conversion factor of 1.05 between gutted weight and whole weight of red grouper is used (SEDAR 42 2015). Estimated increases in economic value are approximated by dividing the change in ACT by 6.51 lbs ww, which is the average weight of a Gulf recreationally landed red grouper from 2015-2017 (SEFSC SRHS data, accessed March 2018; MRIP Intercept data available at: https://www.st.nmfs.noaa.gov/st1/recreational/MRIP_Survey_Data/), to obtain the increase in number of red grouper, which is then multiplied by the CS value per fish of $110.00. The proposed changes in the recreational sector ACL and discounted estimates of associated changes in economic values for **Alternatives 2-5** are provided in Table 4.1.3.3.

Table 4.1.3.3. Alternatives 2-5 - Proposed change in the red grouper recreational sector ACL and ACT (relative to **Alternative 1**) and associated estimated change in CS.

	Change in ACL (mp ww)	Change in ACT (mp gw)	Expected change in CS (million 2019 dollars)
Alternative 2	-0.97	-0.84	-$14.903
Alternative 3	-0.39	-0.34	-$6.032
Alternative 4	-0.42	-0.37	-$6.565
Alternative 5	-0.40	-0.35	-$6.210

Under **Alternative 2**, the red grouper recreational sector ACT would decrease by 0.84 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to decrease by $14.903 million (in 2019 dollars) under **Alternative 2**, compared to **Alternative 1**. Compared to **Alternative 1**, the red grouper recreational sector ACT would decrease by 0.34 mp gw under **Alternative 3**, resulting in an expected decrease in CS by $6.032 million (in 2019 dollars). Under **Alternative 4**, the red grouper recreational sector ACT would decrease by 0.37 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to decrease by $6.565 million (in 2019 dollars) under **Alternative 4**, compared to **Alternative 1**. Compared to **Alternative 1**, the red grouper recreational sector ACT would decrease by 0.35 mp gw under **Alternative 5**, resulting in an expected decrease in CS by $6.210 million (in 2019 dollars).

The PS of the for-hire component of the recreational sector, being comprised of charter vessels and headboats, would be impacted by a change in the number of targeted trips. In the long run, factors of production such as labor and capital can be used elsewhere in the economy, and so only short-term changes to PS are expected. In the Gulf, headboat trips take a diverse set of anglers on a single vessel, generally advertising a diverse range of species to be caught. Therefore, an assumption that no headboat trips would be lost due to a change in ACT would be reasonable. However, charter vessel trips that are targeting red grouper may be subject to cancellation by anglers and are the focus of the recreational sector PS analysis.

Predicted closure dates based on recreational ACT are seen in Table 2.2.4. Charter vessel trips by 2-month wave from 2014-2018 targeting red grouper are seen in Table 3.4.2.4. Based on the predicted closure dates, **Alternative 1** would have no closure, **Alternative 2** would close in the 4th wave (July/August), and **Alternatives 3-5** would close in the 6th wave (November/December). The total number of canceled trips for **Alternative 2** would therefore

also include all of the targeted trips for the rest of year (waves 5 and 6). The number of trips cancelled in the wave in which the predicted closure date would occur, along with the total number of canceled trips, is shown in Table 4.1.3.4. The number of trips cancelled in the interrupted wave is calculated using a ratio of the number of closed days in the wave and the total number of days in the 2-month wave, multiplied by the average trips for that wave from Table 3.4.2.4. This assumes that trips within a 2-month wave are evenly distributed among days.

Table 4.1.3.4. Wave in which predicted closure date occurs, canceled charter trips in the interrupted wave, and total canceled charter trips for **Alternatives 2-5**.

	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alternative 2	4	4,494	11,570
Alternative 3	6	2,148	2,148
Alternative 4	6	2,454	2,454
Alternative 5	6	2,250	2,250

The Net Cash Flow per Angler Trip (CFpA) from Souza and Liese (2019) of $136 (2017 dollars) is used to derive an upper bound for the short-term change in PS for charter vessels; Table 3.4.2.8 updates that estimate to $141 (2019 dollars). The CFpA accounts for the lost revenue, while recognizing that canceled trips do not have certain expenditures such as fuel, trip supplies, and labor. The short-term change in PS is displayed in Table 4.1.3.5. **Alternatives 2-5** are all expected to result in a negative short-term change in PS. As the earliest predicted closure date occurs with **Alternative 2**, the short-term change in PS is greatest (-$1,631,329), compared to **Alternative 1**. The predicted closure dates for **Alternatives 3-5** occur within 6 days of each other, and so the short-term changes in PS of those alternatives have a relatively close range from -$302,799 to -$346,056.

Table 4.1.3.5. Short-term change in PS for **Alternatives 2-5**.

	Short-term change in PS
Alternative 2	-$1,631,329
Alternative 3	-$302,799
Alternative 4	-$346,056
Alternative 5	-$317,218

4.1.4 Direct and Indirect Effects on the Social Environment

The purpose of this amendment is to revise the red grouper allocation between the commercial and recreational sectors and to modify the catch limits based on the results of the recent stock assessment. This action would do three related things that could affect the social environment: 1) reduce the OFL, ABC, and ACLs for red grouper to reflect the results of the new stock assessment; 2) convert the recreational sector ACL from MRIP-CHTS to MRIP-FES units; and 3) reallocate the stock ACL between the commercial and recreational sectors. The social effects of the alternatives are compared for each of these three changes.

Revise the OFL, ABC, and ACL for red grouper

In general, higher catch limits would be associated with fewer negative effects as they would allow for more fish to be landed, while lower catch limits would be associated with greater negative effects as they would allow for less fish to be landed. Additional effects would not be expected under **Alternative 1**, as the catch limits for both sectors would remain the same. **Alternatives 2-5** would reduce the OFL and ABC, and set the stock ACL equal to the new ABC, resulting in direct negative effects as the sector ACLs are reduced from **Alternative 1**. The ACLs under **Alternatives 2-5** are provided in Table 4.1.4.1, with the recreational sector ACLs provided in MRIP-CHTS units based on the ratio of MRIP-CHTS to MRIP-FES units provided for **Alternative 1** (Section 2.1). The commercial sector's red grouper landings have averaged 3.40 mp gw over the last 5 years (Table 2.1.2). The proposed commercial ACLs under **Alternatives 3-5** are lower than the average commercial red grouper landings for the last 5 years, suggesting negative effects would be expected for the commercial sector under these alternatives. The greatest negative effects would be expected under **Alternative 3**, which would reduce the commercial sector's ACL the most among the alternatives, with slightly fewer negative effects expected under **Alternative 5**, followed by **Alternative 4**. Compared to **Alternative 1**, the commercial sector would realize an ACL increase under **Alternative 2**, suggesting positive effects would result. However, the commercial ACL under **Alternative 2** is greater than the average commercial landings for the last 5 years, and commercial landings of red grouper have decreased in recent years despite the quota increase in 2016, suggesting that the presence of red grouper for harvest may be the limiting factor, rather than the availability of IFQ allocation for the sector to reach its quota.

Table 4.1.4.1. Sector ACLs for **Alternatives 1-5**, with the recreational sector ACLs provided in MRIP-CHTS units based on the ratio of MRIP-CHTS units to MRIP-FES units provided for **Alternative 1**.

Alternative	Comm ACL	Rec ACL (CHTS)
1 (No Action)	3.16	1.000
2	3.72	0.562
3	2.53	0.824
4	2.60	0.810
5	2.56	0.819

Note: The recreational ACLs in MRIP-CHTS are calculated using the ratio of 1.00:2.10, representing the conversion of the recreational ACL under Alternative 1 from MRIP-CHTS to MRIP-FES units.

Compared to the commercial sector, the effects of modifying the catch limits are nearly inverted for the recreational sector, such that the most negative effects would be expected under **Alternative 2**, which would reduce the recreational sector ACL by nearly half. **Alternatives 3-5** represent a reduction of approximately 20% of the recreational sector's ACL, with the greatest negative effects expected under **Alternative 4**, followed by decreasing effects under **Alternative 5** then **Alternative 3**. Whereas the commercial sector's landings have decreased in each of the last 5 years, total landings by the recreational sector have varied from year to year, although there is an overall decreasing trend in total landings.

These direct negative effects that may result for either sector in relation to an ACL reduction would be expected in the short-term as less fish are available to be landed. Although the alternatives for reducing the catch limits under **Alternative 2** compared to **Alternatives 3-5** would affect each sector differently in the short term, it would be expected that for the long-term, these negative effects would be mitigated by increasing the protection for the stock, resulting in increased catch limits, and thus positive effects, in the future for both sectors.

Adjust the recreational sector ACL from MRIP-CHTS to MRIP-FES units

Converting the recreational sector's ACL from MRIP-CHTS units to MRIP-FES units would directly affect the recreational sector only. In theory, there should be no direct effects under any of the alternatives, as the change from MRIP-CHTS units to MRIP-FES units is intended to be a conversion, such that the current recreational sector ACL of 1.00 mp gw in MRIP-CHTS units is equivalent to a recreational sector ACL of 2.10 mp gw in MRIP-FES units (Table 4.1.4.2). Applying this conversion to the recreational sector ACLs under **Alternatives 2-5** results in an equivalent amount of fish between the MRIP-CHTS and MRIP-FES derived units, meaning that the amount of harvest available to the recreational sector would not change under any of the alternatives. While no direct effects would be expected for the recreational sector, indirect effects of the conversion would result for both sectors, as the conversion affects the sector allocation.

Table 4.1.4.2. Recreational sector ACLs for **Alternatives 1-5** in MRIP-CHTS units and MRIP-FES units, based on the ratio in **Alternative 1**.

Alternative	Rec ACL (CHTS)	Rec ACL (FES)
1 (No Action)	1.000	2.10
2	0.562	1.18
3	0.824	1.73
4	0.810	1.70
5	0.819	1.72

Reallocate the red grouper ACL between the commercial and recreational sectors

Allocation is an inherently controversial topic as competing user groups strive to obtain the largest share for their group. It is difficult to quantify social effects because a quantitative social benefits model is not available. As a result, this discussion is qualitative in its approach and identifies possible effects that might accrue from reallocation under the alternatives. Most generally, the quality and nature of social impacts differs between the sectors in the long term, in that a loss of commercial access to red grouper could affect the livelihoods of commercial fishermen, especially small-scale owner-operators, hired captains and crew who do not own red grouper shares, and the well-being of commercial fishing communities. In addition, some negative effects would be expected for red grouper consumers if decreased commercial access for the long term is associated with decreased availability. For the recreational sector, the gains in recreational allocation would provide additional recreational opportunities to retain red grouper, while a loss in the underlying amount of quota would represent decreased opportunities

to retain red grouper. For the for-hire component of the recreational sector, these effects would result in similar effects as to the commercial sector.

Although reallocation is the primary purpose of this amendment, the reallocation between the commercial and recreational sectors would be an effect from the conversion of the recreational sector's ACL from MRIP-CHTS units to MRIP-FES units. Table 4.1.4.3 provides the resulting sector allocation for **Alternatives 1-5** and the basis for each allocation. **Alternative 1** (No Action) would retain the current sector allocation for red grouper and would have no effect on either the commercial or recreational sector. A sector allocation is a policy designation of the rights to access, but the reallocation of red grouper also has socio-cultural significance. The current 76% commercial to 24% recreational allocation reflects the greater historical engagement with the red grouper stock by the commercial sector compared to the recreational sector. For comparison, the sector allocation of gag reflects the greater historical engagement of that resource to the recreational sector (61%) compared to the commercial sector (39%).

Table 4.1.4.3. Resulting sector allocations under **Alternatives 1-5** and the basis for the recreational sector allocation.

Alternative	Commercial	Recreational	Basis for Allocation
1	76%	24%	No Action
2	76%	24%	Retain No Action
3	59.3%	40.7%	1986-2005 landings in MRIP-FES
4	60.5%	39.5%	1986-2009 landings in MRIP-FES
5	59.7%	40.3%	1986-2018 landings in MRIP-FES

By retaining the same allocation as **Alternative 1**, additional effects would not be expected from **Alternative 2** in terms of the sector allocation. However, as discussed in the section above on revising the catch limits, the sector ACLs underlying the allocation for **Alternative 2** reflect a change in the amount of fish that would go to each sector compared to **Alternative 1**, with more fish going to the commercial sector and less fish going to the recreational sector. Compared to **Alternatives 1** and **2**, **Alternatives 3-5** would reallocate approximately 16% of the new stock ACL from the commercial sector to the recreational sector, resulting in negative effects for the commercial sector and positive effects for the recreational sector. Because **Alternatives 3-5** all result in a shift in allocation from the commercial sector to the recreational sector, the types of effects on the social environment would be similar among the alternatives. The direct effects from **Alternatives 3-5** would vary in scope and strength relative to the amount of quota that is reallocated, which is within 1.2% among **Alternatives 3-5**. That the different time series of recreational landings used for the allocations under **Alternatives 3-5** result in a narrow range of resulting allocations suggests that the effects between these alternatives would be smaller than between **Alternatives 1-2** and **Alternatives 3-5**.

4.1.5 Direct and Indirect Effects on the Administrative Environment

Under **Alternative 1**, sector allocations would remain the same as in current management (76% commercial / 24 % recreational), which uses data based on average landings from MRIP CHTS. **Alternative 1** would also retain the current OFL, ABC, and ACLs. Under **Alternatives 2-5**, sector allocations of the total ACL between the recreational and commercial sector would be revised based on average landings using MRIP FES data.

Three potential impacts on the administrative environment under Action 1 alternatives include; 1) through potentially managing recreational landings using MRIP FES data, which would preclude the need to convert landings back to MRIP CHTS for management; 2) through in-season closures of the recreational sector to fishing because of the decrease in recreational ACL that occurs under all of the action alternatives (**Alternatives 2-5**); and 3); through allocating a greater percentage of the ACL to a sector that has more uncertainty in landings, which is more likely to result in overfishing/overfished of Gulf red grouper. Potential impacts 1 and 2 would have minor effects on the administrative environment, while implementation of a rebuilding plan would have major effects.

Alternative 1 would continue monitoring landings using MRIP CHTS currency. The Southeast Fisheries Science Center (SEFSC) currently provides data in both MRIP FES and MRIP CHTS currencies, and thus the choice of alternative under Action 1 would not result in any further administrative burden at this time. **Alternatives 2-5** would be monitored with the MRIP FES dataset. The SEFSC has determined that MRIP FES data are the best science available and should be used in management of all applicable fish species. If all species were to utilize MRIP FES data in management, it would negate the need to provide data in MRIP CHTS currency, and thus lessen the administrative burden. Thus, **Alternatives 2-5** would have long-term benefits to the administrative environment when compared to **Alternative 1**.

Alternative 1 is not legally viable because it is not based on the best scientific information available, and would retain the current OFL and ABC, which are above the values produced by the SEDAR 61 stock assessment and recommended by the Scientific and Statistical Committee (SSC).

Alternative 2 would maintain the current allocation split between the sectors at 76 percent commercial and 24 percent recreational, but would update the OFL, ABC, and ACL using SSC recommendations based on SEDAR 61. **Alternative 2** has a relatively high commercial ACL compared to the other action alternatives. Because the commercial sector is an Individual Fishing Quota (IFQ) program that relies on individual catch limits and reported landings (rather than estimates/projections used in the recreational sector), none of the alternatives are likely to result in exceeding the commercial red grouper ACL. The recreational ACL under **Alternative 2** is small relative to other alternatives, and that ACL is the most likely of the alternatives to be exceeded. There are constraints and difficulties in managing recreational data to small quotas. Because recreational landings are generated based on estimates of catch, they have substantial uncertainty associated with them. In addition, recreational landings are not timely, with lags often exceeding several months from when fishing effort takes place and landings estimates are generated. Although overages of the ACL are possible under **Alternative 2**, they would be expected to be small in scope due to the small ACL value they are managed to. Even if the recreational ACL is exceeded, the risk of **Alternative 2** resulting in an overfishing/overfished

declaration is low very low, and would thus have a positive impact on the administrative environment.

Alternatives 3-5 update the commercial and recreational allocations based on total landings in each sector in various reference time-periods using MRIP FES data. These alternatives vary only slightly among each other based on the data years used as the reference period. The OFL, ABC, and ACL among these three alternatives vary by a maximum of 1.2 percent, which is approximately equivalent to 40,000 lb. None of the alternatives are likely to result in exceeding the recreational or commercial ACL, and the risk of any of these alternatives resulting in an overfishing/overfished declaration is very low. Thus, all are expected to have a positive impact on the administrative environment.

Because the recreational ACL in **Alternative 2** is lower than in those for **Alternatives 3-5**, there is a greater risk of an in-season closure of the fishery, which would result in a slight negative impact to the administrative environment. The increased chances of a closure are due to the higher percentage of the landings coming from the recreational sector, where data are more uncertain and are based on estimates of catch. In order to prevent exceeding the recreational ACL, projections of recreational catch must often be made before data are available or verified. A low recreational ACL, like that in **Alternative 2**, requires that these projections be made when less data are available than for the other alternatives. However, because the recreational component of **Alternative 2** is lower than that in **Alternatives 3-5**, the overall ACL is less reliant on the more uncertain recreational data. Thus, in spite of higher catch levels and recreational closure risk in proposed **Alternative 2** when compared to **Alternatives 3-5**, there is negligible additional comparative risk of exceeding the recreational ACL. Therefore, there is expected difference in impact in the administrative environment when comparing **Alternative 2** to **Alternatives 3-5**.

4.2 Action 2 – Modify the Gulf Red Grouper Annual Catch Targets (ACTs)

4.2.1 Direct and Indirect Effects on the Physical Environment

Effects on the physical environment from fishing are described in Section 4.1.1, which describes how increasing fishing effort leads to increasing effects on this environment. Action 1 sets the overall OFL, ABC, and sector ACLs. This action sets the buffer between the ACL and ACT. Action 1 would maintain the buffers between the respective commercial and recreational ACLs and ACTs. For the commercial sector, this buffer allows for gag and red-grouper multi-use shares to be fished under the IFQ program. Thus, the buffer is not used to constrain harvest and consequently fishing effort, but likely maintains fishing effort similar to if there were no buffer. However, for the recreational sector, the buffer is used to account for management uncertainty and decrease the likelihood the recreational ACL is exceeded if exceeded in the previous year. Thus, the greater the buffer, the lower recreational fishing effort would be from the sector. Under these circumstances, **Alternatives 2** and **3** would likely have similar effects because the recreational buffer is the same at 9%. The recreational buffer for **Alternative 1** is 8% and so

could result in slightly more adverse effects than the other two alternatives given it could allow for a minimal increase in effort.

4.2.2 Direct and Indirect Effects on the Biological Environment

Effects on the physical biological/ecological environment from fishing are described in Section 4.1.2, which describes how increasing fishing effort leads to increasing effects on this environment. The decision regarding Action 1 sets the overall OFL, ABC, and sector ACLs. This action sets the buffer between the ACL and annual catch target (ACT). Action 1 would maintain the buffers between the respective commercial and recreational ACLs and ACTs. For the commercial sector, this buffer allows for gag and red-grouper multi-use shares to be fished under the IFQ program. It is the IFQ program that limits the commercial catch to the ACL through the distribution of allocation and allocation reporting that acts as an accountability measure to ensure the ACL is not exceeded. Thus, the buffer is not used to constrain harvest and consequently fishing, but likely maintains fishing levels similar to if there were no buffer and no multi-use shares (e.g., **Alternative 2**). However, for the recreational sector, the buffer is used to account for management uncertainty and decrease the likelihood the recreational ACL is exceeded. Thus, the greater the buffer, the less recreational fishing would likely occur from the sector. Under these circumstances, **Alternatives 2** and **3** would likely have similar effects as the recreational buffer is equal at 9%. The recreational buffer for **Alternative 1** is 8% and so would likely be slightly more adverse than the other two alternatives given it could allow for a minimal increase in fishing.

4.2.3 Direct and Indirect Effects on the Economic Environment

Commercial Sector

Alternative 1 (No Action) would maintain the current commercial buffer of 5% between the ACL and ACT. Therefore, changes in economic value would not be expected to result from this alternative, only if paired with Action 1 **Alternative 1**. As Action 1 **Alternative 1** is not legally viable as a preferred alternative, the landings expected to occur and associated economic values under alternatives from Action 2 must be analyzed with additional alternatives from Action 1. However, the landings expected to occur from Action 2 **Alternative 1** under Action 1 **Alternative 1** (No Action) and the associated economic values are still used in this analysis as the benchmark for changes in economic value for the other alternatives. Action 2 **Alternatives 2-3** are not examined under Action 1 **Alternative 1**, as they would not legally viable or provide an economic benchmark. The changes in producer surplus (PS) estimated in Table 4.2.3.1 capture the annual potential changes in PS from the commercial sector and assumes that the commercial sector lands the entire allocated ACT.

The economic effects expected to result from **Alternatives 1-3** are analyzed as a function of the ACT and compared with Action 2 **Alternative 1** paired with Action 1 **Alternative 1**. An average dockside price from 2018 of $4.83 (2019 dollars) is used from Table 3.4.1.19 to calculate the change in PS, as displayed in Table 4.2.3.1.

Table 4.2.3.1. Expected change in landings for the red grouper commercial sector, expected change in revenue, and expected change in PS for Action 2 **Alternatives 2-5**, relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**.

Action 2 **Alternative 1**			
Action 1	Expected change in landings (mp gw)	Expected change in revenue	Expected change in PS
Alt 2	0.53	$2,559,900	$614,376
Alt 3	-0.60	-$2,898,000	-$695,520
Alt 4	-0.53	-$2,559,900	-$614,376
Alt 5	-0.57	-$2,753,100	-$660,744
Action 2 **Alternative 2**			
Action 1	Expected change in landings (mp gw)	Expected change in revenue	Expected change in PS
Alt 2	0.72	$3,477,600	$834,624
Alt 3	-0.47	-$2,270,100	-$544,824
Alt 4	-0.40	-$1,932,000	-$463,680
Alt 5	-0.44	-$2,125,200	-$510,048
Action 2 **Alternative 3**			
Action 1	Expected change in landings (mp gw)	Expected change in revenue	Expected change in PS
Alt 2	0.53	$2,559,900	$614,376
Alt 3	-0.60	-$2,898,000	-$695,520
Alt 4	-0.53	-$2,559,900	-$614,376
Alt 5	-0.57	-$2,753,100	-$660,744

Action 2 **Alternatives 1** and **3** would result in the same expected change in revenue and in PS for the commercial sector as seen in Section 4.1.3, as Action 1 was also analyzed with the current 5% commercial buffer. Therefore, Action 2 **Alternative 3** is not expected to have any effect on landings, revenue, or PS, relative to **Alternative 1**. Compared with Action 2 **Alternatives 1** and **3**, Action 2 **Alternative 2** results in a larger positive change in PS when paired with Action 1 **Alternative 2**, due to a smaller commercial buffer. As such, Action 2 **Alternative 2** would be expected to increase revenue by an additional $917,700 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 2** is selected. In addition, when compared with Action 2 **Alternatives 1** and **3**, Action 2 **Alternative 2** results in a smaller negative change in PS when paired with Action 1 **Alternatives 3-5**. As such, revenue under Action 2 **Alternative 2** would be expected to decrease by $627,900 less than under Action 2 **Alternative 1**, if Action 1 **Alternatives 3-5** are selected. This relative change in revenue is the same regardless of whether **Alternative 3**, **4**, or **5** is selected under Action 1, as the relative expected change in landings, -0.13 mp gw, is the same between Action 2 **Alternative 1** and **Alternative 2**.

The expected change in revenue in Table 4.2.3.1 also reflects the expected change in red grouper purchases by dealers. The average of the total red grouper purchases from 2014-2018 from Table 3.4.1.23 is $17,557,924. Action 2 **Alternatives 1** and **3** would result in the same expected change in revenue and, therefore, expected changes in red grouper purchases by dealers as seen in Section 4.1.3, as Action 1 was also analyzed with the current 5% commercial buffer. Action 2 **Alternative 3** is not expected to have any effect on red grouper purchases, relative to **Alternative 1**. The expected change in revenue with Action 2 **Alternative 2** paired with Action 1 **Alternative 2** would be expected to result in an increase of 19.81% of the average total red grouper purchases, compared with Action 2 **Alternative 1** paired with Action 1 **Alternative 1**. The expected changes in revenue with Action 2 **Alternative 2** paired with Action 1 **Alternatives 3-5** would be expected to result in, respectively, a decrease of 12.93%, 11.00%, and 12.10% of the average total red grouper purchases, compared with Action 2 **Alternative 1** paired with Action 1 **Alternative 1**. Relative to Action 2 **Alternative 1**, Action 2 **Alternative 2** when paired with Action 1 **Alternative 2** would be expected to result in a 5.23% increase in total red grouper purchases. Relative to Action 2 **Alternative 1**, Action 2 **Alternative 2** when paired with Action 1 **Alternatives 3-5** would be expected to result in a 3.58% less of a decrease in total red grouper purchases.

The proposed increase in the ACL with Action 2 **Alternatives 1-3** paired with Action 1 **Alternative 2** would increase the availability of annual IFQ allocation for sale, as compared with being paired with Action 1 **Alternative 1**. As the supply of annual IFQ allocation increases, the allocation price would be expected to decrease. As shares reflect annual allocation, the expected decrease in allocation price under Action 2 **Alternative 1-3** paired with Action 1 **Alternative 2** would be expected to result in a decrease in red grouper share price. In contrast, the proposed decrease in the ACL with Action 2 **Alternatives 1-3** paired with Action 1 **Alternatives 3-5** would decrease the availability of annual IFQ allocation for sale, compared with being paired with Action 1 **Alternative 1**, and the allocation price would be expected to increase in response. The expected increase in allocation price under Action 2 **Alternative 1-3** paired with Action 1 **Alternatives 3-5** would be expected to result in an increase in red grouper share price.

Changes in red grouper harvests, as a result of the change in ACT, could result in additional economic effects because of the potential effects on ex-vessel prices due to less (or more) red grouper on the markets. The potential effects to the consumer surplus are based on work on supply chains and markets by Asche (2020) and price flexibilities by Keithly and Tabarestani (2018). An average dockside price from 2018 of $4.83 is used from Table 3.4.1.12. An own-price flexibility of -0.533 is used from the Habit Formation model (Keithly and Tabarestani 2018) to derive the average price loss and change in CS for **Alternatives 1-3** as seen in Table 4.1.3.2.

Table 4.2.3.2. Alternatives 1-3 - Proposed change in the red grouper commercial sector ACT (relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**) and associated estimated average price loss ($/lb) and change in CS.

Action 2 **Alternative 1**			
Action 1	Expected change in landings (mp gw)	Expected average price loss ($/lb)	Expected change in CS
Alternative 2	0.53	-$0.45	$1,605,475
Alternative 3	-0.60	$0.51	-$1,235,707
Alternative 4	-0.53	$0.45	-$1,123,378
Alternative 5	-0.57	$0.49	-$1,188,596
Action 2 **Alternative 2**			
Action 1	Expected change in landings (mp gw)	Expected average price loss ($/lb)	Expected change in CS
Alternative 2	0.72	-$0.62	$2,298,415
Alternative 3	-0.47	$0.41	-$1,020,402
Alternative 4	-0.40	$0.34	-$892,455
Alternative 5	-0.44	$0.38	-$966,598
Action 2 **Alternative 3**			
Action 1	Expected change in landings (mp gw)	Expected average price loss ($/lb)	Expected change in CS
Alternative 2	0.53	-$0.45	$1,605,475
Alternative 3	-0.60	$0.51	-$1,235,707
Alternative 4	-0.53	$0.45	-$1,123,378
Alternative 5	-0.57	$0.49	-$1,188,596

Action 2 **Alternatives 1** and **3** would result in the same change in average price loss and in CS for the commercial sector as seen in Section 4.1.3, as Action 1 was also analyzed with the current 5% commercial buffer. Therefore, Action 2 **Alternative 3** is not expected to have any effect on landings, average price loss, or CS, relative to **Alternative 1**. Compared with Action 2 **Alternatives 1** and **3**, Action 2 **Alternative 2** results in a larger positive change in CS when paired with Action 1 **Alternative 2**, due to a smaller commercial buffer. As such, Action 2 **Alternative 2** would be expected to increase CS by an additional $692,940 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 2** is selected. In addition, when compared with Action 2 **Alternatives 1** and **3**, Action 2 **Alternative 2** results in a smaller negative change in CS when paired with Action 1 **Alternatives 3-5**. For instance, CS under Action 2 **Alternative 2** would be expected to decrease by $215,305 less than under Action 2 **Alternative 1**, if Action 1 **Alternatives 3** is selected.

Recreational Sector

Alternative 1 (No Action) would maintain the current recreational buffer of 8% between the ACL and ACT. Therefore, changes in economic value would not be expected to result from this alternative, only if paired with Action 1 **Alternative 1**. As Action 1 **Alternative 1** is not legally viable as a preferred alternative, the landings expected to occur and associated economic values associated with alternatives from Action 2 must be analyzed with additional alternatives from

Action 1. However, the landings expected to occur and the associated economic value from Action 2 **Alternative 1** under Action 1 **Alternative 1** (No Action) is still used in this analysis as the benchmark for changes in economic value for the other alternatives. Action 2 **Alternatives 2-3** are not examined under Action 1 **Alternative 1**, as they would not legally viable or provide an economic benchmark.

The economic effects expected to result from Action 2 **Alternatives 1-3** are analyzed as a function of the ACT. The MRIP FES equivalent of the recreational sector ACT resulting from Action 1 **Alternative 1** is used in this analysis, in order to be in the same currency as the recreational sector ACTs resulting from Action 1 **Alternatives 2-5**. The evaluation of changes in economic value expected to result from ACT increases for the recreational sector is based on work by Carter and Liese (2012). The consumer surplus (CS) value per fish for a second red grouper kept is estimated at $110.00 (2019 dollars). Estimated increases in economic value are approximated by dividing the change in ACT by 6.51 lbs ww, which is the average weight of a Gulf recreationally landed red grouper from 2015-2017 (SEFSC SRHS data, accessed March 2018[43]), to obtain the increase in number of red grouper, which is then multiplied by the CS value per fish of $110.00. The proposed changes in the recreational sector ACL and discounted estimates of associated changes in economic values for **Alternatives 1-3** are provided in Table 4.2.3.3.

Table 4.2.3.3. Alternatives 1-3 - Proposed change in the red grouper recreational sector ACT (relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**) and associated estimated change in CS.

Action 2 **Alternative 1**		
Action 1	Change in ACT (mp gw)	Expected change in CS (million 2019 dollars)
Alternative 2	-0.84	-$14.903
Alternative 3	-0.34	-$6.032
Alternative 4	-0.37	-$6.565
Alternative 5	-0.35	-$6.210
Action 2 **Alternative 2**		
Action 1	Change in ACT (mp gw)	Expected change in CS (million 2019 dollars)
Alternative 2	-0.86	-$15.258
Alternative 3	-0.36	-$6.387
Alternative 4	-0.38	-$6.742
Alternative 5	-0.36	-$6.387
Action 2 **Alternative 3**		
Action 1	Change in ACT (mp gw)	Expected change in CS (million 2019 dollars)
Alternative 2	-0.86	-$15.258
Alternative 3	-0.36	-$6.387
Alternative 4	-0.38	-$6.742
Alternative 5	-0.36	-$6.387

[43] MRIP Intercept data available at: https://www.st.nmfs.noaa.gov/st1/recreational/MRIP_Survey_Data/)

The changes in ACT and CS under Action 2 **Alternative 1** shown in Table 4.2.3.2 are the same as those shown in Table 4.1.3.2, as the current recreational buffer of 8% (No Action) was used to analyzed the alternatives under Action 1. The changes in ACT and CS under Action 2 **Alternatives 2-3** are identical, as they both consider a 9% recreational buffer between the ACL and ACT. As the recreational buffer is greater under **Alternatives 2-3** than under **Alternative 1**, a greater decrease is expected to result in the expected change in CS, under identical alternatives from Action 1. For instance, compared to Action 2 **Alternative 1** with Action 1 **Alternative 1**, the expected change in CS for Action 2 **Alternative 2** (or **Alternative 3**) is expected to result in an annual change in CS of -$15.258 million (in 2019 dollars), whereas the annual change in CS for Action 2 **Alternative 1** is expected to result in annual change in CS of -$14.903 million (in 2019 dollars). Additionally, under Action 2 **Alternatives 2-3**, the changes observed in Table 4.2.3.3 are identical if either Action 1 **Alternative 3** or **Alternative 5** are selected, as they would result in the same change in the recreational sector ACT, a decrease of 0.36 mp gw.

Compared with Action 2 **Alternative 1**, Action 2 **Alternatives 2** and **3** would be expected to result in a larger decrease in CS when paired with Action 1 **Alternative 2-5**, due to a larger recreational buffer. For instance, Action 2 **Alternatives 2** and **3** would be expected to decrease CS by an additional $354,839 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 2** or **3** is selected. Likewise, Action 2 **Alternatives 2** and **3** would be expected to decrease CS by an additional $177,419 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 4** or **5** is selected.

The PS of the for-hire component of the recreational sector, being comprised of charter vessels and headboats, would be impacted by a change in the number of targeted trips. In the long run, factors of production such as labor and capital can be used elsewhere in the economy, and so only short-term changes to PS are expected. In the Gulf, headboat trips take a diverse set of anglers on a single vessel, generally advertising a diverse range of species to be caught. Therefore, an assumption that no headboat trips would be lost due to a change in ACT would be reasonable. However, charter vessel trips that are targeting red grouper may be subject to cancellation by anglers and are the focus of the recreational sector PS analysis.

Predicted closure dates based on recreational ACT are seen in Table 2.2.4. Charter vessel trips by 2-month wave from 2014-2018 targeting red grouper are seen in Table 3.4.2.4. Based on the predicted closure dates, Action 2 **Alternatives 1-3** would close in the 4th wave when paired with Action 1 **Alternative 2**; Action 2 **Alternatives 1-3** would close in the 6th wave with paired with Action 1 **Alternatives 3-5**. The number of trips cancelled in the wave in which the predicted closure date would occur, along with the total number of canceled trips, is shown in Table 4.2.3.4. The number of trips cancelled in the interrupted wave is calculated using a ratio of the number of closed days in the wave and the total number of days in the 2-month wave, multiplied by the average trips for that wave from Table 3.4.2.4. This assumes that trips within a 2-month wave are evenly distributed among days.

Action 2 **Alternatives 2** and **3** would result in the same change in total canceled charter trips. Compared with Action 2 **Alternative 1**, Action 2 **Alternatives 2** and **3** result in a larger total number of canceled charter trips when paired with Action 1 **Alternative 2-5**, due to earlier predicted closure dates. As such, Action 2 **Alternatives 2** and **3** would be expected to result in an additional 364 canceled charter trips relative to Action 2 **Alternative 1**, if Action 1 **Alternative 2** is selected. Action 2 **Alternatives 2** and **3** would be expected to result in an additional 204 canceled charter trips relative to Action 2 **Alternative 1**, if Action 1 **Alternative 3** is selected. Finally, Action 2 **Alternatives 2** and **3** would be expected to result in an additional 102 canceled charter trips relative to Action 2 **Alternative 1**, if Action 1 **Alternative 4** or **5** is selected.

Table 4.2.3.4. Wave in which predicted closure date occurs, canceled charter trips in the interrupted wave, and total canceled charter trips for Action 2 **Alternatives 1-3** paired with Action 1 **Alternatives 2-5**.

Action 2 **Alternative 1**			
Action 1	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alternative 2	4	4,494	11,570
Alternative 3	6	2,148	2,148
Alternative 4	6	2,454	2,454
Alternative 5	6	2,250	2,250
Action 2 **Alternative 2**			
Action 1	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alternative 2	4	4,858	11,934
Alternative 3	6	2,352	2,352
Alternative 4	6	2,557	2,557
Alternative 5	6	2,352	2,352
Action 2 **Alternative 3**			
Action 1	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alternative 2	4	4,858	11,934
Alternative 3	6	2,352	2,352
Alternative 4	6	2,557	2,557
Alternative 5	6	2,352	2,352

The Net Cash Flow per Angler Trip (CFpA) from Souza and Liese (2019) of $136 (2017 dollars) is used to derive an upper bound for the short-term change in PS for charter vessels; Table 3.4.2.8 updates that estimate to $141 (2019 dollars). The CFpA accounts for the lost revenue, while recognizing that canceled trips do not have certain expenditures such as fuel, trip supplies, and labor. The short-term change in PS is displayed in Table 4.2.3.5. Action 2 **Alternatives 1-3** are all expected to result in a negative short-term change in PS, regardless of the Action 1 alternative selected. The short-term change in PS for Action 2 **Alternative 1** was previously examined in Section 4.1.3, as the Action 1 alternatives were analyzed with the current recreational buffer of 8%. Since both alternatives would set a 9% recreational buffer, Action 2

Alternatives 2 and **3** are expected to result in the same short-term change in PS, when paired with the same Action 1 alternative. As compared to Action 2 **Alternative 1** with Action 1 **Alternative 1**, Action 2 **Alternatives 2** and **3** would be expected to result in larger short-term changes in PS compared to Action 2 **Alternative 1**, when paired with the same Action 1 alternative. When paired with Action 1 **Alternative** 2, Action 2 **Alternatives 2** and **3** would be expected to result in the largest short-term change in PS, -$1,682,703. When paired with Action 1 **Alternative** 5, Action 2 **Alternative 1** would be expected to result in the smallest short-term change in PS, -$317,218.

Action 2 **Alternatives 2** and **3** would result in the same short-term change in PS. Compared with Action 2 **Alternative 1**, Action 2 **Alternatives 2** and **3** result in a larger short-term change in PS when paired with Action 1 **Alternative 2-5**, due to additional canceled charter trips. As such, Action 2 **Alternatives 2** and **3** would be expected to result in an additional decrease in PS of $51,374 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 2** is selected. Action 2 **Alternatives 2** and **3** would be expected to result in an additional decrease in PS of $28,838 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 3** is selected. Finally, Action 2 **Alternatives 2** and **3** would be expected to result in an additional decrease in PS of $14,419 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 4** or **5** is selected.

Table 4.2.3.5. Short-term change in PS for Action 2 **Alternatives 1-3** paired with Action 1 **Alternatives 2-5**.

	Action 2 **Alt 1**	Action 2 **Alt 2**	Action 2 **Alt 3**
		Short-term change in PS	
Action 1			
Alternative 2	-$1,631,329	-$1,682,703	-$1,682,703
Alternative 3	-$302,799	-$331,637	-$331,637
Alternative 4	-$346,056	-$360,475	-$360,475
Alternative 5	-$317,218	-$331,637	-$331,637

4.2.4 Direct and Indirect Effects on the Social Environment

The ACT is used as an in-season accountability measure (AM) to reduce the likelihood of exceeding the ACL. In general, a smaller buffer between the ACL and ACT allows for more fish to be harvested before triggering an attending in-season closure. For the commercial sector's harvest of IFQ-managed stocks, an ACT is used to allow for some gag allocation to be used to land red grouper, and for some red grouper allocation to be used to land gag (i.e., multi-use provision). For the recreational sector's harvest of red grouper, the ACT is used to decrease the likelihood the recreational ACL is exceeded in the year following an overage of the ACL, when it would be used to trigger an in-season closure.

For the commercial sector, this action evaluates retaining the existing buffer of 5% (**Alternatives 1** and **3**) or decreasing it to 0% (**Alternative 2**). In general, a stock managed under an IFQ program would not need to set an ACT, as the availability of annual allocation ensures that the ACL is not exceeded. In this case, the ACT is used to specify an amount of red grouper

allocation that may be used to land gag. No additional effects would be expected to result for the commercial sector under **Alternatives 1** or **3**, as no change would be made to the commercial sector's ACT. Limited negative effects would be expected under **Alternative 2**, which would decrease the buffer to 0% and effectively remove the multi-use provision for red grouper allocation, requiring gag to be landed with gag allocation only. These negative effects would be expected to accrue to those fishermen who use the multi-use provision for landing gag with red grouper allocation, as they would no longer be able to do so.

For the recreational sector, this action considers retaining the current 8% buffer (**Alternative 1**) or increasing it to 9% (**Alternatives 2** and **3**). In recent years, the recreational sector has not been catching its quota. However, in addition to the conversion of the ACL to MRIP-FES units which estimates greater landings, the proposed quota reduction that would occur under Action 1 is large enough that recreational landings are likely to meet the new sector ACL. The AM for the recreational sector states that in a year following an ACL overage, the ACT will be used to trigger an in-season closure. Table 2.2.4 provides the predicted closure dates for the multiple combinations of preferred alternatives across Actions 1 and 2; these predicted closure dates represent the date the ACT for each alternative is predicted to be met, which would be used to trigger an in-season closure in the year after one in which the ACL was exceeded. Thus, any effects from changing the recreational sector ACT would not occur until at least the year following the year this amendment is implemented, as the recreational sector ACL implemented through Action 1 would have to be exceeded before the recreational sector ACT is used to trigger an in-season fishing closure.

No additional effects would be expected from **Alternative 1** and the 8% buffer between the recreational sector ACL and ACT would remain in place. Increasing the buffer to 9% (**Alternatives 2** and **3**) alongside any of Alternatives 2-5 under Action 1 would be expected to shorten the length of the recreational fishing season in the year following a recreational sector ACL overage (Table 2.2.4) resulting in greater negative effects compared to **Alternative 1**.

4.2.5 Direct and Indirect Effects on the Administrative Environment

Action 2 would affect the administrative environment in two ways: 1) through in-season closures of the recreational fishery resulting from implementing AMs that are more likely to be triggered than under current management, and 2) by implementing an ACT that changes the likelihood of Gulf red grouper stocks being declared as overfished, which would require development and implementation of a rebuilding plan. Closure of the recreation red grouper sector would have a minor effect on the administrative environment, while implementation of a rebuilding plan would have a major effect.

Each of the three alternatives in Action 2 would set ACTs which implement management buffers below the ACL with the exception of the commercial ACT for **Alternative 2** where the buffer equals zero. These buffers include options for 0 percent and 5 percent for the commercial fishery, and 8 percent and 9 percent for the recreational sector.

In the commercial sector, there is no risk of an in-season closure and little risk of exceeding the ACL. The IFQ system that is in place for regulating commercial landings is designed to prevent ACL overages by allocating quota to individual entities, and holding them accountable stay under that catch limit. The intent of the commercial buffer is to allow for gag multi-use, which allows red grouper to be harvested incidentally when targeting gag. Thus, the choice between a 0% and 5% buffer is not expected impact the likelihood of exceeding the ACL, or the chances of an overfishing/overfished declaration. Therefore, the commercial buffer is not likely to affect the administrative environment.

The recreational buffer under **Alternative 1** is the lowest of the alternatives. In the year following a year in which catch exceeded the ACL, **Alternative 1** would be most likely to result in exceeding the recreational ACL. Recreational landings are generated based on estimates of catch, and they have substantial uncertainty associated with them. In addition, recreational landings are not timely, with lags often exceeding several months from when fishing takes place and landings estimates are generated. Thus, implementing the lower ACT/buffer in **Alternative 1** in the recreational sector is more likely to result in exceeding the recreational and overall ACL (and potentially the OFL) than the higher buffers in **Alternatives 2** and **3**. However, the difference between **Alternative 1** and **Alternatives 2** and **3** is only 1 percent of the ACL (11,800 lb to 17,300 lb depending on Action 1 decision). Given the constraints associated with monitoring recreational data to relatively small values, the increased chance of exceeding recreational component ACL is expected to be negligible. Thus, the recreational buffers proposed in the Action 2 alternatives are not likely to affect the administrative environment

Impact to the administrative environment associated with implementing a recreational fishery closure is higher under **Alternative 1** than under **Alternatives 2** or **3** due to the lower ACT in **Alternative 1**. However, due to the relatively minor differences in these values among the alternatives coupled with the difficulty in monitoring the recreational component to small values, it is expected that the effect on the administrative environment due to a recreational component closure will be negligible. Although the alternatives have different effects on the administrative environment, these effects are likely minor. Assessing the effects of management decisions on stock status are routine endeavors by NMFS. Actions to control harvest by the Gulf of Mexico Fishery Management Council (Council) and NMFS are mostly routine and conducted through the Council system established by the Magnuson-Stevens Fishery Conservation and Management Act.

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APPENDIX A. OTHER APPLICABLE LAW

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for management of stocks included in fishery management plans in federal waters of the exclusive economic zone. However, management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems that support those fisheries. Major laws affecting federal fishery management decision-making include the Endangered Species Act and Marine Mammals Protection Act (Section 3.3), E.O. 12866 (Regulatory Planning and Review, Chapter 5) and E.O. 12898 (Environmental Justice, Section 3.5.2). 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.

Coastal Zone Management Act

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

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

Data Quality Act

The Data Quality Act (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such

as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

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

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

Fish and Wildlife Coordination Act

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

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

National Historic Preservation Act

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

Typically, fishery management actions in the Gulf of Mexico are not likely to affect historic places with exception of the *U.S.S. Hatteras*, located in federal waters off Texas, which is listed in the National Register of Historic Places. Reef fish fishing does occur off Texas; therefore, the proposed actions are a part of the normal fishing activities that occur at this site. Thus, no additional impacts to the *U.S.S. Hatteras* would be expected.

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. 12962: Recreational Fisheries

This E.O. requires federal agencies, in cooperation with states and tribes, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities through a variety of methods including, but not limited to, developing joint partnerships; promoting the restoration of recreational fishing areas that are limited by water quality and habitat degradation; fostering sound aquatic conservation and restoration endeavors; and evaluating the effects of federally-funded, permitted, or authorized actions on aquatic systems and recreational fisheries, and documenting those effects. Additionally, it establishes a seven-member National Recreational Fisheries Coordination Council (NRFCC) responsible for, among other things, ensuring that social and economic values of healthy aquatic systems that support recreational fisheries are considered by federal agencies in the course of their actions, sharing the latest resource information and management technologies, and reducing duplicative and cost-inefficient programs among federal agencies involved in conserving or managing recreational fisheries. The NRFCC also is responsible for developing, in cooperation with federal agencies, States and Tribes, a Recreational Fishery Resource Conservation Plan - to include a five-year agenda. Finally, the E.O. requires NMFS and the USFWS to develop a joint agency policy for administering the ESA.

E.O. 13089: Coral Reef Protection

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

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

E.O. 13132: Federalism

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

No Federalism issues were identified relative to the action to modify the management of mutton snapper and gag. Therefore, consultation with state officials under Executive Order 12612 was not necessary. Consequently, consultation with state officials under Executive Order 12612 remains unnecessary.

E.O. 13158: Marine Protected Areas

This E.O. requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. There are several marine protected areas, HAPCs, and gear-restricted areas in the eastern and northwestern Gulf of Mexico. The existing areas are entirely within federal waters of the Gulf of Mexico. They do not affect any areas reserved by federal, state, territorial, tribal or local jurisdictions.

APPENDIX B. GULF OF MEXICO FISHERY MANAGEMENT COUNCIL – ALLOCATION POLICY

Gulf of Mexico Fishery Management Council
Fishery Allocation Policy
(http://gulfcouncil.org/wp-content/uploads/GMFMC-SOPPs-Fishery-Allocation-Policy.pdf)

The allocation policy presented herein was developed by the Gulf of Mexico Fishery Management Council to provide principles, guidelines, and suggested methods for allocation that would facilitate future allocation and reallocation of fisheries resources between or within fishery sectors.

Issues considered in this allocation policy include principles based on existing regulatory provisions, procedures to request and initiate (re)allocation, (re)allocation review frequency, tools and methods suggested for evaluating alternative (re)allocations.

1. Principles for Allocation

   a. Conservation and management measures shall not discriminate between residents of different states.

   b. Allocation shall:

      (1) be fair and equitable to fishermen and fishing sectors;
         - fairness should be considered for indirect changes in allocation
         - any harvest restrictions or recovery benefits be allocated fairly and equitably among sectors

      (2) promote conservation
         - connected to the achievement of OY
         - furtherance of a legitimate FMP objective
         - promotes a rational, more easily managed use

      (3) ensure that no particular individual, corporation, or other entity may acquire an excessive share.

   c. Shall consider efficient utilization of fishery resources but:

      (1) should not just redistribute gains and burdens without an increase in efficiency

      (2) prohibit measures that have economic allocation as its sole purpose.

   d. Shall take into account: the importance of fishery resources to fishing communities by utilizing economic and social data in order to:

(1) provide for the sustained participation of fishing communities

(2) minimize adverse economic impacts on fishing communities.

e. Any fishery management plan, plan amendment, or regulation submitted by the Gulf Council for the red snapper fishery shall contain conservation and management measures that:

(1) establish separate quotas for recreational fishing (including charter fishing) and commercial fishing

(2) prohibit a sector (i.e., recreational or commercial) from retaining red snapper for the remainder of the season, when it reaches its quota

(3) ensure that the recreational and commercial quotas reflect allocation among sectors and do not reflect harvests in excess of allocations.

2. Guidelines for Allocation

a. All allocations and reallocations must be consistent with the Gulf of Mexico Fishery Management Council's principles for allocation.

b. An approved Council motion constitutes the only appropriate means for requesting the initiation of allocation or reallocation of a fishery resource. The motion should clearly specify the basis for, purpose and objectives of the request for (re)allocation.

c. The Council should conduct a comprehensive review of allocations within the individual FMPs at intervals of no less than five years.

d. Following an approved Council motion to initiate an allocation or reallocation, the Council will suggest methods to be used for determining the new allocation. Methods suggested must be consistent with the purpose and objectives included in the motion requesting the initiation of allocation or reallocation.

e. Changes in allocation of a fishery resource may, to the extent practicable, account for projected future socio-economic and demographic trends that are expected to impact the fishery.

f. Indirect changes in allocation, i.e., shifts in allocation resulting from management measures, should be avoided or minimized to the extent possible.

3. Suggested Methods for Determining (Re)Allocation

a. Market-based Allocation

(1) Auction of quota

(2) Quota purchases between commercial and recreational sectors

- determine prerequisites and conditions;
    - quota or tags or some other mechanism required in one or both sectors
    - mechanism to broker or bank the purchases and exchanges
    - annual, multi-year, or permanent
    - accountability for purchased or exchanged quota in the receiving sector.

b. Catch-Based (and mortality) Allocation

(1) historical landings data
- averages based on longest period of credible records
- averages based on a period of recent years
- averages based on total fisheries mortality (landings plus discard mortality) by sector
- allocations set in a previous FMP
- accountability (a sector's ability to keep within allocation)

c. Socioeconomic-based Allocation

(1) socio-economic analyses
- net benefits to the nation
- economic analysis limited to direct participants
- economic impact analysis (direct expenditures and multiplier impacts)
- social impact analysis
- fishing communities
- participation trends
- "efficiency" analysis
    - lowest possible cost for a particular level of catch;
    - harvest OY with the minimum use of economic inputs

d. Negotiation-Based Allocation

(1) Mechanism for sectors to agree to negotiation and select representatives

(2) Mechanism to choose a facilitator

(3) Negotiated agreement brought to Council for normal FMP process of adoption and implementation.

APPENDIX C. ALLOCATION TRIGGERS

Department of Commerce * National Oceanic & Atmospheric Administration * National Marine Fisheries Service

NATIONAL MARINE FISHERIES SERVICE PROCEDURAL DIRECTIVE 01-119-01
July 27, 2016

Fisheries Management

Criteria for Initiating Fisheries Allocation Reviews. Council Coordinating Committee Allocation Workgroup Guidance Document.

NOTICE: This publication is available at: http://www.nmfs.noaa.gov/op/pds/index.html

OPR: F/SF (CCC Allocation Workgroup) **Certified by: F/SF (A. Risenhoover)**
Type of Issuance: Initial

SUMMARY OF REVISIONS:

Signed _____
Alan Risenhoover
Director, Office of Sustainable Fisheries

Criteria for Initiating Fisheries Allocation Reviews Council Coordinating Committee Allocation Workgroup Guidance Document Approved by the CCC June 24, 2015

Introductory Comments

Fishery allocations can occur at a variety of levels: among countries, communities, sectors within a fishery, gear types within a sector, across seasons, and among individual participants. While allocations between commercial and recreational sectors often figure prominently in fisheries allocations, this guidance document is intended to apply to any type of allocation review Regional Fishery Management Councils (councils) may consider. This Council Coordination Committee (CCC) working group report explores several potential mechanisms for allocation reviews, including criteria based on fishery indicators, time, or public interest. Although the alternatives are not mutually exclusive, the effective implementation of one alternative may ameliorate the need for others.

U.S. marine fisheries and the human interactions with those fisheries are dynamic. Populations in U.S. coastal shoreline counties increased by 34.8 million from 1970 through 2010 (stateofthecoast.noaa.gov). Despite the dynamic nature of these interactions, fisheries allocations are difficult to review and amend.

At the same time, demands for fishery allocation reviews have been increasing. Consider that the ten highest priority recommended actions to improve saltwater recreational fisheries management at the 2014 NMFS Recreational Fisheries Summit included two council-related priorities relevant to the review of allocations: 1) Achieving more equitable council representation and 2) Readjust recreational and commercial allocations.

A number of factors contribute to the challenges in allocation review. Allocation reviews are demanding with respect to the technical work necessary to analyze complex social and economic tradeoffs associated with existing or prospective allocations. In addition, while fishery resources are public trust resources, allocation discussions are inherently politically challenging since they are viewed in zero-sum terms by stakeholders. Despite these challenges, careful consideration of allocation decisions is necessary to meet the mandates of the Magnuson Stevens Fishery Conservation and Management Act (MSA).

The MSA defines optimum yield as "the amount of fish which—
"(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities,..." Allocation is immediately relevant to achieving optimum yield.

Allocation review mechanisms should provide transparent processes for adequate reviews of allocations to ensure that U.S. fisheries are managed to achieve National Standard 1. While the demographic composition of some regional councils closely mirrors that of the commercial and recreational fisheries within a specific region, some councils do not have significant recreational representation among their political appointees. Asymmetrical council compositions further underscore the need for well-defined and transparent processes to ensure fairness and responsiveness to the issue of allocation.

Regardless of the mechanism ultimately used to trigger an allocation review, councils may benefit from developing and maintaining a prioritized schedule for review of allocation issues. Such an effort could provide for a more orderly consideration of this topic and help manage expectations among stakeholders and managers.

In order to address the above issues the CCC Allocation Working Group proposes a protocol based on adaptive management consisting of three separate steps: (a) Triggering an allocation review; (b) the allocation review; (c) and if deemed necessary by the review, a reallocation action to amend the FMP. Critical aspects are the decision threshold for initiating an allocation review and the subsequent reallocation action. <u>The focus of the CCC working group's exploration is the first of those steps – triggering an allocation review</u>. Therefore, the remainder of this document is organized as follows:

A. Adaptive Management
   1. Introduction
   2. Goals and objectives of the allocation decision as criteria for triggering allocation review

3. Defining the management action for potential review
4. Monitoring the achievement of management goals and objectives and the effects of the allocation
5. Evaluating the achievement of management goals and objectives and the impacts of the allocation
6. Adapting in response to evaluation and learning
7. Reconsidering management goals and objectives

B. Definitions
1. Statement of Purpose
2. What are the steps involved in adaptive management of allocation decisions?
3. What is an allocation review?
4. What is a reallocation action?

C. Three approaches to triggering allocation reviews
1. Public interest-based criteria
   a. Ongoing public input on fishery performance
   b. Solicitation of public input on fishery performance
   c. Formal petitions
2. Time-based criteria
3. Indicator-based criteria
   a. Economic criteria
   b. Social criteria
   c. Ecological criteria

Adaptive Management

Introduction

The concept of adaptive management –evaluating successful attainment of management objectives and adjusting strategies in response – has been thoroughly explored in natural resource management literature. While the discussion of requiring a review of allocation decisions by councils has emerged more recently, it is one that contemplates an adaptive approach to one of the most challenging and controversial aspects of federal fisheries management. This section characterizes important considerations in identifying the need to review allocation decisions in the context of adaptive management and its process components.

The working group notes the importance of a common understanding regarding what is meant by "review." To this end, the working group clarifies that "review" is the evaluation described in the preceding paragraph that leads to the decision of whether or not the development and analysis of new alternatives is warranted, and is not, in and of itself, an implicit trigger to consider new alternatives. Instead, the identification of purpose and need for an action and the development of action alternatives (re-allocation) should occur in response to allocation review findings that a re-allocation is warranted.

Establishment of management goals and objectives

The foundation of the active adaptive management process described in this section is the articulation of management goals and objectives upon which management measures

are based, monitoring is designed and implemented, and analysis is focused. This assumes, however, that the goals and objectives on which the original allocation decision was based remain relevant and that ecological, social, and economic conditions do not indicate consideration of different goals and objectives.

A council should consider the contemporary relevance of previously stated goals and objectives and revise its goals and objectives for the fishery and the allocation as appropriate. New goals and objectives or significant revisions to existing ones may necessitate an allocation review, even if those identified at the time of the original action have been met.

It should be made very clear that updating and maintaining contemporary fishery management plan objectives is essential and will likely require considerable effort. The selection of the proper management objectives is critical because they are the "indicators" that are to be used when ascertaining that the current allocation is appropriate. This is important for two reasons. First, it will ensure that the proper criteria are used to judge success and it will narrow the range of inquiry that staff will have to focus on to support the decision. To be specific, the material in both the CCC document and the NMFS document on possible indicators to consider will be very useful in framing the discussion on the selection of management objectives but they should not be viewed as a mandatory list of needed research. The research should focus on the indicators relevant to the selected fishery including its management objectives.

Goals and objectives of the allocation decision as criteria for triggering allocation review

Clearly articulated goals and objectives for an allocation action as informed by broader FMP goals and objectives are the foundation upon which to base allocation decisions and serve as essential criteria for evaluating whether or not a review of such decisions is warranted. The original record of a council decision should therefore be closely examined and thoroughly understood by a council considering an allocation review, as should any expression of expected outcomes (improvements or changes in the social, economic, and ecological performance of the fishery) resulting from the allocation. To the extent that the original record does not include a description of expected outcomes of the allocation decision, the council should consider identifying potential outcomes that logically flow from the action for use as criteria in reviewing the need for an allocation review.

It is important to note that a council's goals and objectives associated with an allocation decision may reach beyond the simple intent to make an orderly division of access to the resource and could reflect or reinforce broader management objectives as detailed in an FMP. Management objectives could include issues such as achievement of optimum yield, maintaining equity among states, providing for the sustained participation of coastal communities, etc. that can be addressed through allocation.

Defining the management action for potential review

When considering the need for allocation review it is important to clearly identify the action or actions that represent the "allocation decision." In some cases this may be straightforward, as with an action that allocates percentages of a resource to two or more long-established fishery sectors.

More often it is the case that allocation actions include multiple decision points —rather than a single, well-defined action – such as identifying and defining specific fishery users or sectors, limiting access to other fisheries by allocation recipients, managing effects of incidental bycatch on other sectors or fisheries, and other measures intended to support implementation of the allocation and mitigate unintended impacts. In these instances, councils should carefully consider the scope of decision elements that comprise the "allocation" for which a review is being considered. A failure to address the appropriate scope of management components and to ensure that the set of included decision elements represent "the allocation" could result in misguided conclusions regarding the need to review an allocation.

Impacts and outcomes of allocation decisions can be observed at a variety of levels within the fishery, from individual participants, to subsets of participants and stakeholders, to sectors, communities, states, etc. For purposes of establishing indicator and public interest-based criteria for allocation review, careful attention should be given to the scope of consideration or standing; triggering review of an entire allocation decision in response to an isolated or small-scale challenge may prove destabilizing to a fishery at large.

Many management actions have, indirectly, some allocative impacts and effects. Closure of near shore fishing grounds to protect habitat may, for example, constrain access to a fishery by small vessels while favoring access by larger vessels capable of fishing further from shore. While such outcomes should come under review by councils and may warrant a management response, these indirect effects are not the focus of this document.

Monitoring the achievement of management goals and objectives and the effects of the allocation

Active adaptive management requires the design and use of monitoring systems that will collect data useful for evaluating the outcomes of management decisions. The quantity and quality of data available for analysis to inform the review of an allocation decision should be carefully assessed and is an important criterion for triggering an allocation review; it is challenging at best to evaluate the achievement of management goals and objectives without reliable data from the fishery and communities. To the extent that existing data collection programs are not contributing to the monitoring of allocation decision outcomes and impacts, efforts should be made to design and implement an effective monitoring system.

Evaluating the achievement of management goals and objectives and the impacts of the allocation

In the multi-step process described in this document, this evaluation is achieved through the consideration of indicators to trigger an allocation review and, if indicated, the allocation review itself. Evaluating the extent to which allocation and broader FMP goals and objectives have been met through an allocation's implementation and ecological, social, and economic impacts associated with the action is the critical component of an adaptive approach to management and of any consideration of the need for allocation review. It is the process through which a council might identify the need to initiate a formal review of an allocation decision or find that implementation of an allocation was successful in meeting its goals and did not result in unanticipated negative impacts.

Adapting in response to evaluation and learning

This component of active adaptive management would be the potential result of an allocation review and would therefore occur only if previous analytical steps indicated the need for such a review. It represents the consideration of reallocation alternatives when indicated by an allocation review.

It is important to note that the recommendations contained herein are based on the assumption that a council's management goals and objectives as related to an FMP, specific management actions, or otherwise, are subject to periodic review and adaptation and are relevant and/or contemporary at the time of consideration for triggering an allocation review, of conducting an allocation review, and of taking a reallocation action.

Definitions

Statement of purpose:

In order to keep to keep allocation policy and decisions responsive to social, economic, and ecological change it is necessary to consider those polices and decisions from time to time.

What are the steps involved in adaptive management of allocation decisions?

Adaptive management of allocation decisions is a sequence of up to three steps consisting of (a) triggering an allocation review according to time-based, public interest-based, or indicator-based criteria; (b) an allocation review; and (c) if the results of the review so indicate, an reallocation action. The working group addressed (a), the criteria for triggering an allocation review.

What is an allocation review?

An allocation review is a structured review of current allocations based on adaptive management (i.e., evaluating successful attainment of management objectives) to determine if further action is required. The purpose is to determine if current management objectives are being achieved through the existing allocation, with the caveat that management objectives are up to date and address the relevant operational, economic, social and ecological aspects of the fishery, including new and expected changes in such things as climate, demography, technology, etc. If it is determined that minimum threshold criteria for meeting management objectives are not being achieved under the existing allocation, then a Reallocation Action should be initiated and new allocation alternatives identified. Otherwise, no further action is required until an allocation review is triggered once again.

What is a reallocation action?

A reallocation action is a formal procedure to amend a FMP to allow for a reallocation of access to fishery resources that follows normal amendment procedures such as scoping, developing a statement of purpose and need for action, developing alternatives (one of which is a no action alternative), assessing the effects of implementing different alternatives, and selecting a preferred alternative.

Three approaches to triggering allocation reviews

This document identifies considerations associated with the design and application of three types of allocation review triggers: 1) public interest-based triggers; 2) time-based triggers; and 3) indicator-based triggers. It is important to note that while this document offers guidance on what aspects of fishery indicators might be considered in triggering an allocation review, monitoring, evaluating, and responding to fishery performance is foundational to adaptive management and the council process. Use of public interest or time-based criteria for triggering allocation review is not mutually exclusive to ongoing formal and informal evaluation of fishery performance and outcomes. This points out as well some inter-relatedness among review trigger criteria options. For example, some forms of public interest criteria are driven and informed by the public's perception of fishery performance.

It is unlikely that one type of criterion serves as the best allocation review trigger for all fisheries. Councils should carefully consider the attributes, dynamics, and relationships of and among various trigger criteria and choose approaches that best fit a specific fishery. Councils may choose to establish different criteria at the species, fishery, or FMP level. This includes species that are managed internationally, but for which a council may have authority for a domestic quota allocation. When applying time-based criteria to a number of fisheries, intervals between reviews of specific allocations may reflect prioritization for review based on specific fishery attributes where the size, variability, or inter-sector dynamics of a fishery may indicate more or less frequent review.

It should be noted that in some instances review trigger criteria are complementary. This is a particularly important dynamic when considering the use of some public interest-based trigger criteria. When considering the use of ongoing or council initiated public comment, the elements identified in the indicator-based criteria may be useful in the council's determination of need of an allocation review.

Within three years of the issuance of this guidance, or as soon as practicable, it is recommended that councils establish transparent criteria for triggering allocation review for all fisheries that have allocations between sectors (e.g. commercial, recreational, for-hire, gear-specific, international, etc.) In the case of fisheries managed under catch shares, councils may choose not to review allocations made to individual fishery participants, but rather consider review of allocations between sectors.

In addition to determining the trigger or triggers that a council will use for initiating review of specific allocations, councils should also develop a structured and transparent process by which allocation reviews will be conducted, including consideration of current council priorities, other actions under deliberation, and available resources.

Trigger basis		Timing	Decision Criteria	Outcome	Source of Guidance	Comments
Step 1: What triggers an allocation review?						
Public interest	Ongoing public input on fishery performance	Ongoing – decision to initiate review may occur at any time	See indicators – is review indicated?	If indicated, allocation review initiated. If not, continue Step 1.	CCC Working Group Paper	From a timing standpoint, this approach is similar to status quo.
Public interest	Solicitation of public comment regarding allocation review	Ongoing – decision to solicit public comment may occur at any time	See indicators – is review indicated?	If indicated, allocation review initiated. If not, continue Step 1.	CCC Working Group Paper	Public comment regarding the need for allocation review may be triggered by early indicators that FMP or management objectives are not being met.
Public interest	Public interest: Formal petitions	Ongoing – public may submit petition at any time	Does public petition have standing?	Public petition with standing may trigger review.	CCC Working Group Paper	This approach requires an allocation review without consideration of timing or indicators.
Time		Specific time intervals (7-10 years)	None – response to scheduled review non-discretionary	Allocation review automatically triggered	CCC Working Group Paper	This approach requires an allocation review without consideration of indicators.
Indicators		Ongoing – Indicators may be evaluated at any time	Is review indicated per social, economic, or ecological criteria?	If indicated, allocation review triggered. If not, continue Step 1.	CCC Working Group Paper	From an evaluation standpoint, this approach is similar to status quo.
Step 2: Allocation Review: Is consideration of new allocation alternatives justified?						
See above		See above	Are the FMP and allocation objectives still relevant? Are they being met? What's changed?	If objectives not being met, then a reallocation is initiated If objectives are relevant and are being achieved, then no further action. Continue Step 1.	NMFS Working Group Paper	It is assumed that that a council's management goals and objectives are current at the time of consideration for triggering an allocation review, of conducting an allocation review, and of taking a reallocation action.
Step 3: Initiating consideration of new allocation alternatives: should there be a reallocation and what needs to be considered?						
Conclusion through allocation review that reallocation is warranted		See above	What alternatives will meet FMP and allocation objectives?	Selection of a preferred alternative	NMFS Working Group Paper	

Public interest-based criteria

If a council develops effective indicator or time-based allocation review mechanisms, then a public-interest review trigger mechanism may not be necessary. However, if those review mechanisms are not established, or if they are not responsive to changing conditions within a fishery, then a public-interest review mechanism could be used to trigger an allocation review.

The U.S. regional fishery management council system is transparent and open to public input throughout the process. Councils implement extensive work plans throughout the year, and manage some regulatory initiatives, including plan amendments, over the span of several years. Managing to meet the councils' statutory requirements and other competing priorities requires effective planning, which typically includes an annual priority-setting process. Ideally, public input on the need to review a specific fishery allocation would feed into this process to enable an orderly consideration of the question, in the context of competing priorities and organizational resources.

This guidance addresses the solicitation or consideration of statements of public interest at three different levels within the regional fishery management council process:

1. Ongoing public input on fishery performance
2. Solicitation of public comment regarding allocation review
3. Formal initiatives

Ongoing public input on fishery performance

As noted above, the council process is open, transparent, and offers frequent opportunities for public comment and input. This dynamic establishes a feedback loop between the council and the public in regard to both the specific issues under the council's consideration and broader indicators of fishery performance. Given the extent to which the impacts of allocation decisions are associated by the public (both through direct observation and perception) with fishery performance, public interest in allocation review is likely to be expressed at many points within the council process and in reference to a variety of fisheries management issues.

This feedback loop of ongoing public comment is a valuable opportunity for the public to express interest in allocation review, and for the council to gauge how effectively allocation objectives are being met. It also serves as an opportunity for the council to understand and evaluate the extent to which allocation lies at the root of fisheries management challenges, and the need to initiate allocation review may be indicated through this process.

Solicitation of public comment regarding allocation review

Councils may choose to engage in allocation review "scoping discussions" with stakeholders and other interested parties. Unlike the collection of feedback through ongoing public comment described above, this process is deliberate and specifically

targets public input on the need for allocation review. Councils rely on outreach and information-gathering mechanisms to achieve public input including the solicitation of written comments, scoping discussion at council meetings, and port meetings and other community engagement strategies.

One of the benefits of this approach to consideration of triggering allocation review is that it is focused directly on the allocation and the necessity for potential review rather than on the secondary and tertiary impacts of the allocation. An additional benefit to this strategy is the council's ability to dictate a schedule. While more demanding of time and resources than identification of allocation review triggers in the course of ongoing public comment, the process for soliciting, receiving, and considering public input can be designed by the council and scheduled in a manner that does not conflict with other council initiatives and priorities.

When considering the solicitation of public input regarding allocation review, councils should be aware of, and sensitive to, the expectations among stakeholders that could develop as a result of the council indicating interest. The council should carefully consider its ability (resources and capacity) and willingness to follow through with an allocation review if warranted before reaching out to the community for focused input.

Formal petition mechanism

The first two approaches to gathering, evaluating, and responding to public input are already possible within the current regional fishery management council system. In both cases, the decision to initiate the review would rest with the council. A stronger public-interest review mechanism could include a provision for a stakeholder request or petition requesting review, together with a requirement for a Council to initiate an allocation review within a reasonable period of time. Such a provision would have more potential to impose a cost on a council's established work plan and priorities but would provide another mechanism to ensure that allocations receive due consideration in response to public concern. If such a mechanism is established, it may be appropriate to incorporate indicator-based criteria to establish a minimum threshold for initiating review.

Any petition-based review process should establish requirements that identify specific conditions or outcomes upon which such requests may be based. In addition, councils should include establishment of guidelines for petitions. While a council has discretion to determine whether or not to move forward with an allocation review as per the requirements it establishes under a petition-based process, it should at least respond to the *request* for a review under this process. This response could be a simple as a letter to the petitioner(s), explaining the council's rationale for its decision (e.g., petition did not meet conditions for consideration, lack of standing by petitioners, etc).

Time-based criteria

Establishment of a time-based trigger has figured prominently in recent discussions regarding allocation review, including provisions for periodic allocation review in

several MSA re-authorization drafts. In several respects periodic allocation review on a set schedule is the most simple and straightforward criterion for triggering an allocation review; the approach is unambiguous and less vulnerable to political and council dynamics. That said, the attributes of simplicity and the mandate of a strict schedule render time-based criteria less sensitive to other council priorities and the availability of time and resources to conduct an allocation review.

Time-based triggers for initiating allocation review might be most suitable for those fisheries or FMPs where the conflict among sectors or stakeholder groups make the decision to simply initiate a review so contentious that use of alternative criteria is infeasible. In such a situation, a fixed schedule ensures that periodic reviews occur regardless of political dynamics or specific fishery outcomes. Given the inflexible nature of time-based triggers, however, it is recommended that they be used only in those situations where the benefit of certainty outweighs the costs of inflexibility.

The inflexible nature of time-based triggers can impact both the work and effectiveness of the council as well as the outcomes of the allocation process itself. As noted above, fixed, time-based triggers for review may conflict with other council priorities. To the extent that those priorities include consideration of actions to mitigate significant social, economic, or conservation concerns, adherence to a fixed review schedule may prevent a council from achieving significant and beneficial management outcomes while achieving at best marginal improvements through allocation review. Given the fact that there is potentially no relationship between the pace at which fishery performance evolves and a fixed schedule for allocation review, use of such a trigger creates the potential of a significant expenditure of council time and resources with little need for review or likely improvement in fishery performance.

Time-based triggers for review may impede stability in subject fisheries. To the extent that reviews are conducted on a regularly scheduled basis, there is an incentive for sectors receiving allocations to continuously employ operational and political tactics to improve their allocation at the next review. The assurance of a "new" allocation review may as well encourage speculative entry into subject fisheries. When considering the adoption of a time-based review trigger, care should be taken to identify if and to what extent the process is likely to be manipulated or "gamed", and measures to minimize that activity should be considered.

The selection of review intervals using time-based triggers should be informed by fishery characteristics, data availability, and council resources. Newly developed or rapidly changing fisheries may warrant more frequent review, while established fisheries with stable participation and performance can likely be reviewed less frequently. Whether following an initial allocation or a re-allocation, the timing of further review should accommodate the collection and analysis of a data series from which meaningful and accurate review and analysis can be achieved. The five-year initial review and subsequent reviews every (up to) seven years of limited access privilege programs (LAPPs) as required under Section 303A of the MSA may indicate a desirable minimum interval between reviews. Similarly, the 10-year durability of LAPP permits may suggest a maximum interval for time-based review triggers.

Indicator-based criteria

The MSA requires that fisheries be managed for Optimum Yield (OY), which is Maximum Sustainable Yield (MSY) as reduced by relevant social, economic and ecological factors. In defining OY, the NS1 guidance provides that these factors should be "quantified and reviewed in historical, short term and long term contexts." Furthermore, it recommends that each FMP should contain a mechanism for periodic review of the OY specification, in order to respond to changing conditions in the fishery. In establishing indicator-based metrics for review of allocations – whether among sectors (e.g., commercial, recreational, for-hire, gear, international, etc.), within a sector (e.g., among catch share recipients), or for purposes such as bycatch accounting –it is logical to apply similar parameters to an allocation review as to an OY review, particularly if the goals and objectives of an FMP specifically address these items. In support of such an approach, the NS4 guidance states that allocation decisions should be "rationally" linked to attaining OY, and/or to the objectives of an FMP. It follows that selection of indicator-based criteria to trigger an allocation review should inherently be linked to those same objectives. In the interest of public transparency and clarity, councils may even consider establishing an objective that is specific to allocation within an FMP.

A time component is inherent in any indicator-based criteria for review of allocations, whether explicitly included (e.g., achieving a desired economic efficiency within XX years) or not. Evaluating a criterion used in establishing an allocation, particularly if it requires the addition of ensuing years of data to a quantitative analysis, indirectly applies a timeframe for review.
There are several categories of indicator-based criteria to consider as triggers for initiating review of allocations, all stemming from the definition of OY: social, economic and ecological. Ideally, the rationale for an initial allocation decision would consider a mix of criteria from all categories, although data limitations may preclude quantitative consideration. This could impact the ability to set an objective, specific review trigger for a particular criterion.

It follows that use of several criteria, either singly or in combination, and across multiple categories, may be optimal when using indicator-based criteria as a trigger for an allocation review. For example, a council may select one social, one ecological and one economic criterion as indicators, and define the "trigger" for review as any two of the three criteria meeting predetermined limits. This clearly defines the minimum threshold to trigger an allocation review. Taking this example to Step 2 (as per Table 1), consideration of allocation alternatives may occur if the selected indicators meet established limits within a particular timeframe, effectively combining indicator- and time-based triggers in order to ensure an adaptive management approach. As noted above, it may be difficult to set measurable values as triggers for indicator-based criteria, and use of quantitative thresholds is likely to be more the exception than the norm. In such cases, qualitative triggers should be considered to ensure that FMP goals and objectives are addressed.

In selecting indicator-based criteria, it is important to recognize there are factors that are not in and of themselves measurable metrics for a particular criterion or set of criteria; however, they may impact selected criteria and thus influence the "triggering" of a review. These factors may include acquisition of new data, natural disasters, etc. that are not necessarily measurable on their own, but can impact measurable criteria from any of the three categories.

Finally, while there is overlap in the discussion of indicator-based criteria in this document with the NMFS guidance document, the purpose of the two documents is different. The latter document refers to the indicators below as "factors" (in addition to many others) to be considered by councils in the context of establishing initial allocations, or if a re-allocation action is undertaken. The CCC document discusses their use as one of three possible types of triggers for an allocation review. While some overlap is inevitable, the context in which that overlap occurs is important.

Economic Criteria

While the quality and quantity of fisheries economic information has improved over the years, there may be instances in which a disparity exists in the available data for one or more industry sectors, user groups or communities impacted by an allocation decision. This should be explicitly noted and accounted for should quantitative economic criteria be selected by councils as a trigger for allocation review. Because economic outcomes are often closely tied to social outcomes, links between economic and social triggers should also be acknowledged (Jepson and Colburn 2013).

The NS5 regulations prohibit the establishment of allocations for economic purposes alone, however, economic efficiency "shall" be considered where practicable. Multiple economic tools are available to assist in establishing indicator-based triggers for review: cost-benefit analysis, economic impact analysis, and economic efficiency (Edwards 1990; Plummer et al. 2012). However, public understanding of the differences between and proper use of these tools is often limited[1]. Whatever the economic triggers for allocation review, it will be of utmost important to explain the tool(s) used in plain language that stakeholders can understand. Although not all sectors of the public may agree with the criteria or trigger value, public understanding of the tool is critical to its acceptance as a means of informing both an initial allocation decision and its subsequent review. Failure to achieve a desired economic efficiency within a particular timeframe, and unanticipated or greater than anticipated/analyzed costs (e.g., outside of a certain error level) are examples of triggers for initiating a review of allocation decisions.

[1] For example, constituents often cite the results of economic impact analyses as justification for allocation of resources to a particular user group. However, the peer-reviewed economic literature clearly states that cost-benefit analyses, not economic impact analysis, are the appropriate tool for informing allocation decisions.

Social Criteria

As noted above, social and economic impacts are often linked, and changes in social criteria may lead to changes in economic criteria and vice versa. National Standard 8 requires that management measures account for social and economic impacts to communities, as well as provide for "sustained participation." This is defined in the NS8 guidelines as "continued access" to the resource, depending on resource condition.

A number of studies and technical memoranda have been published detailing the development and measurement of social metrics such as community resilience, vulnerability and well-being. Jepson and Colburn (2013) describe categories of indices -- social, gentrification, fishing dependence-- that can be used to estimate social impacts of management decisions at the community level. Councils may choose to select several indices among the above categories or an entire category of indices as indicator-based criteria to trigger an allocation review. The methods used in Jepson and Colburn provide a quantifiable means of tracking the potential social impacts of an allocation decision. As alluded to earlier, setting a minimum threshold (e.g., a 0.5 standard deviation change in a social index score, etc.) or a timeframe (e.g., every three or five years) for undertaking a review of selected criteria will ensure that a fishery is not in a constant state of "allocation flux," again illustrating the inter-relationship of the various criteria discussed in this document. While councils may lack a quantitative means of developing social criteria, use of public-interest based criteria may provide a means for doing so (e.g., public input regarding loss of processing capacity or tackle shops in a community), or for establishing qualitative criteria.

Finally, for many communities, social change can be closely linked to ecological change (i.e. a sudden harvest moratorium as a result of a stock assessment; Jepson and Colburn 2013). While ecological criteria for allocation review are addressed in the following section, this relationship is worth noting as it further demonstrates that the categories of indicator-based criteria do not exist independent of one another.

Ecological Criteria

Ecological criteria may be considered some of the most self-evident criteria for triggering an allocation review. Changes in fishery status resulting from a stock assessment, undocumented sources of mortality (fishing or otherwise), increases in discards, changes in species distribution and food web dynamics are all examples of factors that may influence an allocation review. However, as noted previously, not all of these factors are necessarily measurable, indicator-based metrics that the councils have any control over. Measureable criteria that could be considered are failure to end overfishing within a specified timeframe, failure to achieve or rebuild to a certain level of abundance, a significant increase in discard mortality from a particular sector, significant changes in landings (e.g., an increase/decrease greater than one to two standard deviations within a three-year timeframe, etc.). As with social metrics, public-interest based criteria may at least provide a means of establish qualitative ecological criteria (e.g., anecdotal evidence of changes in distribution, discards, size of fish, etc.).

References

Edwards, Steven F. 1990. An Economics Guide to Allocation of Fish Stocks Between Commercial and Recreational Fisheries. U.S. Dept. of Commerce, NOAA Technical Report NMFS 94, 29 p.

Jepson, Michael and Lisa 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 p.

Plummer, M.L., W. Morrison, and E. Steiner. 2012. Allocation of fishery harvests under the Magnuson-Stevens Fishery Conservation and Management Act: Principles and practice. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-115, 84 p.

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APPENDIX D. ALLOCATION FACTORS

Department of Commerce * National Oceanic & Atmospheric Administration * National Marine Fisheries Service

NATIONAL MARINE FISHERIES SERVICE PROCEDURAL DIRECTIVE 01-119-02
July 27, 2016

Fisheries Management
Fisheries Allocation Review Policy

RECOMMENDED PRACTICES AND FACTORS TO CONSIDER WHEN REVIEWING AND MAKING ALLOCATIONDECISIONS

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SUMMARY OF REVISIONS:

Signed _____
Alan Risenhoover
Director, Office of Sustainable Fisheries

Recommended practices and factors to consider when reviewing[1] and making allocation decisions

Background

An allocation (or assignment) of fishing privileges is defined by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) as "a direct and deliberate distribution of the opportunity to participate in a fishery among identifiable, discrete user groups or individuals" 50 CFR 600.325(c)(1)[2]. The Magnuson-Stevens Fishery Conservation and Management Act (MSA)[3] as well as other guidance or policy documents written by NOAA or NMFS include provisions, guidance, or information relevant to allocation decisions (see Appendix A for details). The guidance provided here does not modify or supersede any guidance associated with the National Standards, other provisions of the MSA or other applicable laws; rather, it is intended to help the Councils and NOAA review and update allocations under the MSA. Allocation can be across jurisdictions (e.g., state, regional), across sectors (e.g., commercial, for-hire, private anglers, tribal, research), and within sectors (e.g., individual fishermen, gear types). Allocation of fishery resources is a complex issue facing

[1] For the purposes of this document "review" is the evaluation that leads to the decision of whether or not the development and analysis of alternative allocations is warranted, and is not, in and of itself, an implicit trigger to consider alternative allocation.
[2] www.nmfs.noaa.gov/sfa/laws_policies/national_standards/documents/national_standard_4_cfr.pdf
[3] www.nmfs.noaa.gov/sfa/laws_policies/msa/documents/msa_amended_2007.pdf

fishery managers because of the history and tradition of access to fishery resources, the perceptions of equity that arise with allocation decisions, and differences in the economic and social values competing user groups place on those resources. In addition, fisheries management is not static and should be adaptable as environmental, ecological, social, and economic influences change. Therefore, allocation decisions need to be considered in the context of adaptive management.[4]

In 2011, NMFS issued a contract for an outside entity to interview stakeholders about allocation issues. The report (Lapointe, 2012)[5] is the first comprehensive compilation of fisheries allocation issues. NMFS commissioned the report to facilitate a productive discussion about allocation decisions and socio-economic objectives for fisheries management. It summarizes input from discussions with a wide range of stakeholders and suggests five steps NMFS can take to address allocation issues: 1) increase stakeholder engagement in allocation decisions, 2) increase biological and social science research and data, 3) periodically review allocation decisions, 4) compile a list of past allocation decisions, and 5) create a list of factors to guide allocation decisions.

This document addresses the fifth recommendation by providing a summary of recommended practices and guidance on allocation factors that a Regional Fishery Management Council (Council)[6] should consider when making allocation (initial or reallocation) decisions. The factors are drawn from, or are relevant to, MSA provisions and other legal mandates and thus should already be considered in the fisheries management process. The recommended practices are ideas that could improve the allocation process by increasing transparency and minimizing conflict. The Council Coordinating Committee created a companion document[7] that describes triggers that can be used to determine when to review allocation decisions, addressing the Lapointe report's third recommendation. For the other three recommendations, NMFS has published two technical memorandums that contain a list of past allocation decisions[8, 9] and is continuing to work to increase stakeholder engagement and biological and social science research.

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[4] We describe adaptive management as the on-going process of evaluating if management objectives have been met and adjusting management strategies in response. We do not include large scale scientific manipulations aimed at answering scientific questions.

[5] Lapointe, GD. 2012. Marine Fisheries Allocation Issues: Findings, Discussions and Options. George Lapointe Consulting LLC.58 pgs. External Assessment Completed for NMFS (December 2012). Available: www.nmfs.noaa.gov/stories/2013/01/docs/lapointe_allocation_report_final.pdf

[6] Throughout this document, guidance for Fishery Management Councils also pertains to Atlantic High Migratory Species Secretarial actions.

[7] NMFS Procedural Directive 01-119-01, Criteria for Initiating Fisheries Allocation Reviews, Council Coordinating Committee Allocation Working Group Document. http://www.nmfs.noaa.gov/op/pds/documents/01/119/01-119-01.pdf

[8] Morrison, W.E., T.L. Scott. 2014. Review of Laws, Guidance, Technical Memorandums and Case Studies Related to Fisheries Allocation Decisions. U.S. Dept. of Commerce. NOAA Technical Memorandum NMFS-F/SPO-148, 32 p. www.nmfs.noaa.gov/sfa/laws_policies/national_standards/documents/morrison_scott_nmfs_f_spo_148.pdf

[9] Plummer, M.L., Morrison, W., and E. Steiner. 2012. The Allocation of Fishery Harvests under the Magnuson-Stevens Fishery Conservation and Management Act: Principles and Practice. U.S. Department of Commerce, NOAA Tech. Memo NMFS-NWFSC-115, 84 p. www.nmfs.noaa.gov/sfa/laws_policies/national_standards/documents/plummer_allocationfishharvests_tm115_web_final.pdf

Recommended Practices When Reviewing and Making Allocation Decisions

Several recommended practices would improve the allocation process by increasing transparency and minimizing conflict. A list of recommended practices is below, although it should not be considered comprehensive and may not be applicable to all circumstances.

a. **Evaluate and Update Council and Fishery Management Plan (FMP) Objectives.** Council fishery management decisions often involve trade-offs (e.g., between management objectives within a fishery, or between two fisheries under the Council's jurisdiction). For example, maintaining employment may be in conflict with improving economic efficiency. Similarly, long-term goals related to rebuilding stocks may also be in conflict with short-term goals of minimizing impacts on fishery-dependent communities. Updated and measurable objectives help clarify decisions about these trade-offs within and between FMPs. If FMP objectives are not current, clear, or measurable, a Council should re-assess the FMP objectives prior to or concurrent to initiating the allocation discussion.[10] In addition, the Council should use a transparent process for analyzing and determining trade-offs between FMP objectives and/or FMPs.

b. **Identify User Needs**.
The specific needs and interests of the different types of fishery participants or sectors within a fishery may vary. For example, recreational fishermen may be more interested in stable fishing opportunities than absolute numbers of fish retained. Therefore, articulating the needs of each type or sector should be completed near the beginning of the allocation discussion to facilitate identification of alternatives, which may reduce conflict. Once user needs are identified through a public process, those needs should be communicated and publicly available.

c. **Minimize Speculative Behavior.**
To limit situations which may lead to speculative behavior or practices[11] whenever allocations are being considered, the Council should consider announcing a control date for a given fishery, by sector as appropriate, which is published by NMFS as an advance notice of proposed rulemaking. The control date provides notice that, if an allocation decision is made in an FMP or FMP amendment, there is no assurance that any entrance or increased effort into a fishery beyond said date will be used to determine allocations. Announcing a control date is common practice when creating limited access and catch share programs, but could also be used for allocation decisions between gear types, sectors, or groups.

d. **Plan for Future Conditions.**
To plan for future conditions, Councils may consider adopting in an FMP or FMP amendment mechanisms for implementing actions in an expedited manner, where

[10] For general information on FMP objectives in the National Standard Guidelines, *see* 50 C.F.R. § 600.305(b): http://www.fisheries.noaa.gov/sfa/laws_policies/national_standards/documents/national_standards_general_cfr.pdf.
[11] For example, if fishermen expect future allocations to be based on catch history, they may decide to increase catch in order to improve their catch history, etc.

appropriate and as consistent with the MSA, Administrative Procedure Act, National Environmental Policy Act, Executive Order 13653, and other applicable law. [12] For example, the Bering Sea and Aleutian Islands FMP includes pre-arranged "if/then" allocations for yellowfin sole between two sectors depending on the total allowable catch (TAC). If the TAC for the two sectors is greater than 125,000 metric tons (mt), then the first sector is allocated 60 percent; if the TAC for the two sectors is less than 125,000 mt, then the first sector receives an increasing apportionment.[13] The Mid-Atlantic bluefish FMP provides an example of a mechanism that incorporates more discretion than the example provided above. The Mid-Atlantic bluefish allocation is currently set as 83% recreational and 17% commercial.[14] However, the FMP states that if the recreational sector is not projected to land its harvest limit for the upcoming year, then the commercial catch limit may be increased for that year as long as the combination of the projected recreational landings and the commercial quota does not exceed the total allowable landings.

A pre-arranged management response may be one option for allocating catch of a species that is expected to rebuild or shift distribution due to climate change, for example. Identifying, upfront, specific conditions that may result in changes in allocations could decrease controversy. We note that not all circumstances may be amenable to pre-arranged responses. For example, if external factors change significantly, the original analysis of impacts may no longer be considered adequate because the analysis would not capture the complete range of potential impacts or outcomes.

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[12] Some of these types of mechanisms are referred to by regions as "frameworks". *See* Appendix 3 of the NMFS Operational Guidelines at p. 3 at http://www.fisheries.noaa.gov/sfa/management/councils/operational_guidelines/og_append.pdf. As the Guidelines explain, frameworking is not intended to circumvent standard FMP/amendment and rulemaking procedures, and must be done consistent with the MSA and other applicable law. To the extent that MSA and other statutory requirements can be addressed up front when establishing such a mechanism, this may result in less analysis and process being needed when individual actions are executed under that mechanism. What analysis and process (including public comment) is required for each individual action will depend on the specific facts and circumstances of that action. *Id.*

[13] Northern Economics, Inc. *Five-Year Review of the Effects of Amendment 80 to the Bering Sea and Aleutian Islands Groundfish Fishery Management Plan.* Prepared for North Pacific Fishery Management Council. April 2014.

[14] Amendment 1 to the FMP for the Atlantic Bluefish Fishery, 65 FR 45844 (January 26, 2000).

Factors to Consider When Reviewing and Making Allocation Decisions

Typically allocation decisions are closely aligned with historical use of the resource because the government[15] is hesitant to limit historically established privileges and access (Rolph, 1983).[16] While historical use may (or in some instances, shall) be taken into consideration when reviewing and making an allocation decision,[17] the MSA requires achieving on a continuing basis the optimum yield (OY) from each fishery, which encompasses a broader range of considerations.[18] Recognizing this, below is a list of different factors to consider when reviewing and making an allocation decision.

The list of factors is not all-inclusive, as there may be other appropriate factors to consider. The factors do not prescribe any particular outcome with respect to allocations, but rather, are intended to provide a framework for the allocation analysis. Factors should be compared between groups for which an allocation decision is relevant. The priority and weight afforded each factor will vary depending on the time horizon of the decision,[19] the objectives of the allocation decision, the objectives of the FMP, and the overarching Council[20] goals. If a factor is determined not applicable or unimportant for the allocation decision in question, the Council should clearly document its rationale for the determination for the record. Such documentation is necessary to produce a strong record demonstrating that the factor has been considered. Analysis of an allocation decision under these factors is not a substitute for documenting compliance with MSA mandates, although there may be overlap between certain factors and MSA mandates. Of particular note, National Standard 4, discussed under Social Factors below, has explicit requirements pertaining to allocations of fishing privileges.

1. **Ecological Factors**
   Weakened or damaged marine ecosystems support a lower abundance and diversity of fish species, and may have a harder time adjusting to acute (e.g., hurricane) or long-term (e.g., climate change[21]) impacts than healthy ecosystems. Because different fishing practices

[15] Rolph includes a wide range of resources in his analysis (forests, air waves, etc.). However, in most marine fisheries, Councils and Commissions in coordination with federal and state governments make the allocation decisions.
[16] Rolph, E.S. 1983. Government allocation of property rights: Who gets what? Journal of Policy Analysis and Management 3:45-61.
[17] For example, for limited access privilege programs, historical harvests and historical participation of fishing communities are among the required considerations for establishing procedures for allocations. 16 U.S.C. § 1853a(c)(5)(A).
[18] 16 U.S.C. § 1851(a)(1) (National Standard 1). "'[O]ptimum', with respect to the yield from a fishery, means the amount of fish which— (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems; (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery". 16 U.S.C. § 1802(33).
[19] For example, factors may be weighed differently when considering in-season allocation changes versus longer term changes such as decisions that last years.
[20] Whenever Fishery Management Councils are mentioned, this guidance also pertains to Atlantic High Migratory Species Secretarial actions.
[21] Climate change impacts could be positive or negative for individual species or systems.

(locations fished, gear types used, etc.) can have varied impacts on the marine ecosystem, decisions that determine the allocation between different sectors or groups should take into consideration the potential ecological impacts of allocation alternatives. When making allocation decisions, relevant ecological questions could include, but are not limited to:

a. **What are expected ecological impacts on target species?**
Sectors can differ in their impacts on the target species. For example, sectors may target different stocks, sizes, or age classes, which could impact the productivity, distribution, yield, and/or recovery potential of the species.

b. **What are the expected ecological impacts on other fisheries? What is the status of non-target species[22]? What are the expected impacts on bycatch and bycatch mortality of both non-target species and protected species?**
Ecological impacts can overlap among fisheries.[23] Some ways ecological interactions occur are through bycatch, habitat, predator-prey dynamics, etc. For example, target species in one fishery can be incidental catch or bycatch in another. In addition, if the allocation of one species decreases, fishermen may increasingly target another species. Managers should assess the potential ecological impacts of a change in allocation to other fisheries when making allocation decisions. For example, if reducing bycatch is a priority then lowering allocations to sectors or gear types that have high bycatch could be considered.

c. **What are the impacts on the marine ecosystem?[24] What are the impacts on habitat? What are the impacts on the ecological community (e.g., relevant predator, prey, or competitive dynamics)?**
Fishing can change an ecosystem through both direct and indirect effects. Direct effects include mortality of target and non-target stocks, interactions with marine mammals or other protected species, and disturbance of marine habitat. Indirect impacts to the ecosystem include removal of predators, prey, competitors, or structure that could result in shifts in the ecological community. Managers should consider the direct and indirect impacts of different allocation alternatives to the ecosystem when making allocation decisions. For example, decreasing allocations to gears that have high impacts on biotic hard-bottom habitats could be considered.

2. **Economic Factors**
Allocation of a fishery resource has economic consequences for affected user groups that should be considered. Councils should be very specific in articulating what economic questions they want to consider when making allocation decisions. When making allocation decisions, relevant economic questions could include, but are not limited to:

a. **Can economic efficiency be improved?**
Councils should consider if the current or preferred allocation results in the most economically efficient[25] use of resources. Cost-benefit analyses should be used to

[22] For the purpose of this document, non-target species are the species that were retained but were not the primary target species.
[23] *See* 16 U.S.C. §§ 1853(a)(7) (requiring that FMP measures minimize, to the extent practicable, adverse effects on essential fish habitat caused by fishing) and (9) (requiring fishery impact statement) and 1851(a)(9) (requiring under National Standard 9 that FMP measures minimize to the extent practicable bycatch and bycatch mortality).
[24] *See supra* note 22.

estimate how a proposed allocation would change consumer and producer surplus (i.e., net economic benefits). From an economic analysis perspective, economic efficiency refers to how well resources are utilized in production and consumption[26]; economic efficiency is achieved when all resources are allocated to their most productive use.[27] Analyses that estimate the monetary value individuals or sectors place on the marginal value of their share of the harvest (i.e., "willingness to pay") can inform how allocation changes could improve economic efficiency. However, if use within each sector is not allocated according to those who value the resource most, then information about access to the resource in each sector may also be necessary to determine the efficient allocation among sectors (Holzer and McConnell, 2014)[28]. Methods for estimating the economic efficiency of an allocation decision are being continually improved.[29]

b. What are the economic impacts of potential changes in allocation?

Changes to sales, income, and employment levels as measured by economic impact analyses (i.e., input-output models) should only be used to understand the potential short-term distributive effects of allocation decisions on the affected communities[30], states, or regions (see social impacts below). Analyses should be completed at the finest scale possible, given available data and models. Unlike economic efficiency, economic impact – from an economic analysis perspective – does not measure social welfare. An allocation that maximizes economic impacts could reward the highest spender or highest cost producer, and thereby promote inefficient practices and processes and reduce economic efficiency relative to alternative allocations. Additionally, those affected by a change in allocation will likely adjust their behavior in response to a different allocation. For example, when recreational fishermen spend money on other recreational alternatives under a reduced allocation, it is difficult to determine whether the economic impacts of an alternative allocation on the economy will be positive or negative after those behavioral adjustments have occurred.

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[25] *See* 16 U.S.C. § 1851 (a)(5) (requiring under National Standard 5 that FMP measures "shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose."). According to the National Standard 5 Guidelines, "[t]his standard prohibits only those measures that distribute fishery resources among fishermen on the basis of economic factors alone, and that have economic allocation as their only purpose." 50 C.F.R. § 600.330(e). "Given a set of objectives for the fishery, an FMP should contain management measures that result in as efficient a fishery as is practicable or desirable." 50 C.F.R. § 600.330(b)(1).

[26] *Op. Cit.* Plummer et al. 2012.

[27] The National Standard 5 Guidelines explain: "In theory, an efficient fishery would harvest the OY with the minimum use of economic inputs such as labor, capital, interest, and fuel. Efficiency in terms of aggregate costs then becomes a conservation objective, where 'conservation' constitutes wise use of all resources involved in the fishery, not just fish stocks." 50 C.F.R. § 600.330(b)(2). The Guidelines further explain that "[a]n FMP should demonstrate that management measures aimed at efficiency do not simply redistribute gains and burdens without an increase in efficiency." 50 C.F.R. § 600.330(b)(2)(i).

[28] Holzer, Jorge, and Kenneth McConnell. 2014. "Harvest Allocation without Property Rights." *Journal of the Association of Environmental and Resource Economists* 1: 209-232

[29] NMFS is developing technical guidance on best practices that will clarify emerging issues and the appropriate implementation and use of economic impact and economic efficiency analyses.

[30] *See* 16 U.S.C. §§ 1851(a)(8) (requiring under National Standard 8 that FMP measures take into account the importance of fishery resources to fishing communities and, to the extent practicable, minimize adverse economic impacts on such communities) and 1853 (a)(9) (requiring fishery impact statement).

3. Social Factors

Allocation of a fishery resource can have social consequences on individuals and communities. For example, updating geographically-based allocations could impact the surrounding community by changing the demand for processing facilities, boats, and supplies such as bait and ice. When making allocation decisions, relevant questions on social factors could include, but are not limited to:

a. Is an allocation fair and equitable?

Equity is an important issue in fisheries management. National Standard 4 requires, in relevant part, that if an allocation is made "among various United States fishermen, such allocation shall be…fair and equitable to all such fishermen…"[31] Methods exist to gather information on the impacts of an allocation alternative, though assigning labels of "fairness" will remain subjective and the perception of "fair and equitable" will vary among individuals and sectors.[32] Social impact analyses can point to potential disproportionate impacts of allocation decisions. Relevant sectors and sub-groups may include, among others, vessels of different size categories, target species, or gear; communities of different sizes and different levels of social vulnerability and fisheries dependence; large versus small businesses[33]; or groups of fishermen from different states.

"Well-being" can also inform equity. Two broad principles of equity may be considered: vertical equity and horizontal equity. The former refers to different treatment of entities that are not alike while the latter refers to equal treatment among equal entities. Horizontal equity means that the distribution of well-being before and after a change in allocation is preserved. This might be the case for allocations that are primarily based on historical landings records. Vertical equity means that the distribution of well-being before and after a change in allocation has changed. Creating set-asides for entities that may have been disadvantaged by history-based allocations is an example of a measure that would affect vertical equity. In this case, vertical equity would become more even as a result of the set-aside.

b. Are there disproportionate adverse effects on low income and/or minority groups?

Consistent with Executive Order 12898 and guidance from the Council on Environmental Quality[34], NEPA analyses should continue to assess proposed actions for disproportionate and adverse effects on low-income and/or minority groups, including federally recognized tribes. Environmental justice assessments should include a review

[31] 16 U.S.C. § 1851(a)(4). *See* National Standard 4 Guidelines, 50 C.F.R. § 600.325(c) (addressing analysis of allocations and factors to be used in making allocations, including fairness and equity).
[32] *Op. cit.* Lapointe 2012.
[33] *See* 5 U.S.C. §§ 601 et seq. (requiring agency to review impacts of proposed regulations on small businesses and entities) and Executive Order 13272 (setting forth requirements for agencies when considering impacts on small businesses and entities).
[34] *See* Council on Environmental Quality, Environmental Justice Guidance Under the NEPA (Dec. 10, 1997): http://www.energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf (providing guidance to Federal agencies on considering environmental justice in the NEPA process).

of impacts on both directly and indirectly affected entities[35] (e.g., minority processing workers whose jobs might change due to fisheries allocation decisions that impact the amount and/or timing of fish processing).

c. What is the importance of fishery resources to fishing communities?

National Standard 8 requires that "[c]onservation and management measures shall, consistent with the conservation requirements of this Act…, take into account the importance of fishery resources to fishing communities…in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities".[36] When making allocation decisions, relevant fishing community questions could include, but are not limited to:

i. What is the individual, local, and regional dependence and engagement in each sector[37, 38]?

What is the current dependence and engagement and how are these expected to change in the future (both under the status quo and under the allocation alternatives being considered)? Fishing dependence and engagement analyses should include potential impacts to commercial, for-hire, private angler, and subsistence fishing, as well as shoreside support industries, and should consider impacts at the local level (and could expand to regional/national level) if data are available. For example, dependence and engagement may decrease locally based on decreased opportunities in a particular fishery, but increase on a regional level based on greater opportunities in a different fishery. In addition, the importance of a given species or fishing activity to a culture should be considered when making allocation decisions.

ii. What is the community's vulnerability and adaptive capacity?

Some communities may be more negatively impacted by changes to fishing production or fishery access than others. Social indicators have been developed that describe the vulnerability of a fishing community to "disruptive events" (Jepson and Colburn 2013)[39], such as a change to a group or sector's access to a fishing resource. For example, a community's current and historical dependence on a fishery can suggest a community's vulnerability and possible response to a change in commercial or recreational fishing access.[40] Similarly, understanding a community's ability to adapt to changes may be useful (e.g., the adaptive capacity metric developed by Mathis et al. 2014[41]).

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[35] *Op.cit.* Council on Environmental Quality, Environmental Justice Guidance Under the NEPA, page 8; *see also* 40 C.F.R. § 1508.8 (defining "effects" under NEPA to include direct and indirect effects).

[36] 16 U.S.C. § 1851(a)(8). *See also id.* § 1802(17) (defining "fishing community") and 50 C.F.R. § 600.345 (setting forth requirements for analyses under National Standard 8 Guidelines).

[37] NMFS, Guidance for Social Impact Assessment: www.nmfs.noaa.gov/sfa/laws_policies/economic_social/index.html

[38] Sepez, J., K. Norman and R. Felthoven. 2007. A quantitative model for ranking and selecting communities most involved in commercial fisheries. *NAPA Bulletin* 28, 43-56. 160.

[39] 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. Department of Commerce, NOAA Tech. Memo NMFS-F/SPO-129, 64p, available at spo.nmfs.noaa.gov/tm/TM129.pdf.

[40] *Ibid.*

[41] Mathis, J. T., S. R. Cooley, N. Lucey, S. Colt, J. Ekstrom, T. Hurst, C. Hauri, W. Evans, J. N. Cross, R.A Feely. 2014. Ocean acidification risk assessment for Alaska's fishery sector. Progress in Oceanography.

iii. Are there other social impacts?

Changes to how fisheries are managed can have other social impacts. For example, reducing an allocation may decrease safety if access to a fishery is restricted to a limited number of days (e.g., shortened season) and fishermen must decide whether to fish despite unsafe conditions or miss the year's landings of that fishery (referred to as "derby" fishing).[42] Another example is potential impacts to non-consumptive uses of the resource, such as tourism or the intrinsic beauty of the ecosystem. Will other groups (e.g., beach goers, whale watchers, birders) be negatively impacted by a change in allocation?

4. Indicators of Performance and Change

Councils should assess the current conditions of a fishery and document changes to the fishery that may indicate the need for updated allocations. When making allocation decisions, questions on performance and change could include, but are not limited to:

a. What are the trends in catch/landings?

Historical and current catch and landings data[43] can provide important information about demand, after accounting for changes in annual catch limits and quotas. Past overages or underages should not be used to penalize or reward a group or sector; however, short-term, in-season adjustments based on expected underages could be used to ensure full utilization of resources. Paybacks (reducing a catch limit in a subsequent year to account for an overage in the previous year) have been instituted as a mechanism to account for the biological impacts of overages; however, similar to in-season adjustments, they represent short-term fixes and not long-term changes to the allocations specified in fishery management plans. If there is a perpetual need for paybacks, this could indicate the need to reassess and change allocation, recognizing that there could also be monitoring or other management changes that need to be addressed. Caution should be exercised to avoid creating a perverse incentive system in the fishery and in its management. It is important to consider the reasons behind the overages or underages, such as lag time between catch and reporting, poor prediction of catch, ineffective effort controls, misreporting by fishermen, or intentional underages (e.g., for the purpose of maintaining higher catch rates).

b. What is the status of fishery resources?

A Council should consider the status of a stock (e.g., stock is undergoing overfishing, not undergoing overfishing, overfished, approaching an overfished condition, rebuilding, or rebuilt)[44] when determining allocations. The MSA clarifies that harvest restrictions and recovery benefits must be allocated "fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery"[45]; therefore, the costs and benefits

[42] *See* 16 U.S.C. § 1851(a)(10) (requiring under National Standard 10 that FMP measures shall, to the extent practicable, promote the safety of human life at sea) and 50 C.F.R. § 600.355 (National Standard 10 Guidelines).
[43] *See* 16 U.S.C. § 1853 (a)(13) (requiring that FMP describe sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery).
[44] *See* 16 U.S.C. § 1853 (a)(10) (requiring that FMP specify objective and measurable criteria for identifying when fishery is overfished) and 50 C.F.R. § 600.310(e)(2) (providing under National Standard 1 Guidelines for specification of criteria for determining overfishing and overfished status of stock or stock complex).
[45] 16 U.S.C. § 1853 (a)(14).

to individuals and/or sectors should be considered when updates to stock status result in increases or decreases in allocations.

c. Has the distribution of the species changed?

The distributions of species alter over time for reasons such as climate change (Nye et al., 2009)[46] or natural fluctuations in abundance (Bell et al., 2014)[47], among others. This may create jurisdictional disputes when the distribution crosses international, state, or council boundaries. Where the spatial distribution of the species does not match the spatial distribution of the allocation or geographic location of the fishermen, the allocation may need to be updated, recognizing that there could also be other management changes that need to be addressed.[48] If a stock moves and it is financially viable for fishermen to follow the stock/species, then there can be conflict because fishermen in an area who are historically dependent on the stock will catch fish as well as fishermen new to the area, creating potential for overfishing and reducing the sustainability of the stock. Conversely, if a stock moves and it is not financially viable to follow the stock, there may be less potential for conflict if allocations can be updated to match the new distribution. For stocks expected to change geographic distribution, determining pre-arranged management responses is recommended (see above, "Recommended Practices When Reviewing and Making Allocation Decisions," Section d – Planning for Future Conditions).

d. What is the quality of information available for each sector or group?

In order to properly manage a fishery, scientists need information on stock specific catch rates, abundance, and biology (age, growth, mortality, etc.), as well as data on social and economic aspects of the fishery[49]. Information can be compiled through fishery-dependent and fishery-independent data sources. Fishery dependent data may be collected through use of dockside monitors, at-sea observers, logbooks, electronic monitoring and reporting systems, telephone surveys, and vessel-monitoring surveys. Fishery-dependent data collected varies between sectors. Improvements in the data collected through a fishery can result in a better understanding of the species and the appropriate management actions.[50]

Councils should consider the quality and availability of fishery dependent data collected through each sector when making allocation decisions. Lack of detailed data should not be used to penalize a sector or a group; however, increased allocations could be

[46] Nye, J. A., Link, J. S., Hare, J. A., and Overholtz, W. J. 2009. Changing spatial distribution of fish stocks in relation to climate and population size on the Northeast United States continental shelf. Marine Ecology Progress Series 393: 111-129.

[47] Bell, R.J, J.A. Hare, J.P. Manderson, and D. E. Richardson. 2014. Externally Driven Changes in the Abundance of Summer and Winter Flounder. ICES Journal of Marine Science. doi: 10.1093/icesjms/fsu069.

[48] Changes in stock distribution implicate other MSA mandates, such as National Standards 1 (preventing overfishing and achieving optimum yield) and 3 (management of stocks as a unit, to extent practicable). For example, reference points and catch targets may need to be updated if stock productivity changes with the shifting distribution.

[49] *See* 16 U.S.C. § 1853(a)(5) (requiring that FMP specify pertinent data to be submitted to agency with respect to commercial, recreational, charter fishing, and fishing processing in the fishery).

[50] For example, due to scientific uncertainty, data poor stocks are often managed more conservatively than data rich stocks. Increasing an allocation to a group or sector that provides better biological information may allow for higher retainable catch (due to less of a buffer for uncertainty) in the future.

considered as an incentive to improving data quality. Where appropriate, allocation decisions which incentivize cooperative research or improvements in self-reported data could also be considered in data poor situations, consistent with relevant MSA requirements.

Summary

Allocation of fishery resources is a complex issue facing fishery managers. Because fisheries management, and the conditions surrounding fisheries, are not static, allocation decisions need to be considered in the context of adaptive management. This document provides recommended practices and guidance on allocation factors that a regional fishery management council should consider when making allocation decisions. The Council Coordinating Committee created a companion document that describes triggers that can be used to determine when to review allocation decisions. NMFS is committed to working with the Councils to assist them in their allocation decisions.

Appendix A: Existing National Policy

1. Magnuson-Stevens Fishery Conservation and Management Act (MSA)[51]
Language relevant to allocation decisions is found throughout the MSA, most significantly in National Standards 1, 4, 5, 8, and 9 concerning optimum yield, allocation, economic efficiency, communities, and bycatch, respectively. MSA sections 303A(c)(3) and (c)(5) specify requirements for determining initial allocations and fishing community allocations for Limited Access Privilege Programs (LAPPs)[52]. MSA sections 303(a)(14), 303(b)(6), 303(b)(11), and 304(e)(4)(b) also detail considerations for allocation decision making.[53]

a. **National Standard 1**[54]**:** "Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry."
b. **National Standard 4**[55]**:** "Conservation and management measures shall not discriminate between residents of different States. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be
   (A) fair and equitable to all such fishermen;
   (B) reasonably calculated to promote conservation; and
   (C) carried out in such manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges."
c. **National Standard 5**[56]**:** "Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose."
d. **National Standard 8**[57]**: "**Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of [National Standard 2], in order to
   (A) provide for the sustained participation of such communities, and
   (B) to the extent practicable, minimize adverse economic impacts on such communities."
e. **National Standard 9**[58]**: "**Conservation and management measures shall, to the extent practicable,
   (A) minimize bycatch and
   (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch."
f. **LAPP: Eligibility of fishing communities to participate in a LAPP**[59]**: "**To be eligible to participate in a limited access privilege program to harvest fish, a fishing community shall—

[51] www.nmfs.noaa.gov/sfa/laws_policies/msa/documents/msa_amended_2007.pdf
[52] 16 U.S.C. § 1853a. Limited Access Privilege Programs are a subset of Catch Share Programs.
[53] 16 U.S.C. §§ 1853(a)(14), (b)(6), (b)(11); 16 U.S.C. § 1854(e)(4)(b).
[54] MSA 301(a)(1) [16 U.S.C. § 1851(a)(1)].
[55] MSA 301(a)(4) [16 U.S.C. § 1851(a)(4)].
[56] MSA 301(a)(5) [16 U.S.C. § 1851(a)(5)].
[57] MSA 301(a)(8) [16 U.S.C. § 1851(a)(8)].
[58] MSA 301(a)(9) [16 U.S.C. § 1851(a)(9)].

(I) be located within the management area of the relevant Council;

(II) meet criteria developed by the relevant Council, approved by the Secretary, and published in the Federal Register;

(III) consist of residents who conduct commercial or recreational fishing, processing, or fishery-dependent support businesses within the Council's management area; and

(IV) develop and submit a community sustainability plan to the Council and the Secretary that demonstrates how the plan will address the social and economic development needs of coastal communities, including those that have not historically had the resources to participate in the fishery, for approval based on criteria developed by the Council that have been approved by the Secretary and published in the Federal Register."

g. **LAPP: Requirements for allocation[60]:** "In developing a limited access privilege program to harvest fish a Council or the Secretary shall—

(A) establish procedures to ensure fair and equitable initial allocations, including consideration of— (i) current and historical harvests; (ii) employment in the harvesting and processing sectors; (iii) investments in, and dependence upon, the fishery; and (iv) the current and historical participation of fishing communities;

(B) consider the basic cultural and social framework of the fishery, especially through— (i) the development of policies to promote the sustained participation of small owner-operated fishing vessels and fishing communities that depend on the fisheries, including regional or port-specific landing or delivery requirements; and (ii) procedures to address concerns over excessive geographic or other consolidation in the harvesting or processing sectors of the fishery;

(C) include measures to assist, when necessary and appropriate, entry-level and small vessel owner-operators, captains, crew, and fishing communities through set-asides of harvesting allocations, including providing privileges, which may include set-asides or allocations of harvesting privileges, or economic assistance in the purchase of limited access privileges;

(D) ensure that limited access privilege holders do not acquire an excessive share of the total limited access privileges in the program by—(i) establishing a maximum share, expressed as a percentage of the total limited access privileges, that a limited access privilege holder is permitted to hold, acquire, or use; and (ii) establishing any other limitations or measures necessary to prevent an inequitable concentration of limited access privileges; and

(E) authorize limited access privileges to harvest fish to be held, acquired, used by, or issued under the system to persons who substantially participate in the fishery, including in a specific sector of such fishery, as specified by the Council."

h. **LAPP: Authorization of the use of Auctions[61]:** "In establishing a limited access privilege program, a Council shall consider, and may provide, if appropriate, an auction system or other program to collect royalties for the initial, or any subsequent, distribution of allocations in a limited access privilege program if—

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[59] MSA 303A(c)(3)(A)(i) [16 U.S.C. § 1853a(c)(3)(A)(i)].
[60] MSA 303A(c)(5) [16 U.S.C. § 1853a(c)(5)]; for programs established after the 2007 MSA reauthorization.
[61] MSA 303A(d) [16 U.S.C. § 1853a(d)].

(1) the system or program is administered in such a way that the resulting distribution of limited access privilege shares meets the program requirements of this section; and

(2) revenues generated through such a royalty program are deposited in the Limited Access System Administration Fund established by section 305(h)(5)(B) and available subject to annual appropriations."

i. **Other Applicable Sections:**

MSA 303(a)(14)[62] stipulates that, when harvest reductions are required, the harvest restrictions and recovery benefits must be allocated "fairly and equitably among the commercial, recreational and charter fishing sectors."

MSA 303(b)(6)[63] provides that a Council may establish a "limited access system" provided that it takes into account present and historical participation in the fishery, dependence on the fishery, the economics of the fishery, the capability of the vessels to engage in other fisheries, the cultural and social framework relevant to the fishery, the fair and equitable distribution of access privileges, and any other relevant considerations.

MSA 303(b)(11)[64] authorizes setting aside a portion of the total quota "for use in scientific research."

MSA 304(e)(4)(B)[65] provides that rebuilding programs must allocate "overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery."

2. **Select Relevant NMFS Documents. For additional documents, see Morrison and Scott (2014).**[66]

a. **National Standard Guidelines.**[67]

NMFS provides official guidance on what the National Standards mean for fisheries management. Guidance for NS4 and NS5 were revised in 1998, NS8 and NS9 were revised in 2008, and NS1 were revised in 2009 and proposed to be revised again in 2015.

b. **NOAA Catch Share Policy.**[68]

The NOAA Catch Share Policy provides guidance on making initial allocation decisions for catch share[69] programs. In addition, the policy states that all allocation decisions should be revisited on a regular basis under a catch share program or other management approach.

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[62] 16 U.S.C. § 1853(a)(14).
[63] 16 U.S.C. § 1853(b)(6).
[64] 16 U.S.C. § 1853(b)(11).
[65] 16 U.S.C. § 1854(e)(4)(B).
[66] Morrison, W.E., T.L. Scott. 2014. Review of Laws, Guidance, Technical Memorandums and Case Studies Related to Fisheries Allocation Decisions. U.S. Dept. of Commerce. NOAA Technical Memorandum NMFS-F/SPO-148, 32 p.www.nmfs.noaa.gov/sfa/laws_policies/national_standards/documents/morrison_scott_nmfs_f_spo_148.pdf.
[67] www.nmfs.noaa.gov/sfa/laws_policies/national_standards/index.html
[68] www.nmfs.noaa.gov/sfa/management/catch_shares/about/documents/noaa_cs_policy.pdf
[69] "Catch share" is a general term for several fishery management strategies that allocate specific portions of a fishery's total allowable catch to individuals, cooperatives, communities, or other entities. Each recipient of a catch share is directly accountable to stop fishing when its exclusive allocation is reached. The term includes specific programs defined in law such as "limited access privilege" (LAP) and "individual fishing quota" (IFQ) programs, and other exclusive allocative measures such as Territorial Use Rights Fisheries (TURFs) that grant an exclusive privilege to fish in a geographically-designated fishing ground.

c. **NMFS Economic and Social Impact Assessment Guidance.**[70]
NMFS has created guidance for completing economic and social impact analyses for fishery regulations. These documents provide guidance on completing these analyses for any fishery management decision, including allocation decisions.

d. **NOAA Fisheries National Saltwater Recreational Fisheries Policy.**[71]
As explained in the policy, "this policy identifies goals and guiding principles to be integrated into NMFS' planning, budgeting, decision-making, and activities, and includes examples of implementation concepts and strategies supported by NMFS." The policy establishes six guiding principles, and under the second principle, one example of an implementation strategy is the "recurring evaluation of fishery allocations to facilitate equitable distribution of fishing opportunities as fisheries develop and evolve."

e. **NOAA Fisheries Climate Science Strategy**.[72]
The strategy is part of a proactive approach to increase the production, delivery, and use of climate-related information in fulfilling NMFS mandates. The Strategy identifies seven objectives which will provide decision-makers with the information they need to reduce impacts and increase resilience in a changing climate. It is designed to be customized and implemented through Regional Action Plans that focus on building regional capacity, partners, products and services to address the seven objectives.

[70] www.nmfs.noaa.gov/sfa/laws_policies/economic_social/index.html
[71] www.nmfs.noaa.gov/sfa/management/recreational/documents/noaa_recfish_policy.pdf
[72] www.st.nmfs.noaa.gov/Assets/ecosystems/climate/documents/NCSS_Final.pdf

APPENDIX E. ALLOCATION REVIEW TRIGGERS

006763APR2019

Gulf of Mexico Fishery Management Council
Managing Fishery Resources in the U.S. Federal Waters of the Gulf of Mexico

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Tampa, Florida 33607 USA
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April 23, 2019

Mr. Chris Oliver
Assistant Administrator
NOAA Fisheries
1315 East-West Highway
Silver Spring, MD 20910

Dear Mr. Oliver

The Fisheries Allocation Review Policy (NMFS Policy Directive 01-119) and the associated Procedural Directive on allocation review triggers (NMFS Procedural Directive 01-119-01) request that Regional Fishery Management Councils establish review triggers and present three types of triggers: indicator-based, public interest-based, and time-based criteria. Councils are expected to identify their allocations subject to the policy and establish review triggers, i.e., select the criteria for initiating fisheries allocation reviews, by August 2019.

The Gulf of Mexico Fishery Management Council (Council) initially reviewed a discussion paper introducing the allocation review policy and procedural directive during its August 2018 meeting. Follow-up discussions during the October 2018 meeting included an evaluation of the types of triggers considered in the policy and procedural directives and a preliminary identification of Gulf allocations that would be subject to the policy. Additional discussions, including the formal selection of triggers for relevant Gulf of Mexico allocations and the adoption of the policy on allocation reviews detailed below were held in January 2019 and finalized during the April 2019 Council meeting. For relevant fisheries in the Gulf of Mexico, the Council adopted the following policy on allocation reviews:

> The Council selects time-based criteria as primary allocation review triggers bolstered by general monitoring of indicators for reallocation justification through the Council's general deliberative process including public input channels as a secondary trigger. Consistent with the adaptive management process suggested in the Allocation Review Policy (referenced above), the incorporation of the Council's public input process as secondary public interest-based review triggers will include the consideration of relevant social, economic, and ecological indicators as an intermediate step before determining whether an allocation review is triggered. For example, economic tools that might contribute to the development of indicator-based review triggers could include cost-benefit analysis, economic impact analysis, economic efficiency, and others. Social indicators could include a range of social metrics such as community resilience, vulnerability and well-being. Examples of ecological criteria include changes in fishery

status resulting from a stock assessment, undocumented sources of mortality, increases in discards, or changes in species distribution and food web dynamics. Allocations included are:

- red snapper allocations within the recreational sector, i.e., between the federal for-hire and private angling components (with a 4-year timeframe);
- red snapper allocations between the five Gulf states (with a 5-year timeframe);
- gray triggerfish and greater amberjack allocations between the commercial and recreational sectors (with a 6-year timeframe);
- Gulf of Mexico group king mackerel allocations between the recreational and commercial sectors, zones, and gear types (with a 6-year timeframe);
- recreational and commercial allocations of red snapper, gag, red grouper, shallow water grouper IFQ aggregate, deep water grouper IFQ aggregate, and tilefish IFQ aggregate (with a 7-year timeframe);
- black grouper, mutton snapper, yellowtail snapper allocations between the Gulf and South Atlantic Councils (with a 7-year timeframe).

The Council will publish this policy on allocation reviews on its website and looks forward to working with the Southeast Regional Office and Science Center staff to set the schedule for the allocation reviews. The table appended to this letter lists the time intervals to be used with the time-based allocation review triggers and provides anticipated start dates for the initial allocation reviews. In addition to the allocation reviews scheduled based on the review triggers selected above, the Council may initiate supplementary allocation reviews at any time. For example, the Council could initiate an allocation review should relevant new information, e.g., data recalibration, be made available.

Sincerely,

Thomas R. Frazer

Thomas Frazer, Ph.D.
Council Chair

cc: Alan Risenhoover
Regional Fisheries Management Councils
Roy Crabtree, Ph.D.
Andy Strelcheck
Jack McGovern, Ph.D.
Mara Levy
Clay Porch, Ph.D.

Timeframes for the time-based allocation review triggers and expected starts of initial reviews

Allocations	Time Intervals	Expected start of the first review
Recreational red snapper ACL allocation between the private angling and federal for-hire components	4 years	April 2023
Red snapper allocations between the Gulf states	5 years	April 2024
Gray triggerfish and greater amberjack allocations between the recreational and commercial sectors	6 years	April 2025
Gulf of Mexico group king mackerel allocations between the recreational and commercial sectors, zones, and gear types	6 years	April 2025
Recreational and commercial allocations of red snapper, gag, red grouper, shallow water grouper IFQ aggregate, deep water grouper IFQ aggregate, and tilefish IFQ aggregate	7 years	April 2026
Black grouper, mutton snapper, yellowtail snapper allocations between the Gulf and South Atlantic Councils	7 years	April 2026

APPENDIX F. ACL/ACT CONTROL RULE FOR THE RECREATIONAL SECTOR

As of 05/21/2020				Red Grouper	
ACL/ACT Buffer Spreadsheet			version 4.1 - April 2011	Sector: Recreational	
sum of points	2			Data: 2016-2019	
max points	5.0		Buffer between ACL and ACT (or ABC and ACL)	Unweighted	8
Min. Buffer	0	**min. buffer**	User adjustable	Weighted	9
Max Unw.Buff	19	max unwt. Buff			
Max Wtd Buff	25	**max wtd. buffe**	User adjustable		

Component	Element score	Element	Selection	Element result
Stock assemblage	0	This ACL/ACT is for a single stock.	x	0
	1	This ACL/ACT is for a stock assemblage, or an indicator species for a stock assemblage		
Ability to Constrain Catch	0	Catch limit has been exceeded 0 or 1 times in last 4 years	x	0
	1	Catch limit has been exceeded 2 or more times in last 4 years		
		For the year with max. overage, add 0.5 pts. For every 10 percentage points (rounded up) above ACL	0.0	
		Not applicable (there is no catch limit)		
		Apply this component to recreational fisheries, not commercial or IFQ fisheries		
Precision of Landings Data Recreational	0	Method of absolute counting		2
	1	MRIP proportional standard error (PSE) <= 20		
	2	MRIP proportional standard error (PSE) > 20	x	
		Not applicable (will not be included in buffer calculation)		
		Apply this component to commercial fisheries or any fishery under an IFQ program		
Precision of Landings Data Commercial	0	Landings from IFQ program		not applicabl
	1	Landings based on dealer reporting		
	2	Landings based on other		
		Not applicable (will not be included in buffer calculation)	x	
Timeliness	0	In-season accountability measures used or fishery is under an IFQ	x	0
	1	In-season accountability measures not used		
			Sum	2

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

*2016-2019 landings data from NOAA Fisheries ACL Monitoring Dataset. Accessed May 8, 2020.

ACL/ACT Control Rule Data							
Year	**Sector**	**Landings**	**PSE**	**ACL**	**Exceeded ACL?**	**Buffer**	**Data Used**
2016	Recreational	1,373,337	21.6	2,580,000	No	9%	MRIP-APAIS
2017	Recreational	739,073	21	2,580,000	No		MRIP-APAIS
2018	Recreational	913,978	21.5	2,580,000	No		MRIP-APAIS
2019*	Recreational	725,105	21.6	1,000,000	No		MRIP-APAIS

Source: Source: SERO ACL Monitoring dataset, retrieved 8 May 2020 (recreational). *2019 recreational data are preliminary.

APPENDIX G. ACL/ACT CONTROL RULE FOR THE COMMERCIAL SECTOR

As of 05/21/2020				Red Grouper	
ACL/ACT Buffer Spreadsheet			version 4.1 - April 2011	Sector: Commercial	
sum of points	0			Data: 2016-2019	
max points	5.0		Buffer between ACL and ACT (or ABC and ACL)	Unweighted	0
Min. Buffer	**0**	**min. buffer**	User adjustable	Weighted	**0**
Max Unw.Buff	19	max unwt. Buff			
Max Wtd Buff	**25**	**max wtd. buffe**	User adjustable		

Component	Element score	Element	Selection	Element result
Stock assemblag	0	This ACL/ACT is for a single stock.	x	0
	1	This ACL/ACT is for a stock assemblage, or an indicator species for a stock assemblage		
Ability to Constrain Catch	0	Catch limit has been exceeded 0 or 1 times in last 4 years	x	0
	1	Catch limit has been exceeded 2 or more times in last 4 years		
		For the year with max. overage, add 0.5 pts. For every 10 percentage points (rounded up) above ACL	0.0	
		Not applicable (there is no catch limit)		
		Apply this component to recreational fisheries, not commercial or IFQ fisheries		
	0	Method of absolute counting		not applicabl
Precision of Landings Data Recreational	1	MRIP proportional standard error (PSE) <= 20		
	2	MRIP proportional standard error (PSE) > 20		
		Not applicable (will not be included in buffer calculation)	x	
		Apply this component to commercial fisheries or any fishery under an IFQ program		
Precision of Landings Data Commercial	0	Landings from IFQ program	x	0
	1	Landings based on dealer reporting		
	2	Landings based on other		
		Not applicable (will not be included in buffer calculation)		
Timeliness	0	In-season accountability measures used or fishery is under an IFQ	x	0
	1	In-season accountability measures not used		
			Sum	0

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

*2016-2019 landings data from NOAA Fisheries ACL Monitoring Dataset. Accessed May 8, 2020.

ACL/ACT Control Rule Data							
Year	**Sector**	**Landings**	**PSE**	**ACL**	**Exceeded ACL?**	**Buffer**	**Data Used**
2016	Commercial	4,497,582	0 - IFQ	7,780,000	No	0%	IFQ
2017	Commercial	3,328,271	0 - IFQ	7,780,000	No		IFQ
2018	Commercial	2,363,280	0 - IFQ	7,780,000	No		IFQ
2019	Commercial	2,037,046	0 - IFQ	3,000,000	No		IFQ

Source: SEFSC Commercial ACL dataset, retrieved 15 November 2019 (commercial).

APPENDIX H. MODIFICATION OF MANAGEMENT FOR RED GROUPER IN THE GULF

Modification of Management for Red Grouper in the Gulf of Mexico: Amendment 53

Jeff Pulver; May 26, 2020
LAPP/DM Branch
Southeast Regional Office

Revise the Annual Catch Target for Red Grouper: Modeling Season Length for the Recreational Sector

Landings data for Gulf of Mexico red grouper were obtained from the Southeast Fisheries Science Center (SEFSC) recreational Annual Catch Limit (ACL) dataset obtained in May of 2020. The current ACT is being tracked using Marine Recreation Information Program (MRIP) Coastal Household Telephone Survey (CHTS) equivalent landings. However, this analysis uses MRIP Fishing Effort Survey (FES) data to match the same currency (MRIP FES) as the most recent assessment (SEDAR 61). Future landings were determined from taking a three-year average of the three most recent years of complete MRIP FES data, as the most recent data are assumed to be the best approximation of future harvest. Additionally, the current 2-red grouper per angler bag limit became effective on May 7, 2015 precluding using landings prior to 2016 without adjusting for the previously higher bag limits. Recreational landings are collected in two-month increments called waves (e.g., January and February = wave 1, March and April = wave 2, etc.). Landings from 2017 through 2019 and a prediction of future landings (average landings from 2017-2019) by wave are shown in Figure 1. Season lengths were projected with upper and lower 95% confidence intervals for each recreational ACT being considered in Amendment 53 (Table 1). The predicted closure dates span from July 23 to no closure (Table 1). There is considerable uncertainty in the predictions since the confidence intervals range from early June to no closure needed (Table 1; Figure 2).

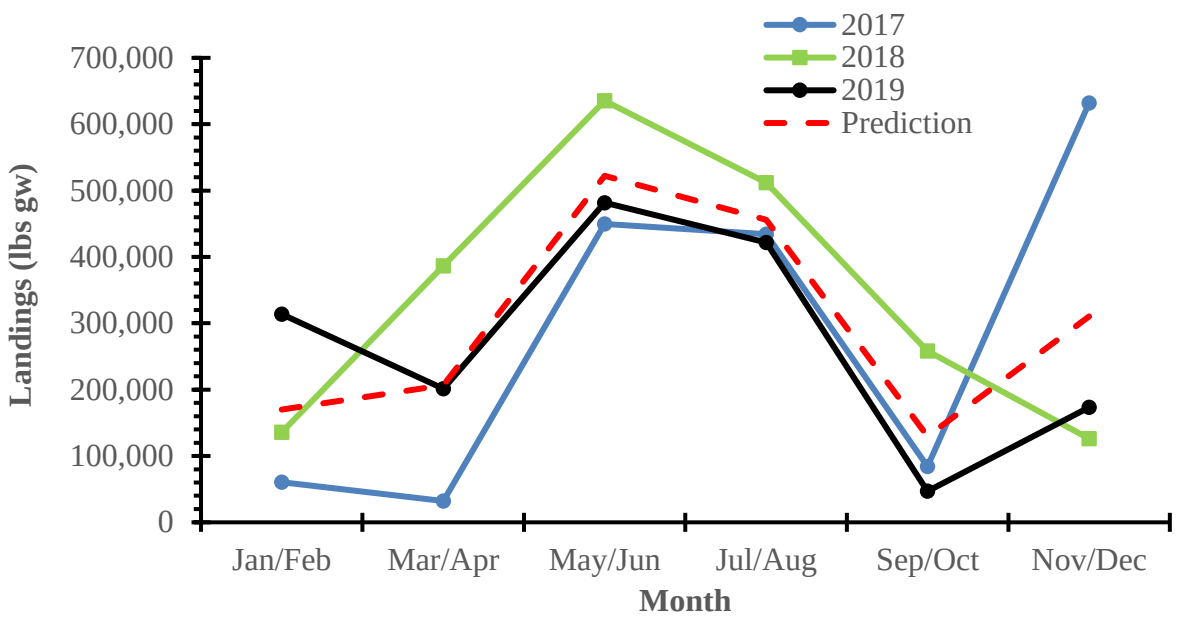

Figure 1. Gulf of Mexico recreational landings by two-month wave and predicted future landings. Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

Table 1. The predicted closure dates for each recreational ACT (mp gw) currently in Amendment 53 generated from predicted landings and also predicted landings upper and lower 95% confidence intervals. Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

Alternatives (Action 2—Action 1)	ACT	Predicted Closure Date	Season Length (95% Confidence Interval)
1—1	1.93	No Closure	259—365 Days
2—1	1.09	July 26	157—365 Days
2—2	1.59	November 20	211—365 Days
2—3	1.56	November 14	207—365 Days
2—4	1.58	November 18	209—365 Days
3—1, 4—1	1.07	July 23	155—365 Days
3—2, 3—4, 4—2, 4—4	1.57	November 16	208—365 Days
3—3, 4—3	1.55	November 12	206—365 Days

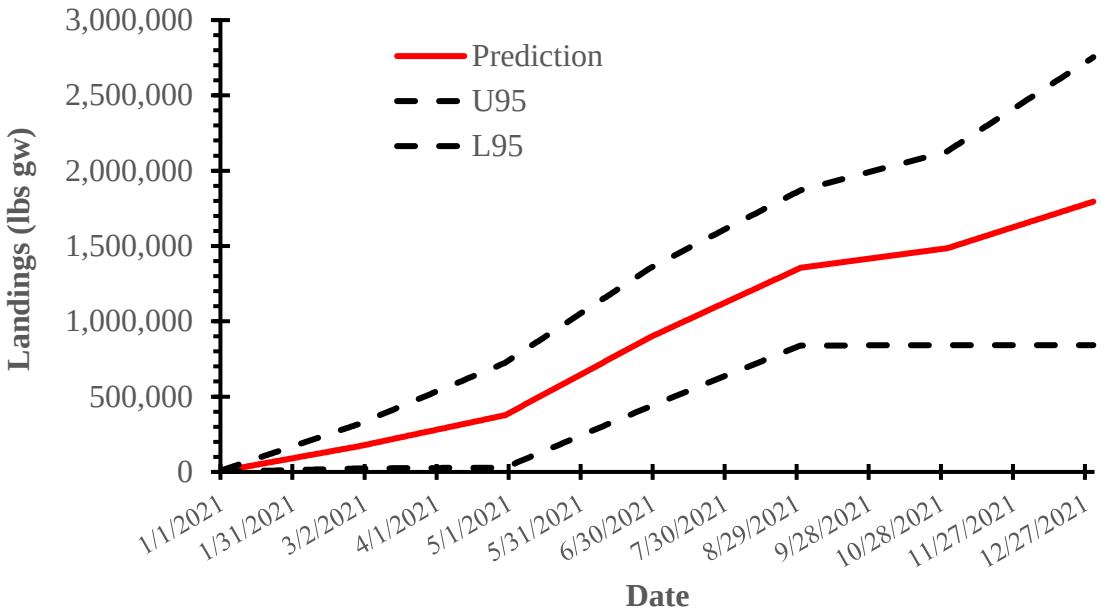

Figure 2. Cumulative predicted Gulf of Mexico red grouper recreational landings with 95% confidence interval (dashed lines). Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

As with most predictions, the reliability of the results is dependent upon the accuracy of their underlying data and input assumptions. We have attempted to create a realistic baseline as a foundation for comparisons, under the assumption that projected future landings will accurately reflect actual future landings. Uncertainty exists in this projection, 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.