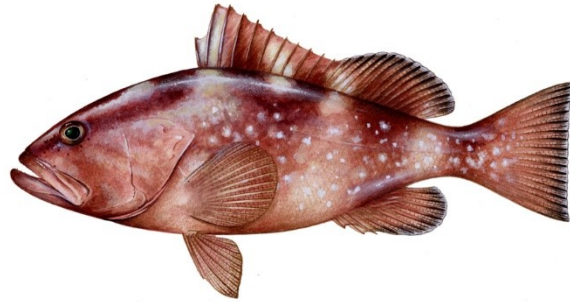
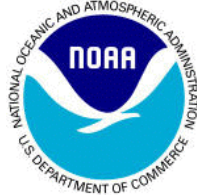


Red Grouper Allocations and Annual Catch Levels and Targets



Amendment 53 to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico Revised Draft

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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
CEA	cumulative effects analysis
CEQ	Council on Environmental Quality
CFpA	Net Cash Flow per Angler Trip
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
EFH	essential fish habitat
EIS	environmental impact statement
EJ	environmental justice
ESA	Endangered Species Act
F	fishing mortality rate
FES	Fishing Effort Survey
FGBNMS	Flower Garden Banks National Marine Sanctuary
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
GT	gray triggerfish
gw	gutted weight
HAPC	Habitat Area of Particular Concern
HCR	harvest control rule
IFQ	individual fishing quota
LNG	liquefied natural gas
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
OLE	NOAA Office of Law Enforcement
OY	optimum yield
PAH	polycyclic aromatic hydrocarbons
PDF	probability distribution function
PS	producer surplus
PSE	proportional standard error
pw	product weight
RFFA	reasonably foreseeable future action
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
SF	Sustainable Fisheries
SFA	Sustainable Fisheries Act
SOI	Segments of Interest
SPR	spawning potential ratio
SRHS	Southeast Region Headboat Survey
SSB	spawning stock biomass
SSC	Scientific and Statistical Committee
SWG	shallow-water grouper
TAC	total allowable catch
TF	tilefish
USCG	United States Coast Guard
VEC	valued environmental component
ww	whole weight

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EXECUTIVE SUMMARY

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 (ACT).

The Gulf of Mexico (Gulf) red grouper stock was determined to be overfished and undergoing overfishing in 2000. A 10-year rebuilding plan was subsequently put in place to allow the stock to recover. In 2007, NMFS determined that the red grouper stock was rebuilt. The current OFL and ABC are based on the results of SEDAR 42, conducted in 2015. However, fishermen had expressed concern about the condition of the red grouper stock because recent harvests had been well below the ACLs. In 2018, the Council received a recommendation from their Scientific and Statistical Committee (SSC) to reduce the red grouper commercial and recreational annual catch limits (ACL) and annual catch targets (ACT), effective for the 2019 fishing year. Because an ongoing SEDAR 61 would not be completed until later in 2019, the Southeast Fisheries Science Center (SEFSC) performed an interim analysis that used a harvest control rule to adjust the catch advice based on an index of relative stock abundance. The interim analysis suggested the stock might be in decline. The SSC found the analysis was sufficient to recommend a 2019 stock ACL of 4.60 mp gw. When the Council approved this reduction, they also noted the severe red tide conditions that occurred in the summer and fall of 2018 off the Florida west coast as part of their reasoning to reduce the ACL. The red grouper stock has been shown to be adversely affected by red tide (*Karenia brevis*) events similar to what occurred in 2018. Through an emergency rule followed by rulemaking to implement a framework action, the Council and NMFS applied the current red grouper sector allocation of 76% commercial and 24% recreational, and the sector specific ACT buffers to set the commercial ACL and ACT to 3.16 mp gw and 3.00 mp gw, respectively, and the recreational ACL and ACT to 1.00 mp gw and 0.92 mp gw, respectively.

The most recent assessment, SEDAR 61 (2019), used updated recreational data from the Marine Recreational Information Program (MRIP) Access Point Angler Intercept Survey (APAIS) and Fishing Effort Survey (FES), which collectively have resulted in higher catch and effort estimates for the recreational sector compared to previous estimates based on the Coastal Household Telephone Survey (CHTS). 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 the impacts of the 2018 red tide event could not be directly accounted for in SEDAR 61, the SSC recommended that projections from the assessment assume the 2018 red tide event had impacts on the stock similar to the 2005 red tide event. The SEFSC's results indicated allocation affected OFL projections, and because the MRIP-FES estimated higher recreational landings and the current commercial-recreational allocation is based on

historic landings, the Council requested the SSC provide OFL and ABC recommendations based on different allocation scenarios.

The purposes of Amendment 53 are to revise the red grouper allocation between the commercial and recreational sectors using the best scientific information available and to modify the allowable harvest of red grouper 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, ACLs, and ACTs, 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).

Amendment 53 has two actions. Action 1 considers modifying the OFL, ABC, and ACLs for Gulf red grouper based on different allocation scenarios, and it examines six alternatives. Action 2 would modify the Gulf red grouper ACTs based on the application of the ACL/ACT control rule and considers three alternatives.

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

Alternative 1 (No Action) and **Alternative 2** would maintain the sector allocations established in Amendment 30B of 76% commercial: 24% recreational (Table 1). **Alternative 1** would maintain the current OFL, ABC, and ACLs while **Alternative 2** would revise the OFL, ABC, and ACLs based on SEDAR 61 (2019) and SSC recommendations.

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

	OFL*	ABC	Total ACL	Comm ACL	Rec ACL
Alternative 1** MRFSS data 1986-2005 (76% commercial:24% recreational)	14.16	13.92	4.16	3.16	1.00
MRIP FES equivalent			(5.26)		(2.10)
Alternative 2*** Retain current percentages (76% commercial:24% recreational)	5.35	4.90	4.90	3.72	1.18
Preferred Alternative 3*** MRIP-FES data 1986-2005 (59.3% commercial:40.7% recreational)	4.66	4.26	4.26	2.53	1.73
Alternative 4*** MRIP-FES data 1986-2009 (60.5% commercial:39.5% recreational)	4.70	4.30	4.30	2.60	1.70
Alternative 5*** MRIP-FES data 1986-2018 (59.7% commercial:40.3% recreational)	4.67	4.28	4.28	2.56	1.72
Alternative 6*** MRIP FES data but retain commercial ACL at 3.16mp (68.7% commercial:31.3% recreational)	5.03	4.60	4.60	3.16	1.44

*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.

Preferred Alternative 3 and **Alternatives 4-5** reflect recreational landings estimated using MRIP FES from the SEFSC ACL monitoring datasets. **Preferred Alternative 3** would base the commercial and recreational sector allocations of red grouper on landings from the same timeframe as used in Amendment 30B (1986 – 2005), but would use MRIP FES landings from the SEFSC ACL monitoring dataset. The resulting allocations are 59.3% commercial and 40.7% recreational and the OFL, ABC, and ACLs are shown in Table 1. **Preferred Alternative 3** would revise the OFL and ABC based on SEDAR 61 (2019) and then set the stock ACL equal to the stock ABC. **Alternatives 4** and **5** would base the commercial and recreational sector allocations on landings from the timeframes 1986 through 2009 and 1986 through 2018, respectively. The resulting allocations from **Alternative 4** are 60.5% commercial:39.5% recreational and would revise the OFL and ABC based on SEDAR 61 (2019) and then set the stock ACL equal to the stock ABC (Table 1). For **Alternative 5**, the resulting allocations are 59.7% commercial:40.3% recreational and would also revise the OFL and ABC based on the stock assessment and then set the stock ACL equal to the stock ABC.

Alternative 6 would base the sector commercial and recreational allocation by holding the commercial ACL at its current level (3.16 million pounds gutted weight) and then base the

recreational allocation as the difference between the stock and commercial ACLs. This provides an allocation of 68.7% commercial and 31.3% recreational.

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 was only exceeded in 2013, and was subject to in-season closures in 2014 and 2015. The various time series under consideration in **Preferred Alternative 3** and **Alternatives 4-5** have relatively small differences in sector allocations (at most 1.2%). The difference in the commercial and recreational allocations when **Alternatives 1-2** are compared to **Preferred Alternative 3** and **Alternatives 4-5** is, at most, 16.7%, due to 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. The **Alternative 6** allocation is between the current allocation (**Alternatives 1-2**) and those derived from historical time series (**Preferred Alternative 3** and **Alternatives 4-5**).

In comparison to the MRIP FES equivalent total ACL of 5.26 mp gw under **Alternative 1**, **Alternatives 2-6** would result in a decrease of the total ACL (Table 1). In comparison to **Alternative 1**, **Alternative 2** would result in an increase of the commercial sector ACL; **Preferred Alternative 3** and **Alternatives 4-5** would result in a decrease of the commercial sector ACL; and **Alternative 6** would be equal. In comparison to the MRIP FES equivalent recreational sector ACL of 2.10 mp gw under **Alternative 1**, **Preferred Alternative 3** as well as **Alternatives 2 and 4-6** 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 **Preferred Alternative 3** as well as **Alternatives 2 and 4-6** in order to have equivalent currency in recreational units.

In general, the effects on the physical environment from management actions primarily include changes to interactions of fishing gear with the habitat. This action could affect the physical environment if changes in the allocation result in a shift in the use of fishing gear types used to harvest the stock annual catch limits (ACL). Under **Alternatives 2-6**, all the yield streams that provide overfishing limits (OFL) 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 (ABC). Under the stock ACLs, **Alternative 1**, no action, would likely have the greatest effect on the physical environment. This alternative is then followed by **Alternative 2**, **Alternative 6**, **Alternative 4**, **Alternative 5**, and **Preferred Alternative 3** in descending order of ACLs. **Alternatives 3-5** have very similar stock ACLs (4.26-4.30 mp gw) and any effects would be expected to be very similar. The effects from the recreational and commercial sectors on the physical environment would be opposite. Where commercial ACLs are higher, recreational ACLs decrease. Thus, the effects from the sectors on this environment likely offset each other to a certain extent.

Management actions that affect the biological environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat. This action could affect the biological/ecological environment 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 2-6** 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.

In addition to the OFL and ABC, Action 1 would modify sector allocations and the sector ACLs, and analysis of the economic impacts on the commercial and recreational sectors uses the current sector buffers between the ACLs and ACTs. For the commercial sector, **Alternative 2** would result in a positive total expected change in net economic benefits due to the increase in the commercial ACL, while **Alternatives 1** and **6** would result in a zero total expected change, as they both retain the current commercial ACL. **Preferred Alternative 3** and Alternatives 4-5 would be expected to result in negative changes, as the commercial ACL decreases relative to current commercial ACL. For the recreational sector, **Alternative 1** would be expected to result in a zero total expected change in net economic benefits. The remaining alternatives would result in negative total expected changes, with **Alternative 2** resulting in the largest negative change, followed by **Alternative 6**.

In general, higher catch limits would be associated with fewer negative social effects as they would allow for more fish to be landed, while lower catch limits would be associated with greater negative social effects as they would allow for less fish to be landed. Additional social effects would not be expected under **Alternative 1**, as the catch limits for both sectors would remain the same. **Preferred Alternative 3 and Alternatives 2 and 4-6** would reduce the OFL and ABC, and set the stock ACLs equal to the respective ABCs, resulting in direct negative social effects as the sector ACLs are reduced from **Alternative 1**. The proposed commercial ACLs under **Preferred Alternative 3 and Alternatives 4-6** would result in negative social effects. The commercial ACL would be the same under **Alternative 1 and Alternative 6**. Compared to **Alternative 1**, the commercial sector would realize an ACL increase under **Alternative 2**, suggesting positive effects would result. For the recreational sector, the most negative social effects would be expected under **Alternative 2**. **Preferred Alternative 3 and Alternatives 4-6** would also result in negative social effects. These direct negative social 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. In the long-term, these negative social effects would be mitigated by increasing protection for the stock, resulting in increased catch limits and positive effects in the future for both sectors.

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).

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.

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

By retaining the same allocation as **Alternative 1**, additional social 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**, **Preferred Alternative 3** and **Alternatives 4-5** would result in negative effects for the commercial sector and positive effects for the recreational sector. Because **Preferred Alternative 3** and **Alternatives 4-5** 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. By holding the commercial ACL at the same amount as under **Alternative 1**, **Alternative 6** would reallocate approximately 7% of the new stock ACL from the commercial sector to the recreational sector, resulting in intermediary negative social effects between **Alternatives 1-2** and **Preferred Alternative 3** and **Alternatives 4-5**.

Three potential impacts on the administrative environment under Action 1 alternatives include: 1) potentially managing recreational landings using MRIP FES data, which would preclude the need to convert landings back to MRIP CHTS for management; 2) 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 2-6**); and 3) 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, which is not considered the best scientific information available. **Alternatives 2-6** would use MRIP FES currency, which is the best scientific information available. Because the recreational ACL in **Alternative 2** is lower than in those for **Preferred Alternative 3** and **Alternatives 4-6**, 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. The effects from **Alternative 6** would be

intermediate to **Alternative 2, Preferred Alternative 3,** and **Alternatives 4-5** as that stock ACL falls midway between the stock ACLs.

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

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. The buffer between the sector ACLs and ACTs was determined by applying the Council’s ACL/ACT Control Rule and used MRFSS data for the recreational sector. The buffers for this alternative applied to the ACLs in Action 1 to derive the respective ACTs are shown in Table 2.

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

		Action 2					
		Alt 1		Alt 2		Preferred 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
	Preferred 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
	Alt 6	3.00	1.32	3.16	1.31	3.00	1.31

* 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.

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. **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. However, with a commercial buffer of 0%, the gag multi-use allocation would be zero, and therefore, only gag could be landed with gag allocation. To allow for gag multi-use allocation while using current information to set an appropriate buffer for the recreational sector, **Preferred 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% would be based on the application of the Council’s ACL/ACT Control Rule.

With respect to the physical environment, this action is expected to have minimal effects. **Alternative 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, a greater buffer would be expected to result in lower recreational fishing

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 ACT. The buffer is not used to constrain the commercial 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, **Alternative 2** and **Preferred 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.

No additional social effects would be expected to result for the commercial sector under **Alternative 1** or **Preferred Alternative 3**, as no change would be made to the commercial sector's ACT. Limited negative social effects would be expected under **Alternative 2**, which would decrease the commercial 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 social 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.

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. In the commercial sector, there is no risk of an in-season closure and little risk of exceeding the ACL because this sector is managed under an IFQ system. The recreational buffer under **Alternative 1** is the less than the buffer for **Alternative 2** and **Preferred Alternative 3**. Thus, **Alternative 1** would be most likely to result in exceeding the recreational ACL. However, the difference between **Alternative 1** and **Alternative 2** and **Preferred Alternative 3** is only 1 percent of the ACL. 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. The impact to the administrative environment associated with implementing a recreational fishery closure is higher under **Alternative 1** than under **Alternative 2** and **Preferred Alternative 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.

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 (ACL), and sector annual catch targets (ACT).

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 C). 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 Policy² (01-119) and two procedural directives (01-119-01 and 01-119-02, respectively as Appendix D and Appendix E) 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 F). 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 IFQ 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

Current Recreational Accountability Measures

Both in-season and post-season accountability measures (AM) apply to harvest by the recreational sector. The in-season AM for red grouper requires NMFS to close the recreational sector when red grouper landings reach or are projected to reach the ACL. If landings exceed the red grouper ACL in a fishing year, the post-season AM requires NMFS to shorten the length of the following fishing year by the amount necessary to ensure landings do not exceed the ACT. If the red grouper stock is overfished, NMFS must also reduce the ACL and ACT by the amount of the overage in the prior year.

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 (MRIP) Coastal Household Telephone Survey (CHTS). 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

³ at <http://portal.southeast.fisheries.noaa.gov/cs/main.html>

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).

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 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 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 allowable harvest of red grouper 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, ACLs, and ACTs, ensuring that the historical participation by the recreational and commercial sectors is accurately reflected by the sector ACLs, and that the 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.

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.

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

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 $F_{30\% SPR}$.

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 85°30' 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 the following fishing year of only the species for which the ACL was exceeded (to specify gag or red grouper); 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 (ACL) 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.

Preferred 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.

Alternative 6: Revise the sector allocations of the total ACL between the recreational and commercial sectors, such that the commercial ACL is retained at 3.16 million pounds gutted weight. The allocations for red grouper are 68.7% commercial and 31.3% recreational. Revise the OFL and ABC to retain the commercial ACL. Set the stock ACL equal to the stock ABC.

Table 2.1.1. OFL, ABC, total and sector ACLs for **Preferred Alternative 3** and **Alternatives 1-2 and 4-6**.

	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)
Alternative 2***	5.35	4.90	4.90	3.72	1.18
Preferred 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
Alternative 6***	5.03	4.60	4.60	3.16	1.44

*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

⁵ The OFL and ABC associated with **Alternative 2** was recommended at the September 2019 meeting; the OFLs and ABCs associated with **Preferred Alternative 3** and **Alternatives 4-5** 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.

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 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 Coastal Household Telephone Survey (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 **Preferred Alternative 3** and **Alternatives 4-6** 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.

Preferred 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, **Preferred Alternative 3** best reflects the landings from each sector from 1986-2005. The resulting allocations are 59.3% commercial and 40.7% recreational. **Preferred Alternative 3** would revise the OFL and ABC based on SEDAR 61 (2019) and then set the stock ACL equal to the stock ABC.

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

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 red grouper. 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 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.

Alternative 6 would revise the sector allocations of the total ACL between the recreational and commercial sectors, such that the commercial ACL is retained at 3.16 mp gw. The resulting allocations are 68.7% commercial and 31.3% recreational. **Alternative 6** would revise the OFL and ABC to retain the 3.16 mp gw commercial ACL and then set the stock ACL equal to the stock ABC. The OFL and ABC for **Alternative 6** are within the range of the OFL and ABC values for **Preferred Alternative 3** and **Alternatives 2 and 4-5**, which were recommended by the SSC at its September 2019 and January 2020 meetings.

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. Commercial and recreational ACLs, ACTs, and landings are displayed in Table 2.1.3. The various time series under consideration in **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred Alternative 3** and **Alternatives 4-5** 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 2-6** 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; **Preferred Alternative 3** and **Alternatives 4-5** would result in a decrease of the commercial sector ACL. The commercial sector ACL for **Alternatives 1 and 6** would be the same. In comparison to the MRIP FES equivalent recreational sector ACL of 2.10 mp gw under **Alternative 1**, **Preferred**

Alternative 3 as well as **Alternatives 2** and **4-6** 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 **Preferred Alternative 3** as well as **Alternatives 2** and **4-6** 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
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
Alts 1 and 2 (1986-2005)	76%	24%		
Preferred Alt 3 (1986-2005)			59.3%	40.7%
Alt 4 (1986-2009)			60.5%	39.5%
Alt 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).

Table 2.1.3. Commercial and recreational ACLs, ACTs, and landings for red grouper in pounds gutted weight (gw) in CHTS units for years in which an ACL and/or an ACT was in place.

Year	Commercial			Recreational		
	ACL	ACT	Landings	ACL	ACT	Landings
2004	N/A	5,310,000	5,635,577	N/A	N/A	N/A
2005	N/A	5,310,000	5,380,603	N/A	N/A	N/A
2006	N/A	5,310,000	5,109,824	N/A	N/A	N/A
2007	N/A	5,310,000	3,650,777	N/A	N/A	N/A
2008	N/A	5,310,000	4,748,224	N/A	N/A	N/A
2009	N/A	5,750,000	3,698,227	N/A	N/A	N/A
2010	N/A	5,750,000	2,910,970	1,850,000	N/A	635,680
2011	N/A	5,230,000	4,783,668	1,510,000	N/A	643,745
2012	6,030,000	5,370,000	5,219,133	1,900,000	N/A	1,752,930
2013	6,030,000	5,530,000	4,599,001	1,900,000	N/A	2,377,111
2014	6,030,000	5,630,000	5,601,144	1,900,000	1,730,000	1,600,475
2015	6,030,000	5,720,000	4,797,159	1,900,000	1,730,000	1,847,573
2016	8,190,000	7,780,000	4,497,582	2,580,000	2,370,000	1,403,236
2017	8,190,000	7,780,000	3,328,271	2,580,000	2,370,000	807,085
2018	8,190,000	7,780,000	2,363,280	2,580,000	2,370,000	872,045
2019	3,160,000	3,000,000	2,037,046	1,000,000	920,000	764,985

Source: Commercial data from 2010 through 2019 were obtained from the Quotas and Catch Allowances, accessed December 3, 2020

(<https://portal.southeast.fisheries.noaa.gov/reports/cs/CommercialQuotasCatchAllowanceTable.pdf>), remaining years were obtained from the Gulf of Mexico Historical Commercial Landings and Annual Catch Limits (ACLs), updated November 7, 2018 (<https://www.fisheries.noaa.gov/southeast/gulf-mexico-historical-commercial-landings-and-annual-catch-limit-monitoring>). Recreational data from 2010 through 2018 were obtained from recreational historical landings, updated October 13, 2020 (<https://www.fisheries.noaa.gov/southeast/recreational-fishing-data/gulf-mexico-historical-recreational-landings-and-annual-catch>), data from 2019 was obtained December 3, 2020 from <https://www.fisheries.noaa.gov/southeast/2019-and-2020-gulf-mexico-recreational-landings-and-annual-catch-limits-acls-and-annual>.

Changes in the recreational sector ACLs are predicted to impact the recreational sector's season length.⁸ 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

⁸ This information is also displayed in Appendix I, which was provided at the April 2021 Council meeting.

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 2.1.1. Season lengths were projected with upper and lower 95% confidence intervals for each recreational ACL being considered in Amendment 53 (Table 2.1.4). The predicted closure dates for the ACL options span from August 8 to no closure (Table 2.1.4). There is considerable uncertainty in the predictions since the confidence intervals range from mid-June to no closure needed (Table 2.1.4; Figure 2.1.2).

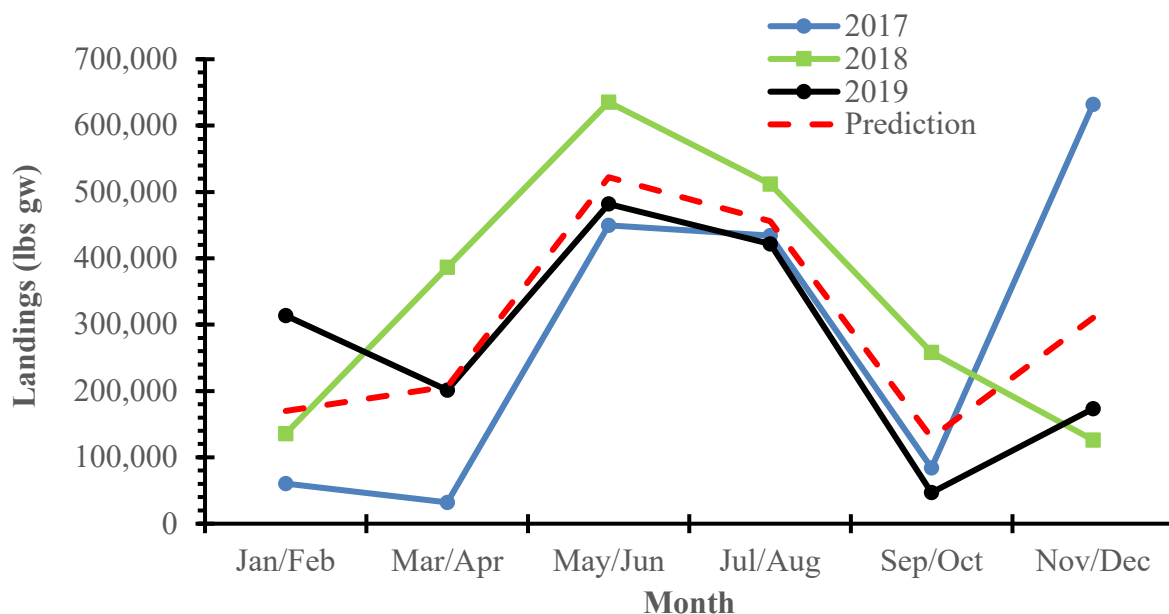


Figure 2.1.1. Gulf recreational landings by two-month wave and predicted future landings. Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

Table 2.1.4. The predicted closure dates for each recreational ACL (mp gw) currently in Amendment 53 generated from predicted landings with 95% confidence intervals.

Action 1 Alternative	ACL	Predicted Closure Date	Season Length (95% Confidence Interval)
Alt 1	2.10	No Closure	October 25 - No Closure
Alt 2	1.18	August 8	June 13 - No Closure
Preferred Alt 3	1.73	December 19	August 15 - No Closure
Alt 4	1.70	December 13	August 11 - No Closure
Alt 5	1.72	December 17	August 14 - No Closure
Alt 6	1.44	October 11	July 10 - No Closure

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

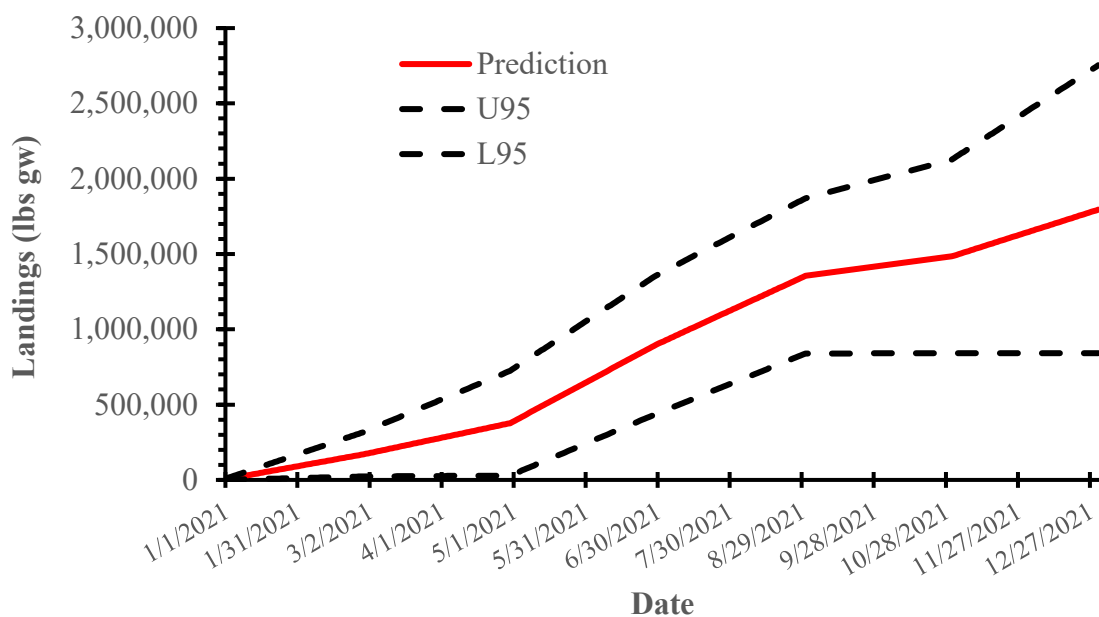


Figure 2.1.2. Cumulative predicted red grouper recreational landings with 95% confidence interval (dashed lines).

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. 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.

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

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%.

Preferred 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% to account for the multi-use provision for the gag quota under the commercial IFQ program (GMFMC 2016a). The recreational sector ACT is used as an accountability measure in the subsequent year to one in which the recreational ACL has been exceeded. 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:

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

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

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 **Alternative 2** and **Preferred Alternative 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 G (recreational) and H (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 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.

Preferred 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. **Preferred 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 **Alternative 1** and **Preferred Alternative 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 **Alternative 2** and **Preferred Alternative 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		Preferred 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
	Preferred 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
	Alt 6	3.00	1.32	3.16	1.31	3.00	1.31

* 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.

Assuming the recreational sector's post-season accountability measure has been triggered, changes in the recreational sector ACTs are predicted to impact the recreational sector's season length.⁹ 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 2.1.1. 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 for the ACT options 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 2.1.2).

Table 2.2.4. The predicted closure dates for each recreational ACT (mp gw) currently in Amendment 53 generated from predicted landings with 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	Sep 15 - No Closure
1-2	1.18	8%	1.09	July 26	June 5 - No Closure
2-2; 3-2	1.18	9%	1.07	July 23	June 3 - No Closure
1-3	1.73	8%	1.59	November 20	July 29 - No Closure
2-3; 3-3*	1.73	9%	1.57	November 16	July 26 - No Closure
1-4	1.70	8%	1.56	November 14	July 25 - No Closure
2-4; 3-4	1.70	9%	1.55	November 12	July 24 - No Closure
1-5	1.72	8%	1.58	November 18	July 27 - No Closure
2-5; 3-5	1.72	9%	1.57	November 16	July 26 - No Closure
1-6	1.44	8%	1.32	August 27	June 27 - No Closure
2-6; 3-6	1.44	9%	1.31	August 25	June 26 - No Closure

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

*The combination of preferred alternatives from Actions 1 and 2 are highlighted.

⁹ This information is also displayed in Appendix I, which was provided at the June 2020 Council meeting.

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. 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.

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 Survey¹⁰ (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).

¹⁰ 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.¹¹ 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).¹² 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).

¹¹ <http://gulfcouncil.org/fishery-management/>

¹² 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.¹³

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.

¹³ <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 bottom longlines (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 85°30'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 indiscriminate 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
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
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 km²), 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 54° F to 84° F (12° C to 29° C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73 ° F through 83° F (23-28° C) including bays and bayous (Figure 3.1.1) between 1982 and 2009, according to satellite-derived measurements (NODC 2011)¹⁴. 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, 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.

¹⁴ NODC 2011: <http://accession.nodc.noaa.gov/0072888>

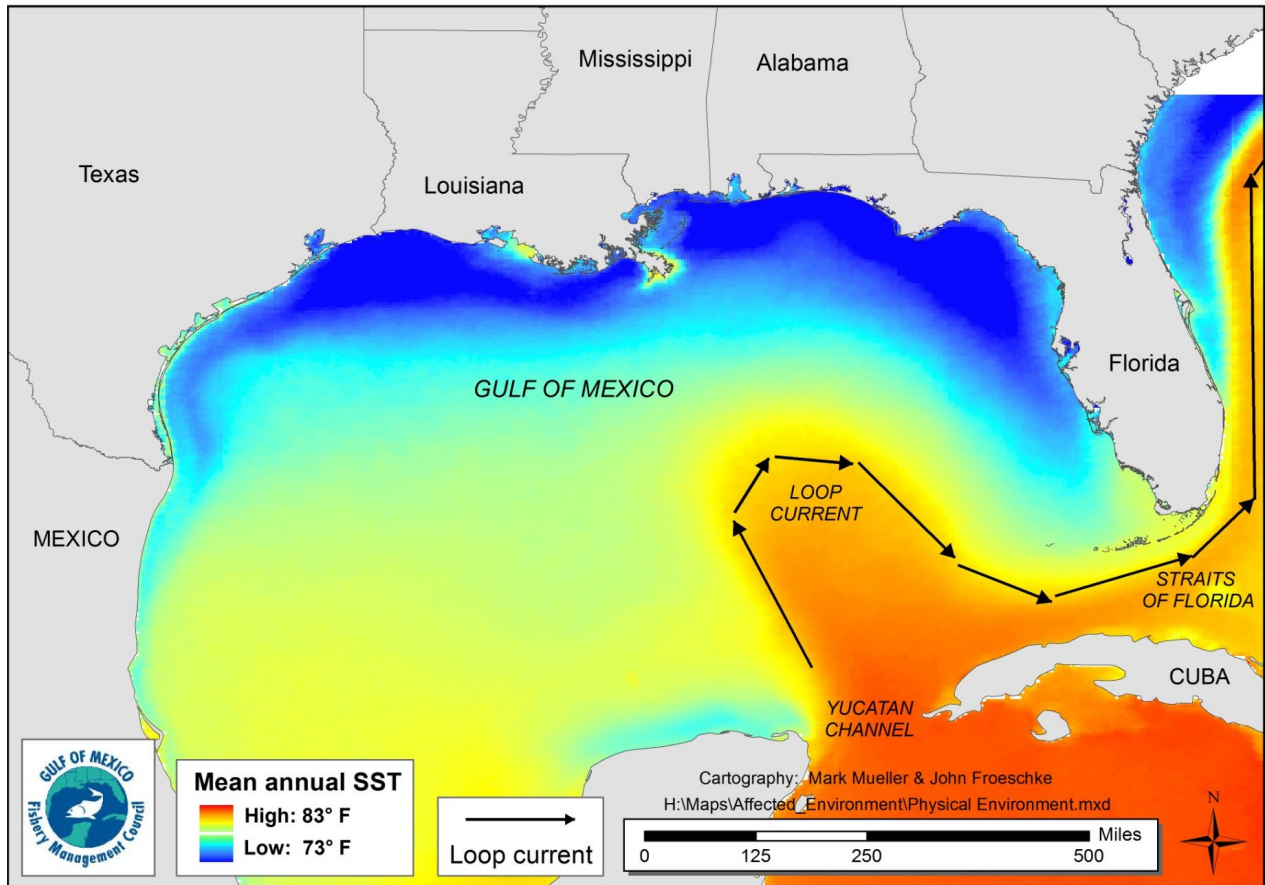


Figure 3.2.1. Physical environment of the Gulf, including major feature names and mean annual sea surface temperature as derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (<http://accession.nodc.noaa.gov/0072888>)

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 come¹⁵.

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

¹⁵ <http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx>.

be 6,952 square miles and ranks as the eighth largest event over the past 33 years the area has been mapped.¹⁶ 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 Change¹⁷ 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.

Emission source	CO ₂	Greenhouse CH ₄	Gas N ₂ O	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 CO₂ equivalent (CO_{2e}) emission estimates represent the number of tons of CO₂ emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH₄ and N₂O). Conversion factors to CO_{2e} are 21 for CH₄ and 310 for N₂O.

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.

¹⁶ <http://gulfhypoxia.net>

¹⁷ <https://www.ipcc.ch/srocc/>

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 ($SSB_{2017}/MSST = 1.64$; $MSST = 0.5 \cdot B_{MSY}$) and is not undergoing overfishing ($F_{Current(2015-2017)}/MFMT = 0.784$; $MFMT = F_{30\%SPR}$). 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 ($MSST$) ($1 - M \cdot B_{MSY}$), 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 Congress¹⁸ 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 Council¹⁹ and SEDAR²⁰ websites. Of the 14 stocks for which stock assessments have been conducted and accepted by the SSC, the fourth quarter report of the 2020 Status of U.S. Fisheries classifies only one as overfished (greater amberjack) and two stocks undergoing overfishing (cobia and lane snapper). The status of both assessed and unassessed stocks, as of the writing of this amendment is provided in Table 3.3.1.

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

¹⁸ <https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates>

¹⁹ www.gulfcouncil.org

²⁰ <http://sedarweb.org/>

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 (DLMTTool; 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 DLMTTool. 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 DLMTTool 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.

Common Name	Scientific Name	Stock Status		Most recent assessment or SSC workshop**
		Overfishing	Overfished	
Family Balistidae – Triggerfishes				
gray triggerfish	<i>Balistes capriscus</i>	N	N	SEDAR 43 2015
Family Carangidae – Jacks				
greater amberjack	<i>Seriola dumerili</i>	N†	Y	SEDAR 70 2020
lesser amberjack	<i>Seriola fasciata</i>	Y	Unknown	SEDAR 49 2016
almaco jack	<i>Seriola rivoliana</i>	Y	Unknown	SEDAR 49 2016
banded rudderfish	<i>Seriola zonata</i>	Y	Unknown	
Family Labridae – Wrasses				
hogfish	<i>Lachnolaimus maximus</i>	N	N	SEDAR 37 2014
Family Malacanthidae – Tilefishes				
tilefish (golden)	<i>Lopholatilus chamaeleonticeps</i>	N	N	SEDAR 22 2011a
blueline tilefish	<i>Caulolatilus microps</i>	N	Unknown	
goldface tilefish	<i>Caulolatilus chrysops</i>	N	Unknown	
Family Serranidae – Groupers				
gag	<i>Mycteroperca microlepis</i>	N	N	SEDAR 33 Update 2016b
red grouper	<i>Epinephelus morio</i>	N	N	SEDAR 61 2019
Scamp	<i>Mycteroperca phenax</i>	Unknown	Unknown	
black grouper	<i>Mycteroperca bonaci</i>	N	N	SEDAR 19 2010
yellowedge grouper	<i>Hyporthodus flavolimbatus</i>	N	N	SEDAR 22 2011b
snowy grouper	<i>Hyporthodus niveatus</i>	N	Unknown	SEDAR 49 2016
speckled hind	<i>Epinephelus drummondhayi</i>	N	Unknown	SEDAR 49 2016
yellowmouth grouper	<i>Mycteroperca interstitialis</i>	Unknown	Unknown	SEDAR 49 2016
yellowfin grouper	<i>Mycteroperca venenosa</i>	Unknown	Unknown	
warsaw grouper	<i>Hyporthodus nigritus</i>	N	Unknown	
*Atlantic goliath grouper	<i>Epinephelus itajara</i>	N	Unknown	SEDAR 47 2016
Family Lutjanidae – Snappers				
queen snapper	<i>Etelis oculatus</i>	N	Unknown	
mutton snapper	<i>Lutjanus analis</i>	N	N	SEDAR 15A Update 2015
blackfin snapper	<i>Lutjanus buccanella</i>	N	Unknown	
red snapper	<i>Lutjanus campechanus</i>	N	N	SEDAR 52 2018
cubera snapper	<i>Lutjanus cyanopterus</i>	N	Unknown	
gray snapper	<i>Lutjanus griseus</i>	N	N	
lane snapper	<i>Lutjanus synagris</i>	Y	Unknown	SEDAR 49 Update 2019
silk snapper	<i>Lutjanus vivanus</i>	N	Unknown	
yellowtail snapper	<i>Ocyurus chrysurus</i>	N	N	SEDAR 64 2020
vermilion snapper	<i>Rhomboplites aurorubens</i>	N	N	SEDAR 45 2016
Wenchman	<i>Pristipomoides aquilonaris</i>	N	Unknown	SEDAR 49 2016

Note: *Atlantic goliath grouper is a protected grouper (i.e., ACL is set at zero), and benchmarks do not reflect appropriate stock dynamics. Species status based on the NOAA Quarter 4 2020 FSSI report. The most recent stock assessment is provided for reference, and the stock status determination may reflect more current information than reported in the latest stock assessment. †The greater amberjack assessment (SEDAR 70) which determined the stock was overfished and undergoing overfishing was accepted by the SSC in January 2021. However, the Quarter 4 2020 FSSI report does not include this update for greater amberjack.

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.

Appendix B analyses the ten bycatch practicability factors. The main benefits of reducing grouper bycatch are: 1) less waste and 2) increased yield in the directed fishery. Reducing discards and discard mortality rates would result in less forgone yield. Reducing red grouper ACLs is expected to reduce bycatch and discard mortality. The benefits of the ACL reduction on red grouper bycatch in the recreational sector may be partially mitigated by the regulatory discards that would occur by fishermen that target other species and catch red grouper should accountability measures lead to closure of the fishery. There are likely to be negative social and economic effects to the commercial sector, stemming largely from the expected reduction in income that is likely if the subject action is implemented. The Council will have to weigh the benefits of reducing bycatch with the negative social and economic effects that the commercial sector would face.

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 website²¹. 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

²¹ <https://www.fisheries.noaa.gov/topic/laws-policies#endangered-species-act>

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.²²

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 (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

²²<http://www.nmfs.noaa.gov/pr/sspecies/>

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.²³ 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 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 Portal²⁴ predicts the average sea surface temperature in the Gulf will increase by 1-3°C 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

²³ <http://www.ipcc.ch/>

²⁴ <https://www.esrl.noaa.gov/psd/ipcc/>

(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 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.²⁵

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.

²⁵ <http://myfwc.com/research/redtide/general/about/>

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 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 red snapper (RS)-IFQ program was implemented in 2007. This decline has continued since the gray triggerfish (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 3.4.1.1. 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.²⁶ 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.

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.²⁷ 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

²⁶ 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.

²⁷ Shares were reclaimed from accounts that had never been activated since the start of the GT-IFQ program.

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).²⁸

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.

²⁸ 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).

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.²⁹

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.

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

²⁹ 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.

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 \$39,000.³⁰ Realized value in the form of actual annual

³⁰ “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.

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.

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.³¹

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.

³¹ 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.

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.

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,³² and 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.

³² Net revenue from operations accrues to the vessel owner and, when applicable, the IFQ shareholder, who may not be the same entity.

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 2018.³³ 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.

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%)

³³ 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.

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 dollars³⁴ 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

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)³⁵ 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),

³⁴ The commercial economic impact model has not been updated yet to produce estimates in 2019\$.

³⁵ A detailed description of the input/output model is provided in NMFS (2011).

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.³⁶ 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.

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

³⁶ Prior to 2013, Northwest Florida and Alabama headboat landings were reported together so it is not possible to disaggregate them.

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)				Total	Percent Distribution			
	Charter vessel	Headboat	Private	Shore		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.³⁷

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. Louisiana 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.

³⁷ <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. Louisiana 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. Louisiana 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 2017.³⁸ 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

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

³⁸ Sample sizes were too small to generate reliable estimates for Gulf and South Atlantic headboats separately.

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 snapper³⁹ 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.⁴⁰ 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 comprehensive cost data at the vessel level.⁴¹

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

³⁹ 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.

⁴⁰ 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.

⁴¹ 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.

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.⁴²

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 (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.

⁴² The recreational economic impact model has not yet been updated to generate estimates in 2019\$.

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.

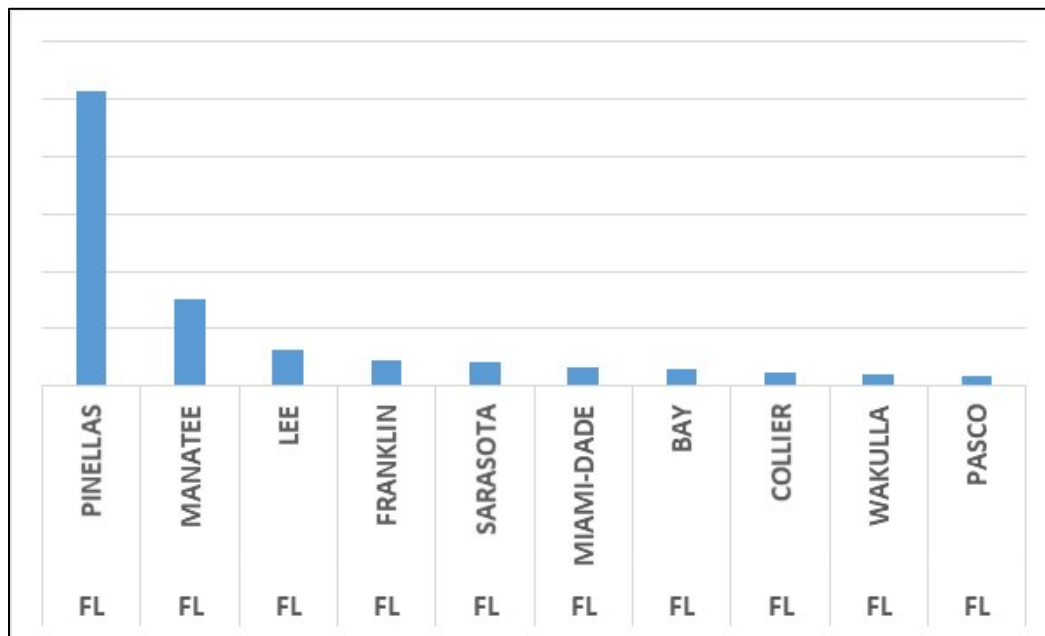


Figure 3.5.1.1. Red grouper regional quotient by top 10 homeport counties.

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.

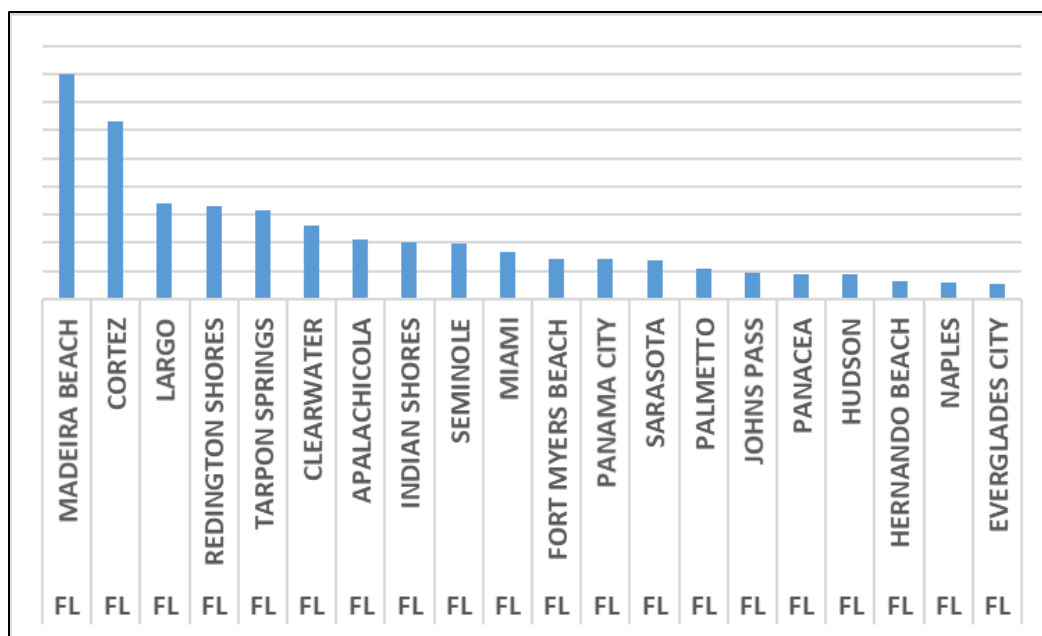


Figure 3.5.1.2. Red grouper regional quotient by top 20 homeport communities.
Source: IFQ database accessed 2/20/2020 NOAA Fisheries, NMFS, SERO.

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 $\frac{1}{2}$ 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 $\frac{1}{2}$ 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.

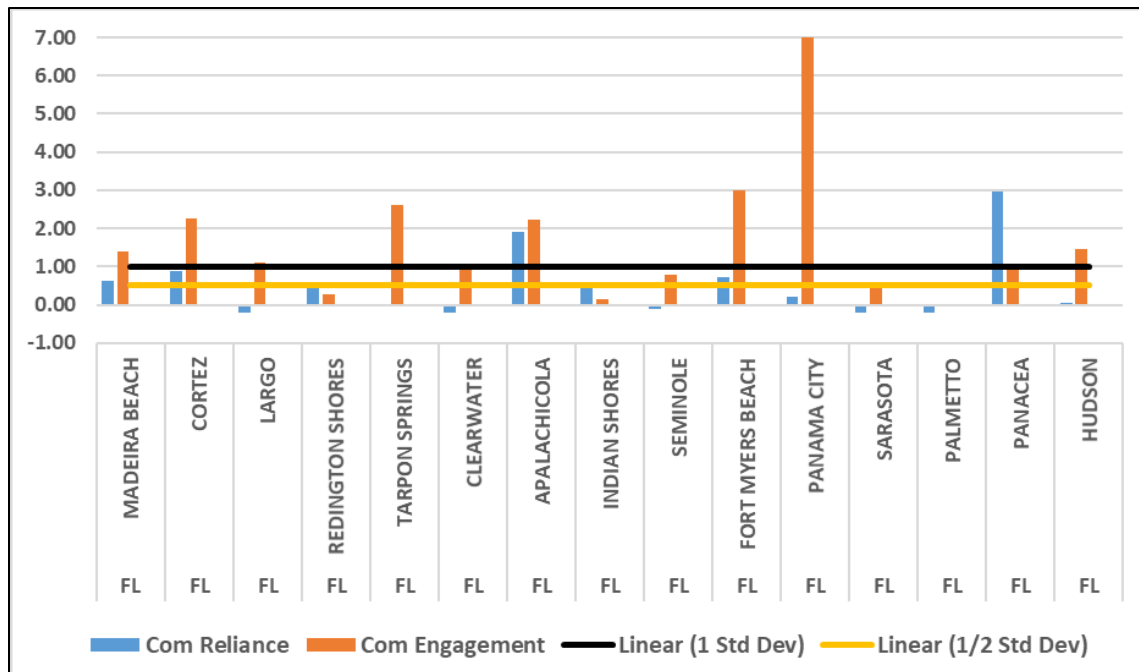


Figure 3.5.1.3. Commercial fishing engagement and reliance of the top 15 red grouper homeports for 2017.

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.

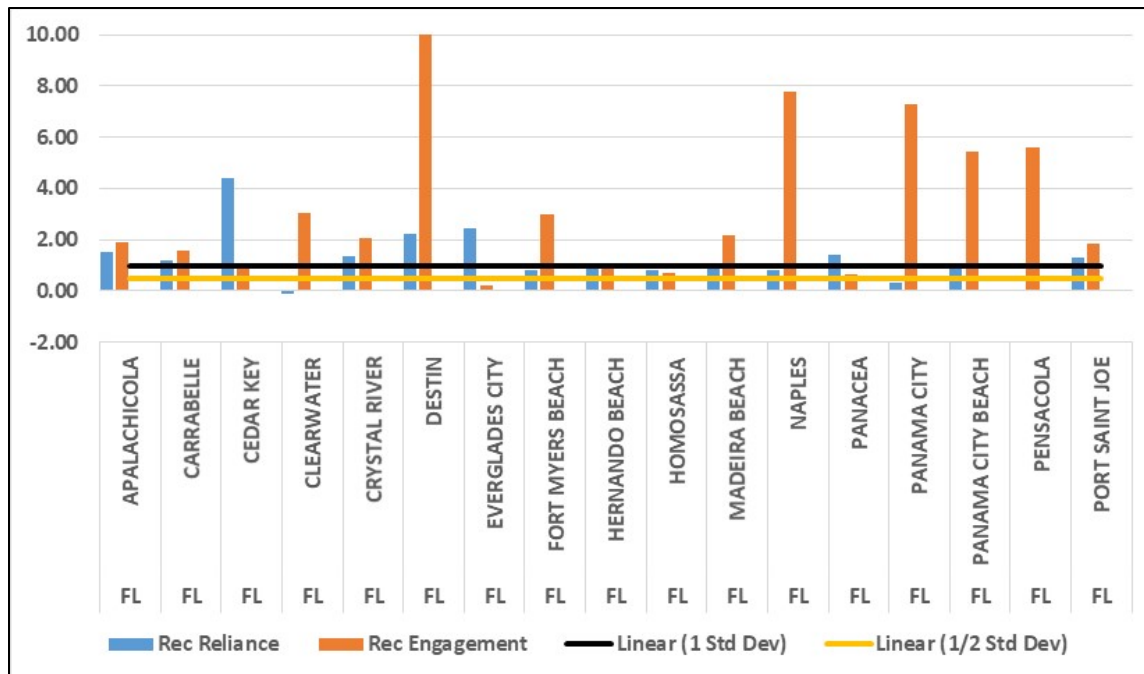


Figure 3.5.2.1. Recreational fishing engagement and reliance for communities on Florida’s west coast for 2017.

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.

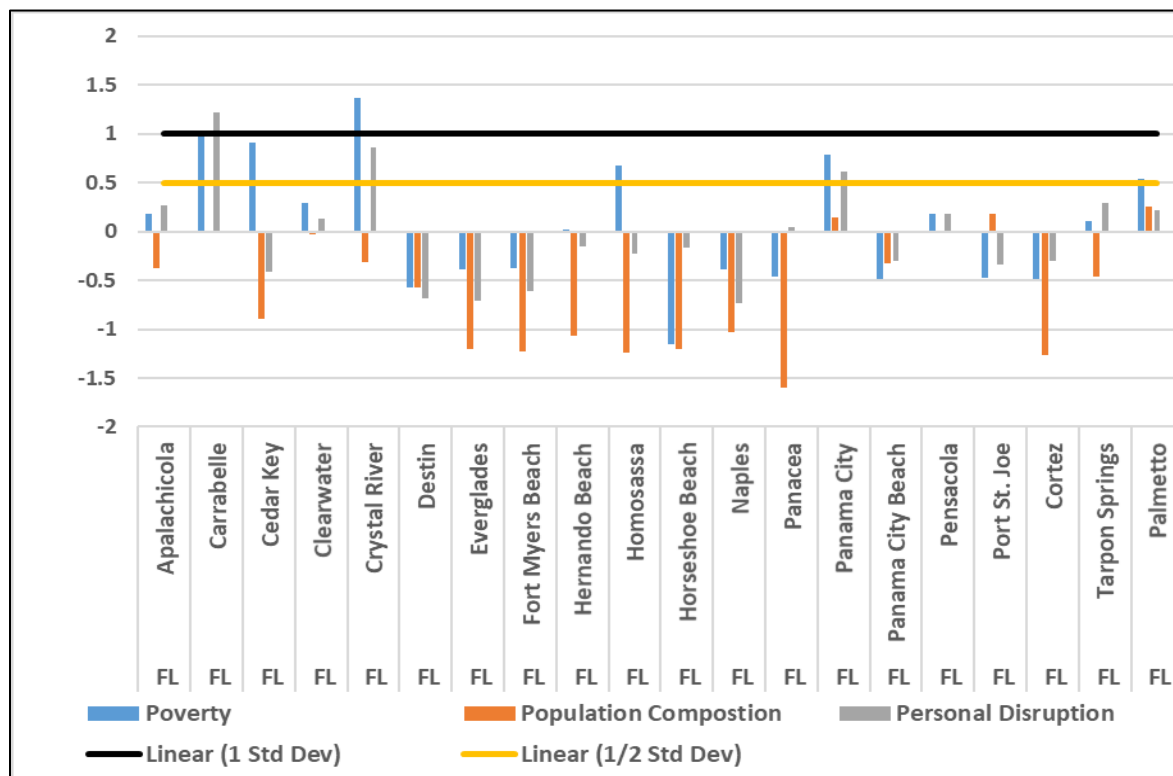


Figure 3.5.3.1. Community social vulnerability indices for communities on Florida's west coast. Source: Social Indicators Database 2020 (ACS 2016), NOAA Fisheries, SERO.

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.⁴³

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/

⁴³ www.gsmfc.org

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1 – Modify the Sector Allocations, Overfishing Limit (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limits (ACL) 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 2-6**, 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 6** (4.60 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 2-6** would be similar as the management goal is the same. Under **Alternatives 2-6**, 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. As described in Appendix B, the recreational fishery discards an order of magnitude more fish than the commercial fishery. This difference is especially pronounced in the most recent 5 years (2013-2017), where commercial discards (~320k/year) have been less than a tenth of recreational discard (~3.71 million/year). Thus, despite a higher discard mortality rate in the commercial fishery (due largely to the bottom longline fishery), the recreational sector is responsible for more discards and more dead discards.

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 **Preferred Alternative 3** and **Alternatives 2** and **4-6** 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 **Preferred Alternative 3** and **Alternatives 2** and **4-6**, relative to **Alternative 1**.

Alternative	Expected change in landings (mp gw)	Expected change in revenue	Expected change in PS
Alt 2	0.53	\$2,559,900	\$614,376
Preferred 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
Alt 6	0.00	\$0	\$0

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. **Preferred Alternative 3** and **Alternatives 4-5** 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**. **Preferred Alternative 3** and **Alternatives 4-5** would be expected to result in a decrease in PS, relative to **Alternative 1**. **Alternative 6** would be expected to result in no change 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 **Preferred Alternative 3** and **Alternatives 4-5** 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**. **Alternative 6** would be expected to result in no expected change in revenue and no change in the average total red grouper purchases, relative to **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 **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred Alternative 3** and **Alternatives 4-5** would be expected to result in an increase in red grouper share price. **Alternative 6** would not change the availability of annual IFQ allocation for sale, compared with **Alternative 1**, so the allocation price would not be expected to change. No change in red grouper share price would be expected with **Alternative 6**.

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 **Preferred Alternative 3** and **Alternatives 2 and 4-6** in comparison to **Alternative 1** as seen in Table 4.1.3.2.

Table 4.1.3.2. Preferred Alternative 3 and Alternatives 2 and 4-6 - Proposed change in the red grouper commercial sector ACT (relative to Alternative 1) and associated estimated average price change (\$/lb) and change in CS.

Alternative	Change in ACT (mp gw)	Expected average price change (\$/lb)	Expected change in CS
Alt 2	0.53	-\$0.45	\$1,605,475
Preferred Alt 3	-0.60	\$0.51	-\$1,235,707
Alt 4	-0.53	\$0.45	-\$1,123,378
Alt 5	-0.57	\$0.49	-\$1,188,596
Alt 6	0.00	\$0.00	\$0

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**. **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred 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. Compared to **Alternative 1**, the red grouper commercial sector ACT would not change under **Alternative 6**, and therefore result in no change in the CS.

The total expected change in net economic benefits for the commercial sector from **Preferred Alternative 3** and **Alternatives 2 and 4-6**, relative to **Alternative 1**, are displayed in Table 4.1.3.3. These changes are the addition of the expected change in PS from Table 4.1.3.1 to the expected change in CS from Table 4.1.3.2.

Table 4.1.3.3. Preferred Alternative 3 and Alternatives 2 and 4-6 – Total Expected Change in Net Economic Benefits for the Commercial Sector, relative to Alternative 1.

Alternative	Total Expected Change in Net Economic Benefits
Alt 2	\$2,219,851
Preferred Alt 3	-\$1,931,227
Alt 4	-\$1,737,754
Alt 5	-\$1,849,340
Alt 6	\$0

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 **Preferred Alternative 3** and **Alternatives 2 and 4-6** are analyzed as a function of the ACL. The MRIP FES equivalent of the recreational sector ACL for **Alternative 1** is used in this analysis, in order to be in the same currency as the recreational sector ACLs for **Preferred Alternative 3** and **Alternatives 2 and 4-6**. The evaluation of changes in economic value expected to result from ACL changes 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 ACL 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 estimates of associated annual changes in economic values for **Preferred Alternative 3** and **Alternatives 2 and 4-6** are provided in Table 4.1.3.4.

Table 4.1.3.4. Preferred Alternative 3 and Alternatives 2 and 4-6 - Proposed change in the red grouper recreational sector ACL (relative to Alternative 1) and associated estimated annual change in CS.

Alternative	Change in ACL (mp gw)	Expected annual change in CS (2019 dollars)
Alt 2	-0.92	-\$16,322,581
Preferred Alt 3	-0.37	-\$6,564,516
Alt 4	-0.40	-\$7,096,774
Alt 5	-0.38	-\$6,741,935
Alt 6	-0.66	-\$11,709,677

Under **Alternative 2**, the red grouper recreational sector ACL would decrease by 0.92 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to decrease by \$16.323 million (in 2019 dollars) under **Alternative 2**, compared to **Alternative 1**. Compared to **Alternative 1**, the red grouper recreational sector ACL would decrease by 0.37 mp gw under **Preferred Alternative 3**, resulting in an expected decrease in CS by \$6.565 million (in 2019 dollars). Under **Alternative 4**, the red grouper recreational sector ACL would decrease by 0.40 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to decrease by \$7.097 million (in 2019 dollars) under **Alternative 4**, compared to **Alternative 1**. Compared to **Alternative 1**, the red grouper recreational sector ACL would decrease by 0.38 mp gw under **Alternative 5**, resulting in an expected decrease in CS by \$6.742 million (in 2019 dollars). Under **Alternative 6**, the red grouper recreational sector ACL would decrease by 0.66 mp gw, compared to **Alternative 1**. As a result, the CS would be expected to decrease by \$11.710 million (in 2019 dollars) under **Alternative 6**, compared to **Alternative 1**.

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 ACL 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 ACL are seen in Table 2.1.4. 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, **Alternatives 2** would close in the 4th wave (July/August), and **Preferred Alternative 3** and **Alternatives 4-5** would close in the 6th wave (November/December). **Alternative 6** would close in the 5th wave (September/October). The total number of canceled trips for **Alternatives 2** and **6** would therefore also include all of the targeted trips for the rest of year (waves 5 and 6 for **Alternative 2**; wave 6 for **Alternative 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 4.1.3.5. 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 4.1.3.5. Wave in which predicted closure date occurs, canceled charter trips in the interrupted wave, and total canceled charter trips for **Preferred Alternative 3** and **Alternatives 2 and 4-6**.

Alternative	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alt 2	4	2,915	9,991
Preferred Alt 3	6	665	665
Alt 4	6	971	971
Alt 5	6	767	767
Alt 6	5	1,362	4,481

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 4.1.3.6. **Preferred Alternative 3 and Alternatives 2 and 4-6** 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 (-\$1,408,708), compared to **Alternative 1**. Following **Alternative 2**, the next earliest predicted closure date occurs with **Alternative 6**, which results in the next greatest short-term change in PS (-\$631,856), compared to **Alternative 1**. The predicted closure dates for **Preferred Alternative 3** and **Alternatives 4-5** occur within 6 days of each other, and so the short-term changes in PS of those alternatives have a relatively close range from -\$93,723 to -\$136,980.

Table 4.1.3.6. Short-term change in PS for charter vessels under **Preferred Alternative 3** and **Alternatives 2 and 4-6**.

Alternative	Short-term change in PS
Alt 2	-\$1,408,708
Preferred Alt 3	-\$93,723
Alt 4	-\$136,980
Alt 5	-\$108,142
Alt 6	-\$631,856

The total expected change in net economic benefits for the recreational sector from **Preferred Alternative 3** and **Alternatives 2 and 4-6**, relative to **Alternative 1**, are displayed in Table 4.1.3.7. These changes are the addition of the expected annual change in CS from Table 4.1.3.4 to the short-term change in PS from Table 4.1.3.6.

Table 4.1.3.7. Preferred Alternative 3 and Alternatives 2 and 4-6 – Total Expected Change in Net Economic Benefits for the Recreational Sector, relative to Alternative 1.

Alternative	Total Expected Change in Net Economic Benefits
Alt 2	-\$17,731,289
Preferred Alt 3	-\$6,658,239
Alt 4	-\$7,233,754
Alt 5	-\$6,850,077
Alt 6	-\$12,341,533

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-Coastal Household Telephone Survey (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 interrelated 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 2-6 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 2-6** 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 **Preferred Alternative 3** and **Alternatives 4-6** 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 **Preferred 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**. The commercial quota would be the same under **Alternative 1** and **Alternative 6**. 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 1-6**, 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
Pref. 3	2.53	0.824
4	2.60	0.810
5	2.56	0.819
6	3.16	0.686

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. **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred Alternative 3**. **Alternative 6** would represent a reduction of approximately 30% compared to **Alternative 1**, and thus be intermediary between **Alternative 2** and the approximate reductions under **Preferred Alternative 3** and **Alternatives 4-5**. 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 **Preferred Alternative 3** and **Alternatives 4-6** 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 protection for the stock, resulting in increased catch limits and 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 2-6** 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 1-6** 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
Pref. 3	0.824	1.73
4	0.810	1.70
5	0.819	1.72
6	0.686	1.44

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 indirect 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 under **Alternatives 1-6** 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 1-6** and the basis for the recreational sector allocation.

Alternative	Commercial	Recreational	Basis for Allocation
1	76%	24%	No Action
2	76%	24%	Retain Alternative 1
Pref. 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
6	68.7%	31.3%	Retain Commercial ACL under Alternative 1

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**, **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred Alternative 3** and **Alternatives 4-5** would vary in scope and strength relative to the amount of quota that is reallocated, which is within 1.2% among **Preferred Alternative 3** and **Alternatives 4-5**. 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 **Preferred Alternative 3** and **Alternatives 4-5**. By holding the commercial ACL at the same amount as under **Alternative 1**, **Alternative 6** would reallocate approximately 7% of the new stock ACL from the commercial sector to the recreational sector, resulting in intermediary negative effects between **Alternatives 1-2** and **Preferred Alternative 3** and **Alternatives 4-5**.

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. **Alternative 2** would result in an increase in the commercial ACL, while **Preferred Alternative 3** and **Alternatives 4 and 5** would result in a decrease in the commercial ACL, and vary only slightly among each other based on the data years used as the reference period. **Alternative 6** would result in the same commercial ACL as **Alternative 1**. Using the MRIP-FES equivalent recreational ACL in **Alternative 1** for comparison, all of the action alternatives would result in a decrease in the

recreational ACL. **Alternative 2** would result in the largest decrease and **Preferred Alternative 3** and **Alternatives 4 and 5** vary only slightly from each other and would result in the least decrease. **Alternative 6** would result in a recreational ACL that is in between the ACL resulting from **Alternative 2** and the ACLs resulting from **Preferred Alternative 3** and **Alternatives 4 and 5**.

The potential impacts on the administrative environment depend on the action necessary to compare landings to the catch limits and the likelihood of needing to implement a recreational closure or take additional action to prevent overfishing. All alternatives, except **Alternative 1**, would result in beneficial effects because they would eliminate the need to convert landings back to MRIP CHTS for management. However, all alternatives, except **Alternative 1**, would result in a decrease in recreational ACL, which may increase the likelihood of needing to implement an in-season closure. Alternatives that result in larger allocations to the recreational sector could increase the likelihood of overfishing because of the uncertainty in determining recreational landings. However, the recreational ACT is used to monitor landings in years after the ACL has been exceeded, which reduces the likelihood of successive years of overharvest by the recreational sector, and there has been an overall decreasing trend in total landings. Thus, it is unlikely that any of the action alternatives will result in any significant increase in exceeding the OFL.

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

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. 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 if exceeded in the previous year. 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 could result in slightly more adverse effects 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 **Alternative 2** and **Preferred Alternative 3** are not examined under Action 1 **Alternative 1**, as they would not be 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 1-2** and **Preferred Alternative 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.

As noted 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. Under **Alternative 2**, with a commercial buffer of 0%, the gag multi-use (GGM) allocation would be zero, and therefore, only gag could be landed with gag allocation. From 2016 to 2018, 0.3% to 2% of the GGM was used to land red grouper; however, the 2019 data show an increase to 19% of the GGM being used for landing red grouper. Under Alternative 2, minor direct, negative economic effects would therefore result from the lack of red grouper landings, although some mitigation may occur as the poundage that would be used for GGM with red grouper might be instead used for landing gag. As such, these effects are described qualitatively, rather than quantitatively.

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 **Preferred Alternative 3** and **Alternatives 2** and **4-6**, relative to Action 2 **Alternative 1** with Action 1 **Alternative 1**.

		Action 2 Alt 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
Preferred 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
Alt 6	0.00	\$0	\$0
		Action 2 Alt 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
Preferred 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
Alt 6	0.16	\$772,800	\$185,472
		Action 2 Preferred Alt 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
Preferred 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
Alt 6	0.00	\$0	\$0

Action 2 **Alternative 1** and **Preferred Alternative 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 **Preferred Alternative 3** is not expected to have any effect on landings, revenue, or PS, relative to **Alternative 1**.

Compared with Action 2 **Alternative 1** and **Preferred Alternative 3**, Action 2 **Alternative 2** results in a larger positive change in PS when paired with Action 1 **Alternatives 2** and **6**, 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; Action 2 **Alternative 2** would be expected to increase revenue by an additional \$772,800 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 6** is selected. In addition, when compared with Action 2 **Alternative 1** and **Preferred Alternative 3**, Action 2 **Alternative 2** results in a smaller negative change in PS when paired with Action 1 **Preferred Alternative 3** or **Alternatives 4-5**. 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 **Preferred Alternative 3** or **Alternatives 4-5** are selected. This relative change in revenue is the same regardless of whether **Preferred Alternative 3** or **Alternatives 4-5** 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 **Alternative 1** and **Preferred Alternative 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 **Preferred 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**. Similarly, the expected change in revenue with Action 2 **Alternative 6** paired with Action 1 **Alternative 2** would be expected to result in an increase of 4.40% 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 **Preferred Alternative 3** or **Alternatives 4-5** 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 **Alternative 6** would be expected to result in a 4.40% increase in total red grouper purchases. Relative to Action 2 **Alternative 1**, Action 2 **Alternative 2** when paired with Action 1 **Preferred Alternative 3** or **Alternatives 4-5** 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 **Preferred Alternative 3** or **Alternatives 1-2** 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 **Preferred Alternative 3** or **Alternative 1-2** 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 **Preferred Alternative 3** and **Alternatives 1-2** paired with Action 1 **Preferred Alternative 3** and **Alternatives 4-5** 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 **Preferred Alternative 3** and **Alternatives 1-2** paired with Action 1 **Preferred Alternative 3** and **Alternatives 4-5** would be expected to result in an increase in red grouper share price.

The proposed increase in the ACL with Action 2 **Alternative 2** paired with Action 1 **Alternative 6** 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 2** paired with Action 1 **Alternative 2** would be expected to result in a decrease in red grouper share price. Due to the commercial buffer of 5%, Action 2 **Preferred Alternative 3** or **Alternative 1** paired with Action 1 **Alternative 6** would result in no change in the ACL and no change in the availability of annual IFQ allocation for sale, as compared with being paired with Action 1 **Alternative 1**. Therefore, since the supply of annual IFQ allocation would not be expected to change, the allocation price would not be expected to change. As shares reflect annual allocation, the expected lack of change in allocation price under Action 2 **Preferred Alternative 3** or **Alternative 1** paired with Action 1 **Alternative 2** would be expected to result in no change 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 1-2** and **Preferred Alternative 3** as seen in Table 4.1.3.2.

Table 4.2.3.2. Alternatives 1-2 and Preferred Alternative 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 change (\$/lb) and change in CS.

		Action 2 Alt 1	
Action 1	Expected change in landings (mp gw)	Expected average price change (\$/lb)	Expected change in CS
Alt 2	0.53	-\$0.45	\$1,605,475
Preferred Alt 3	-0.60	\$0.51	-\$1,235,707
Alt 4	-0.53	\$0.45	-\$1,123,378
Alt 5	-0.57	\$0.49	-\$1,188,596
Alt 6	0.00	\$0.00	\$0
		Action 2 Alt 2	
Action 1	Expected change in landings (mp gw)	Expected average price change (\$/lb)	Expected change in CS
Alt 2	0.72	-\$0.62	\$2,298,415
Preferred Alt 3	-0.47	\$0.41	-\$1,020,402
Alt 4	-0.40	\$0.34	-\$892,455
Alt 5	-0.44	\$0.38	-\$966,598
Alt 6	0.16	-\$0.14	\$433,871
		Action 2 Preferred Alt 3	
Action 1	Expected change in landings (mp gw)	Expected average price change (\$/lb)	Expected change in CS
Alt 2	0.53	-\$0.45	\$1,605,475
Preferred Alt 3	-0.60	\$0.51	-\$1,235,707
Alt 4	-0.53	\$0.45	-\$1,123,378
Alt 5	-0.57	\$0.49	-\$1,188,596
Alt 6	0.00	\$0.00	\$0

Action 2 **Alternative 1** and **Preferred Alternative 3** would result in the same expected 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 Preferred Alternative 3** is not expected to have any effect on landings, average price loss, or CS, relative to **Alternative 1**. Compared with Action 2 **Alternative 1** and **Preferred Alternative 3**, Action 2 **Alternative 2** results in a larger positive change in CS when paired with Action 1 **Alternatives 2** and **6**, due to a smaller commercial buffer. For instance, 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 **Alternative 1** and **Preferred Alternative 3**, Action 2 **Alternative 2** results in a smaller negative change in CS when paired with Action 1 **Preferred Alternative 3** or **Alternatives 4-6**. 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 **Preferred Alternative 3** is selected.

The total expected change in net economic benefits for the commercial sector from **Preferred Alternative 3** and **Alternatives 2** and **4-6**, relative to **Alternative 1**, are displayed in Table

4.2.3.3. These changes are the addition of the expected change in PS from Table 4.2.3.1 to the expected change in CS from Table 4.2.3.2.

Table 4.2.3.3. Alternatives 1-2 and Preferred Alternative 3 – Total Expected Change in Net Economic Benefits for the Commercial Sector, relative to Action 2 Alternative 1 with Action 1 Alternative 1.

	Action 2 Alt 1
Action 1	Total Expected Change in Net Economic Benefits
Alt 2	\$2,219,851
Preferred Alt 3	-\$1,931,227
Alt 4	-\$1,737,754
Alt 5	-\$1,849,340
Alt 6	\$0
	Action 2 Alt 2
Action 1	Total Expected Change in Net Economic Benefits
Alt 2	\$3,133,039
Preferred Alt 3	-\$1,565,226
Alt 4	-\$1,356,13
Alt 5	-\$1,476,646
Alt 6	\$619,343
	Action 2 Preferred Alt 3
Action 1	Total Expected Change in Net Economic Benefits
Alt 2	\$2,219,851
Preferred Alt 3	-\$1,931,227
Alt 4	-\$1,737,754
Alt 5	-\$1,849,340
Alt 6	\$0

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 **Alternative 2** and **Preferred Alternative 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 1-2** and **Preferred Alternative 3** are analyzed as a function of the ACT and would only be expected to result if the recreational sector's post-season accountability measure is triggered. 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 **Preferred Alternative 3** and **Alternatives 2** and **4-6**. 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). 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 2018⁴⁴), 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 1-2** and **Preferred Alternative 3** are provided in Table 4.2.3.4.

Table 4.2.3.4. Alternatives 1-2 and Preferred Alternative 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 Alt 1		
Action 1	Change in ACT (mp gw)	Expected change in CS (2019 dollars)
Alt 2	-0.84	-\$14,903,226
Preferred Alt 3	-0.34	-\$6,032,258
Alt 4	-0.37	-\$6,564,516
Alt 5	-0.35	-\$6,209,677
Alt 6	-0.61	-\$10,822,581
Action 2 Alt 2		
Action 1	Change in ACT (mp gw)	Expected change in CS (2019 dollars)
Alt 2	-0.86	-\$15,258,065
Preferred Alt 3	-0.36	-\$6,387,097
Alt 4	-0.38	-\$6,741,935
Alt 5	-0.36	-\$6,387,097
Alt 6	-0.62	-\$11,000,000
Action 2 Preferred Alt 3		
Action 1	Change in ACT (mp gw)	Expected change in CS (2019 dollars)
Alt 2	-0.86	-\$15,258,065
Preferred Alt 3	-0.36	-\$6,387,097
Alt 4	-0.38	-\$6,741,935
Alt 5	-0.36	-\$6,387,097
Alt 6	-0.62	-\$11,000,000

The changes in ACT and CS under Action 2 **Alternative 2** and **Preferred Alternative 3** are identical, as they both consider a 9% recreational buffer between the ACL and ACT. As the recreational buffer is greater under **Alternative 2** and **Preferred Alternative 3** than under

⁴⁴ MRIP Intercept data available at: https://www.st.nmfs.noaa.gov/st1/recreational/MRIP_Survey_Data/

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 **Preferred 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 **Alternative 2** and **Preferred Alternative 3**, the changes observed in Table 4.2.3.3 are identical if either Action 1 **Preferred 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 **Alternative 2** and **Preferred Alternative 3** would be expected to result in a larger decrease in CS when paired with Action 1 **Preferred Alternative 3** and **Alternatives 2** and **4-6**, due to a larger recreational buffer. For instance, Action 2 **Alternative 2** and **Preferred Alternative 3** would be expected to decrease CS by an additional \$354,839 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 2** or **Preferred Alternative 3** is selected. Likewise, Action 2 **Alternative 2** and **Preferred Alternative 3** would be expected to decrease CS by an additional \$177,419 relative to Action 2 **Alternative 1**, if Action 1 **Alternatives 4-6** 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 1-2** and **Preferred Alternative 3** would close in the 4th wave when paired with Action 1 **Alternatives 2** and **6**; Action 2 **Alternatives 1-2** and **Preferred Alternative 3** would close in the 6th wave with paired with Action 1 **Preferred Alternative 3** or **Alternatives 4-5**. 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 4.2.3.5. 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 **Alternative 2** and **Preferred Alternative 3** would result in the same change in total canceled charter trips. Compared with Action 2 **Alternative 1**, Action 2 **Alternative 2** and **Preferred Alternative 3** result in a larger total number of canceled charter trips when paired with Action 1 **Preferred Alternative 3** or **Alternative 2** or **4-6**, due to earlier predicted closure dates. As such, Action 2 **Alternatives 2** and **Preferred Alternative 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 **Preferred Alternative 3** would be expected to result in an additional 204 canceled charter trips relative to Action 2 **Alternative 1**, if Action 1 **Preferred Alternative 3** is selected. Action 2 **Alternatives 2** and **Preferred Alternative 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. Finally, Action 2 **Alternatives 2** and **Preferred Alternative 3** would be expected to result in an additional 243 canceled charter trips relative to Action 2 **Alternative 1**, if Action 1 **Alternative 6** is selected.

Table 4.2.3.5. Wave in which predicted closure date occurs, canceled charter trips in the interrupted wave, and total canceled charter trips for Action 2 **Alternatives 1-2** and **Preferred Alternative 3** paired with Action 1 **Preferred Alternative 3** and **Alternatives 2** and **4-6**.

Action 2 Alt 1			
Action 1	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alt 2	4	4,494	11,570
Preferred Alt 3	6	2,148	2,148
Alt 4	6	2,454	2,454
Alt 5	6	2,250	2,250
Alt 6	4	607	7,683
Action 2 Alt 2			
Action 1	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alt 2	4	4,858	11,934
Preferred Alt 3	6	2,352	2,352
Alt 4	6	2,557	2,557
Alt 5	6	2,352	2,352
Alt 6	4	850	7,926
Action 2 Preferred Alt 3			
Action 1	Interrupted Wave	Canceled Charter Trips in Interrupted Wave	Total Canceled Charter Trips
Alt 2	4	4,858	11,934
Preferred Alt 3	6	2,352	2,352
Alt 4	6	2,557	2,557
Alt 5	6	2,352	2,352
Alt 6	4	850	7,926

The 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 4.2.3.6. Action 2 **Alternatives 1-2** and **Preferred Alternative 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 **Alternative 2** and **Preferred Alternative 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 **Alternative 2** and **Preferred Alternative 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 **Alternative 2** and **Preferred Alternative 3** would be expected to result in the largest short-term change in PS, -\$1,682,703. When paired with Action 1 **Alternative 2**, Action 2 **Alternative 1** would be expected to result in the smallest short-term change in PS, -\$302,799.

Action 2 **Alternative 2** and **Preferred Alternative 3** would result in the same short-term change in PS. Compared with Action 2 **Alternative 1**, Action 2 **Alternative 2** and **Preferred Alternative 3** result in a larger short-term change in PS when paired with Action 1 **Preferred Alternative 3** and **Alternatives 2 and 4-6**, due to additional canceled charter trips. As such, Action 2 **Alternatives 2** and **Preferred Alternative 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 **Alternative 2** and **Preferred Alternative 3** would be expected to result in an additional decrease in PS of \$28,838 relative to Action 2 **Alternative 1**, if Action 1 **Preferred Alternative 3** is selected. Action 2 **Alternative 2** and **Preferred Alternative 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. Finally, Action 2 **Alternative 2** and **Preferred Alternative 3** would be expected to result in an additional decrease in PS of \$34,249 relative to Action 2 **Alternative 1**, if Action 1 **Alternative 6** is selected.

Table 4.2.3.6. Short-term change in PS for charter vessels under Action 2 **Alternatives 1-2** and **Preferred Alternative 3** paired with Action 1 **Preferred Alternative 3** and **Alternatives 2 and 4-6**.

	Action 2 Alt 1	Action 2 Alt 2	Action 2 Preferred Alt 3
Action 1			
Alt 2	-\$1,631,329	-\$1,682,703	-\$1,682,703
Preferred Alt 3	-\$302,799	-\$331,637	-\$331,637
Alt 4	-\$346,056	-\$360,475	-\$360,475
Alt 5	-\$317,218	-\$331,637	-\$331,637
Alt 6	-\$1,083,339	-\$1,117,589	\$1,117,589

The total expected change in net economic benefits for the recreational sector from **Preferred Alternative 3** and **Alternatives 2 and 4-6**, relative to **Alternative 1**, are displayed in Table 4.2.3.7. These changes are the addition of the expected annual change in CS from Table 4.2.3.4 to the short-term change in PS from Table 4.2.3.6.

Table 4.2.3.7. Alternatives 1-2 and Preferred Alternative 3 – Total Expected Change in Net Economic Benefits for the Recreational Sector, relative to Action 2 **Alternative 1 with Action 1 **Alternative 1**.**

	Action 2 Alt 1
Action 1	Total Expected Change in Net Economic Benefits
Alt 2	-\$16,534,555
Preferred Alt 3	-\$6,335,057
Alt 4	-\$6,910,572
Alt 5	-\$6,526,895
Alt 6	-\$11,905,920
	Action 2 Alt 2
Action 1	Total Expected Change in Net Economic Benefits
Alt 2	-\$16,940,768
Preferred Alt 3	-\$6,718,734
Alt 4	-\$7,102,410
Alt 5	-\$6,718,734
Alt 6	-\$12,117,589
	Action 2 Preferred Alt 3
Action 1	Total Expected Change in Net Economic Benefits
Alt 2	-\$16,940,768
Preferred Alt 3	-\$6,718,734
Alt 4	-\$7,102,410
Alt 5	-\$6,718,734
Alt 6	-\$12,117,589

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 gag and red grouper, 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% (**Alternative 1** and **Preferred Alternative 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 **Alternative 1** or **Preferred Alternative 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% (**Alternative 2** and **Preferred Alternative 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% (**Alternative 2** and **Preferred Alternative 3**) alongside any of **Alternatives 2-6** 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 exceeding the recreational ACL and overfishing of the Gulf red grouper stock. Closure of the recreation red grouper sector would have a minor effect on the administrative environment, while overfishing could have more significant effects. However, the likelihood of overfishing is low given the use of an ACT to constrain landings in years following an ACL overage.

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 causing overfishing.

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 (Magnuson-Stevens Act).

4.3 Cumulative Effects Analysis (CEA)

As directed by the National Environmental Policy Act (NEPA), federal agencies are mandated to assess not only the indirect and direct impacts, but cumulative impacts of actions as well. Cumulative impact are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (RFFA) regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 C.F.R. 1508.7). Cumulative effects can be either additive or synergistic. A synergistic effect occurs when the combined effects are greater than the sum of the individual effects.

This section uses an approach for assessing cumulative effects that was initially used in Amendment 26 to the Reef Fish Fishery Management Plan (Reef Fish FMP) and is based on

guidance in the Council on Environmental Quality's (CEQ) Considering Cumulative Effects handbook (CEQ 1997). The report outlines 11 items for consideration in drafting a CEA for a proposed action.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
 2. Establish the geographic scope of the analysis.
 3. Establish the timeframe for the analysis.
 4. Identify the other actions affecting the resources, ecosystems, and human communities of concern.
 5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.
 6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
 7. Define a baseline condition for the resources, ecosystems, and human communities.
 8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
 9. Determine the magnitude and significance of cumulative effects.
 10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
 11. Monitor the cumulative effects of the selected alternative and adapt management.
- Cumulative effects on the biophysical environment, socio-economic environment, and administrative environments are analyzed below.

1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.

The CEQ cumulative effects guidance states this step is accomplished through three activities as follows:

- I. The direct and indirect effects of the proposed actions (Section 4.1 – 4.2);
- II. Which resources, ecosystems, and human communities are affected (Chapter 3); and
- III. Which effects are important from a cumulative effects perspective (information revealed in this CEA).

2. Establish the geographic scope of the analysis.

The primary effects of the actions in this amendment would be to the social, economic, and administrative environments of the Gulf. The physical and biological/ecological environments would be less affected as described in Sections 4.1-4.2, Subsections 1 and 2.

The geographic scope affected by these actions, including red grouper, is detailed in the Generic Essential Fish Habitat (EFH) Amendment, Reef Fish Amendment 30B, and the Generic ACL/AM Amendment (GMFMC 2004a; GMFMC 2008c; GMFMC 2011a, respectively) which are incorporated by reference and further summarized in Section 3.2. The Gulf has a total area of approximately 600,000 square miles (1.5 million km²), including state waters (Gore 1992). 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.

As noted in Section 3.3, larval red grouper are found in the plankton across the west-Florida shelf and juveniles are generally found in shallow waters around structures and patch reefs. Adult red grouper are mostly found in the eastern Gulf on hard substrate. Adult red grouper are known as ecological engineers because they are able to sediment and debris from favored hard substrate habitat (see Section 3.3). There are environmental sites of special interest that are relevant to red snapper management. These include the longline/buoy area closure, the Edges Marine Reserve, Tortugas North and South Marine Reserves, the Florida Middle Grounds HAPC, and the Pulley Ridge HAPC. These areas are managed with gear restrictions to protect habitat and specific reef fish species.

Commercial and recreational fishing for reef fish occurs throughout the Gulf; however, most red grouper fishing occurs on the west Florida Shelf (see Section 3.5.1). There were 845 vessels with commercial reef fish permits at the end of 2018 (Table 3.1.1) and approximately 80% of the commercial reef fish permits have mailing recipients in Florida. Final data for 2018 showed 1,312 for-hire permits (Table 3.1.4) and approximately 64% of the permits had mailing addresses in Florida. The distribution of commercial and for-hire permits from other states can be found in Tables 3.1.1 and 3.1.4.

3. Establish the timeframe for the analysis.

The timeframe for this analysis is 1984 to 2022. Red grouper have been managed in the Gulf since the implementation of the Reef Fish FMP in 1984, which put in place a 20-inch TL minimum size limit. The red grouper stock has been assessed periodically since 1991. The most recent stock assessment (SEDAR 61 2019) used data through 2017. The current allocation of 76% commercial: 24% recreational allocation was established through Reef Fish Amendment 30B (GMFMC 2008c). In 2018, the effort survey for MRIP changed from a phone-based survey to a mail-based survey. Those calibrations were incorporated into the SEDAR 61. ABC projections from the SSC generally go out three years, or in the case, cover 2020-2022.

The following is a list of reasonably foreseeable future management actions. These are described in more detail in Step 4. Should new regulations be needed for the management of the red grouper stock, they would likely not be implemented until 2022 at the earliest, the end of the timeframe discussed in this analysis.

- The next assessment for red grouper through SEDAR has not been scheduled yet. The current SEDAR schedule shows assessments through 2024. The SEFSC conducted a red grouper interim analysis in late 2020; however, the SSC has not reviewed it, as of March 31, 2021.

The Council is currently developing several actions that could affect the reef fish fishery. Actions affecting red grouper include:

- A generic amendment to revise the ABC control rule and framework procedures.
- A generic amendment to carryover unharvested quota to subsequent fishing years.
- Amendments 36B and 36C to modify commercial individual fishing quota (IFQ) programs.
- Amendment 48 to establish or revise status determination criteria and optimum yield (OY) for reef fish.

4. Identify other actions affecting the resources, ecosystems, and human communities of concern.

Past actions affecting reef fish and red grouper are summarized in Section 1.4 and on the Council's website⁴⁵ and are incorporated here by reference.

a. The following are red grouper specific related actions and activities.

i. The following list identifies past actions affecting red grouper:

From 2009 to 2019, the Council took actions to revise the red grouper stock ACL. The ACL increased from 7.72 mp in 2009 to 10.77 mp in 2016. However, the Council reduced the ACL to 4.16 mp in 2019 for several reasons including decreases in harvests, input from fishermen, and an interim stock analysis as detailed in Section 1.1. Details on changes to the recreational ACL and fishing seasons are provided in Sections 1.4 and 3.1.

In May 2009, Amendment 30B was implemented, which set the current red grouper allocation between the recreational and commercial sectors. It also established red grouper ACLs and AMs for the commercial and recreational sectors, adjusted recreational grouper bag limits and seasons, and reduced the red grouper commercial minimum size limit. See Section 1.4 for more details on this amendment.

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

In May 2010, Amendment 31 was implemented. It prohibited the use of bottom longline (BLL) gear shoreward of a line approximating the 35-fathom contour from June through August, created a BLL endorsement, and restricted the number of hooks a BLL vessel could carry. The area closure and hook requirements were initially established through an emergency rule.

A regulatory amendment implemented in January 2011 reduced total allowable catch (TAC) for red grouper from 7.57 mp gw to 5.68 mp gw resulting in a 4.32 mp gw commercial quota and 1.36 mp gw recreational catch limit.

A regulatory amendment implemented in November 2011 increased the red grouper TAC to 6.88 mp gw with subsequent increases each year from 2012 to 2015. It also increased the red grouper bag limit to four fish per person.

⁴⁵ <https://gulfcouncil.org/fishery-management/>

In March 2012, Amendment 32 was implemented and set the red grouper commercial ACL at 6.03 mp gw and the recreational ACL at 1.90 mp gw. It also added an overage adjustment, in-season, and bag limit reduction process to the red grouper recreational AMs.

In March 2013, Amendment 38 was implemented that revised the post-season recreational AM 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.

In May 2015, a framework action was implemented to reduce the red grouper bag limit from four fish to two fish per person per day and eliminated the bag limit reduction AM.

In October 2016, a framework action was implemented that increased the commercial ACL to 8.19 mp gw and the commercial ACT, also called a quota in the codified regulations at 50 CFR 622, to 7.78 mp gw. The recreational ACL was increased to 2.58 mp gw; and the recreational ACT to 2.37 mp gw.

In December 2017, Amendment 44 was approved and set the red grouper minimum stock size threshold (MSST) to 50% of the biomass at maximum sustainable yield (MSY).

On June 12, 2018, NMFS published a final rule to implement Amendment 36A that requires owners or operators of federally permitted commercial Gulf reef fish vessels landing any commercially harvested, federally managed reef fish from the Gulf to provide notification prior to landing and to land at approved locations. It also requires shares from the red snapper IFQ program and the grouper-tilefish IFQ program that are in non-activated IFQ accounts to be returned to NMFS for redistribution, and allows NMFS to withhold a portion of IFQ allocation at the start of a fishing year equal to an anticipated commercial quota reduction.

A temporary rule implemented in January 2019 withheld 59.4% of the red grouper IFQ allocation (4.78 mp gw) as a result of a proposed quota reduction.

ii. **The following list identifies more recent and present actions affecting red grouper:**

A May 2019 emergency rule reduced the red grouper commercial and recreational ACLs and ACTs consistent with a stock ACL of 4.16 mp gw.

A framework action implemented in October 2019 reduced the catch limits for red grouper consistent with the May 2019 emergency rule.

A Reef Fish framework action was approved by the Council and currently undergoing rulemaking that would prohibit fishing year-round in the Madison-Swanson and Steamboat Lumps Marine Protected Areas and prohibit the possession of Gulf reef fish, with no exception for vessels in transit unless the vessel has an operating vessel monitoring system and a valid federal commercial Gulf reef fish permit.

A Reef Fish framework action was implemented in March 2019 that modifies the on-board multi-day possession limit of fish species so that a second bag-limit can be retained at any time after the vessel leaves the dock for fishing trips that are greater than 30 hours in duration on qualifying vessels.

iii. **The following list identifies RFFAs and activities affecting red grouper.**

The purpose of Reef Fish Amendment 36B is to limit IFQ share ownership in shareholder accounts without a valid or renewable commercial reef fish permit, thereby promoting share ownership by fishermen who have the ability to land reef fish within the red snapper and grouper-tilefish IFQ programs.

The purpose of Amendment 36C is to assist small participants and new entrants to the IFQ programs, to reduce discards, and to increase access to shares to actively fishing eligible commercial fishermen.

The purpose of a generic amendment to revise the ABC control rule and framework procedures is to revise or replace the current ABC control rule, and to consider incorporating provisions to allow carry-over of uncaught ACLs, phase-in of changes to ABCs, and to consider developing a process to evaluate “economic, social, or ecological trade-offs when determining the risk policy for an ABC control rule.”

b. The following are reef fish and ecosystem related actions and activities that also affect red grouper.

i. **The following list identifies past actions/events affecting red grouper:**

In April 2010, the *Deepwater Horizon* MC252 deep-sea drilling rig exploded and sank off the coast of Louisiana. Because of the resulting oil spill, approximately one-third of the Gulf was closed to fishing for much of the summer months. The direct loss of fishing opportunities due to the closure, plus the reduction in tourism throughout the coastal Gulf, resulted in a much lower catch than had been projected (NMFS 2010). Additionally, deep-water corals are particularly vulnerable to episodic mortality events such as oil spills, since corals are immobile.

In 2005 and 2014, severe red tide events are thought to have negatively affected red grouper populations. A red tide event also occurred in 2017-2018 and is described in the next section. During these years, stock assessments showed declines in the spawning stock biomass. These red tide events are most common off the central and southwestern coasts of Florida where red grouper are primarily found. For 2020, the Florida Fish and Wildlife Conservation Commission (FWC) did not report any severe red tide events through September (<https://myfwc.com/research/redtide/>). The effects of red tide on fish are discussed in Section 3.3.

Amendment 34, effective on November 19, 2012, eliminated the earned income qualification requirement for the renewal of Gulf commercial reef fish permits and increased the maximum number of crew members for dual-permitted (commercial and for-hire) vessels.

The Council determined the existing earned income requirement in the reef fish fishery was no longer necessary and increasing the number of crew on dual-permitted vessels increased the safety on commercial trips, particularly for commercial spear fishermen.

A framework action effective March 5, 2014, required headboats to report their logbooks electronically in the Gulf reef fish and coastal migratory pelagic fisheries.

On April 9, 2014, NMFS published a final rule to modify the permitting and reporting requirements for seafood dealers who first receive species managed by the Council. These revisions created a single dealer permit for dealers who first receive fish managed by the Council, required both purchase and non-purchase reports to be submitted online on a weekly basis, prohibited dealers from first receiving fish from federally permitted vessels if they are delinquent in submitting reports, and changed the sale and purchase provisions based on the new dealer permitting requirements.

Effective June 17, 2019, Amendment 49 adds three new sea turtle release gear options and simplifies existing requirements for fishermen with federal commercial or charter/headboat permits. The amendment also modified the FMP framework procedure to streamline future changes to release gear and handling requirements for sea turtles.

ii. **The following list identifies more recent and present actions/events affecting reef fish and related ecosystems:**

In February 2015, the National Oceanic and Atmospheric Administration (NOAA) published a Notice of Intent to consider possible expansion of the Flower Garden Banks National Marine Sanctuary (FGBNMS). The preferred alternative establishes nine new areas and two areas that are expansions of existing sanctuary boundaries. The potential impacts of the FGBNMS expansion are detailed in Chapter 5 of the FGBNMS Expansion draft environmental impact statement (EIS) and incorporated here by reference (Office of National Marine Sanctuaries 2016). Long-term beneficial impacts are anticipated if the proposed action is implemented. The proposed alternatives limit some types of commercial fishing, but would not establish regional closures of fishing grounds or impact other fishery management activities arising from the review process by the Council. The impacts on commercial fishing from the regulations were identified as minor.

In October 2017, Florida began to experience what would become one of the widest spread and most persistent red tide events on record. As of November 2018, the red tide had spread to the western panhandle as well as the southeast coast of Florida. It was reported as having dissipated in March 2019. Its impacts on reef fish stocks are unknown, but may be taken into account in future stock assessments.

In 2018, the effort survey for MRIP changed from a phone-based survey to a mail-based survey. On average, fishing effort estimates are higher with the new survey and calibrations between data from the old and new surveys have been completed. Calibrations will be incorporated into future reef fish assessments as they are scheduled. These calibrations were incorporated into SEDAR 61 (2019) to estimate landings.

In 2018, NMFS certified data collection programs for Alabama, Florida, and Mississippi. Texas has its own sampling program and Louisiana's has been used since 2013. The Mississippi and Alabama programs are specific to red snapper, but the programs used by the other states collect information for other species, including red grouper.

In November 2018, NMFS published a proposed rule to modify charter vessel and headboat reporting requirements. The modifications require the owner or operator of a vessel with a federal for-hire permit to electronically declare (hail-out) a fishing trip before leaving port; submit an electronic fishing report for each trip prior to the vessel offloading the fish; and install NMFS-approved hardware and software with GPS capabilities that at a minimum archive the vessels position data and transmit data to NMFS. The final rule for this action published in July 2020 and NMFS expects to implement the reporting program in 2021

In 2020, NMFS expects to publish a final rule to implement the actions in Amendment 9 to the Fishery Management Plan for Coral and Coral Reefs of the Gulf of Mexico, U.S. Waters (Coral Amendment 9; GMFMC 2018). The rule would establish 13 new HAPCs with prohibitions on bottom tending fishing gear, 8 new HAPCs without fishing regulations, and prohibit dredge fishing in all HAPCs in the Gulf. While data showed little fishing occurs in a majority of these areas, any reduction would help prevent impacts to reef fish habitat.

iii. **The following list identifies RFFAs and activities affecting reef fish and related ecosystems:**

The Council is working on several actions affecting reef fish. These include framework actions to address lane snapper ACLs and AMs; greater amberjack bag limits, fishing year, and season; vermilion snapper ACLs and bag limit; gray triggerfish ACLs and recreational fixed closed season; and red snapper conversion ratios between state and MRIP landing estimates.

The overall harvest of recreational red grouper will continue to be monitored by NMFS, and will also be monitored by Florida, Louisiana, and Texas under their respective landings monitoring program. Florida uses MRIP catch estimates paired with their own effort estimates. The programs used by Louisiana, Alabama, Florida, and Mississippi to estimate landings of some reef fish have been certified by MRIP as statistically and scientifically valid.

An abbreviated framework action has been developed to replace reef fish and coastal migratory pelagic historical captain endorsements held by approximately 32 for-hire operators in the Gulf with standard Gulf charter/headboat (for-hire) permits. This would reduce the regulatory and potential economic burden on historical captain permit holders.

A generic amendment to carryover unharvested quota to subsequent fishing years is being developed. This would implement provisions to allow carryover of portions of ACLs that were unused due to landings uncertainty and management limitations, and to modify the framework procedure to allow carryover and other changes to operate in a timely manner. Since Amendment 50 has an action to address carryover specifically for red snapper, the effects of this action have been analyzed in this document.

In April 2017, the Council passed a motion to begin working on an amendment, subsequent to Coral Amendment 9 (GMFMC 2018), that would address the 24 areas proposed by the Coral Working Group that were not included in Coral Amendment 9. The 24 areas encompass existing HAPCs that do not currently have fishing regulations, and include some areas under consideration for the FGBNMS. Additional recognition of sensitive coral and coral reef habitat or actions to reduce impacts to those areas could be beneficial for reef fish.

The Florida Keys National Marine Sanctuary is in the process of finalizing the draft EIS for the sanctuary management plan. At this time, NMFS does not anticipate that actions and activities outlined in that plan would directly affect the Gulf reef fish fishery. If the sanctuary area is expanded, reef fish fishermen could be affected; on the other hand, additional recognition of sensitive coral and coral reef habitat or actions to reduce impacts to those areas could be beneficial for reef fish.

Climate change projections show increases in sea surface temperature and sea level; decreases in sea ice cover; and changes in salinity, wave climate, and ocean circulation (Intergovernmental Panel on Climate Change⁴⁶). These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. NOAA's Climate Change Web Portal⁴⁷ indicates that the average sea surface temperature in the Gulf will increase by 1.2-1.4°C for 2006-2055 compared to the average over the years 1956-2005. For reef fishes, Burton (2008) speculated that climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. For species such as red grouper, there has been a distributional trend towards deeper waters.

Liquefied natural gas (LNG) facilities are being proposed in the western and northern Gulf. These facilities can have a negative effect on species with pelagic larvae, like most reef fish species. At this time, the effect of LNG facilities is unknown and is likely to be less for reef fish species than other more coastal species. Other factors such as climate change, hurricanes, and oil and gas extraction could have detrimental effects on reef fish species, but these effects are poorly understood.

5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stress.

This step should identify the trends, existing conditions, and the ability to withstand stresses of the environmental components. According to the CEQ guidance describing stress factors, there are two types of information needed. The first are the socioeconomic driving variables identifying the types, distribution, and intensity of key social and economic activities within the region. The second are the indicators of stress on specific resources, ecosystems, and communities.

⁴⁶ <http://www.ipcc.ch/>

⁴⁷ <http://www.esrl.noaa.gov/psd/ipcc/ocn/>

a. Socioeconomic driving variables identifying the types, distribution, and intensity of key social and economic activities within the region

The socioeconomic driving variables identifying the types, distribution, and intensity of key economic and social activities within the region are described in detail in Sections 3.4-3.5. As of February 27, 2020, there were 1,270 valid or renewable for-hire reef fish permits. From 2014 through 2018, the majority of headboat angler days occurred in Florida, followed by Texas and Alabama. Combined, Mississippi and Louisiana accounted for only a small percentage of headboat angler days. From 2012 through 2016, the private angling component of the recreational sector took an average of at least 228,122 directed angler trips annually. From 2014 through 2018, the private angling component of the recreational sector took an average of 460,677 red grouper target trips and an average of 915,624 catch trips. By mode, the majority of charter trips and private angler trips occurred in Florida, followed by a small number of trips in Alabama. Landings from the private angling component constituted 85% of the total recreational sector's landings from 2014 through 2018. As of February 27, 2020, there were 834 valid or renewable commercial reef fish permits. The number of vessels commercially harvesting red grouper from 2015 to 2018 has been relatively stable, ranging between 374 and 384 vessels. Between 2014 and 2018, commercial red grouper landings have fallen by 57%, and revenue has fallen by 49%. As of February 19, 2020, there were 495 IFQ accounts holding red grouper shares, and those IFQ accounts are held by 436 businesses. The number of dealers purchasing red grouper landings decreased by 19% from 2014 to 2018, from 110 dealers to 89 dealers. The majority of commercial red grouper landings occur along the west coast of Florida, and the top ten counties with commercial vessels with red grouper landings in 2018 are all in Florida.

b. Indicators or stress specific resources, ecosystems, and communities

i. Ecosystem

With respect to stresses to the ecosystem from actions in this amendment, modifying sector allocations and setting ACLs and ACTs are not likely to create additional stress. Vertical-line gear, the primary gear used by the reef fish fishery, and longlines can damage habitat through snagging or entanglement; however, these impacts are minimal. Changes in the population size structure as a result of shifting red grouper fishing selectivities and increases in stock abundance could lead to changes in the abundance of other reef fish species that compete with red grouper for shelter and food. Predators of red grouper could increase if red snapper abundance is increased, while species competing for similar resources as red grouper could potentially decrease in abundance if food and/or shelter are less available. As described in Part 4 of this CEA, red tide, the *Deepwater Horizon* MC252 and climate change have affected the Gulf overall.

ii. Reef Fish/Red Grouper Stock

In the early 2000's major stresses to the red grouper stock have primarily come from the stock being overfished and experiencing overfishing, which was documented in the 2002 stock assessment (Schirripa and Legault 2002). Subsequent assessments have shown the stock is neither overfished or undergoing overfishing. Trends in landings and the

status of the red grouper stock are based on NMFS and SEDAR stock assessments (summarized in Sections 3.1 and 3.3) and are incorporated here by reference. It is likely the red grouper stock has been adversely affected by the red tide events occurring in 2010; the red tide events in 2005, 2014, and 2017-2018 as evidenced in dips in recruitment.

As mentioned previously, natural events such as red tide could be a source of stress on reef fish, including red grouper. However, the extent and magnitude of that impact is unknown, and may not be apparent for several years, until subsequent recruitment data is available. Additionally, climate change is already influencing red grouper. For reef fishes, Burton (2008) speculated that climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. For red grouper, declines in biomass have been linked to large-scale and persistent red tide events (SEDAR 61 2019).

iii. Reef Fish Fishing Communities

Fisheries are subject to stress as a result of increases in fishing costs, increases in harvesting efficiency, more restrictive regulations (particularly for red grouper), and changes in the stock status of certain species (effort shifting). Reductions in dollars generated would likely be felt in the fishery infrastructure (e.g., marinas, bait and tackle shops). For the reef fish fishery, an indicator of stress would be a decline in the number of permitted vessels or a decrease in landings.

In the Gulf, red grouper is harvest primarily in Florida. Total recreational and commercial landings for the years 1986 through 2005, based on SEDAR 12, and for the years 1986 through 2019, based on the SEFSC ACL monitoring dataset, are provided in Table 2.1.1.

Declines in fishing permits may be a signal of stress within the fishery. The number of valid or renewable for-hire Gulf reef fish permits has declined gradually from 1,458 permits in 2008 to 1,277 permits in 2019. Likewise, the number of valid or renewable commercial Gulf reef fish permits has gradually declined from 1,099 permits in 2008 to 842 permits in 2019. The number of businesses in 2019 associated with the 1,099 commercial reef permits is 637, with 543 business (85.2% of the businesses) holding only one permit each (64.5% of the permits). The number of commercial vessels harvesting red grouper has remained relatively stable at 384 in 2014 and at 376 in 2018, while red grouper landings have declined from 5,497,993 lbs gutted weight in 2014 to 2,361,280 lbs gutted weight in 2018. In addition, the number of dealers that purchased red grouper landings steadily decreased from 110 in 2014 to 89 in 2018, or by 19%. These declines may reflect the difficulties in maintaining participation in the fishery.

With a broad view for the reef fish fishery, effort in the commercial sector has decreased significantly according to multiple measures. Between 2006 and 2014, the number of vessels, trips, and days at sea decreased by 31%, 38%, and 28%, respectively. However, 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, with crew costs decreasing by 6% and other variable costs (supplies, fuel, etc.) decreasing by 33%. Even though fuel prices increased by 25%, a 49% decrease in fuel usage served as the primary driver of the decline in other variable costs.

Table 3.5.1.1 identifies the number of vessels landing red grouper by top 10 county homeports. All 10 of those county homeports are located in Florida.

Several natural disasters have impacted coastal communities in the Gulf in recent years. The effects of these events on fishing communities may take several years to understand and become fully apparent. The Department of Commerce determined commercial fishery disasters for Hurricane Harvey (2017) in Texas, and Hurricanes Irma (2017) and Michael (2018) in Florida. As of December 15, 2020, determinations are pending for Florida Red Tide Events (2015-2019), Gulf of Mexico Freshwater Flooding (2019) in Louisiana, Mississippi, and Alabama, and Hurricane Laura (2020) in Louisiana. These determinations provide the basis for Congress to appropriate fishery disaster assistance for the new fiscal year in which it is declared.

iv. **Administrative Environment**

The stresses to the administrative environment from these actions would include: 1) converting landings from MRIP-CHTS data to MRIP-FES; 2) rulemaking for in-season fishing closures for the recreational sector due to managing to decreased recreational ACLs; 3) an increased potential for overfishing of red grouper if there is an increase in allocation the recreational sector, which is associated with more uncertainty in constraining harvest. However, none of these stresses are likely to be significant. Updating catch levels using MRIP-FES estimates for historical recreational landings would result in some beneficial impacts because NMFS would not be required to convert landings estimates to monitor harvest. Shifting allocation to the recreational sector could increase the likelihood of overfishing because of the uncertainty associated with monitoring landings. However, an ACT will remain in place to help ensure that the recreational ACL is not exceeded on a regular basis, which will reduce the likelihood of total red grouper landings exceeding the OFL.

6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.

This section examines whether resources, ecosystems, and human communities are approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds can be identified for some resources, which are levels of impact beyond which the resources cannot be

sustained in a stable state. Other thresholds are established through numerical standards, qualitative standards, or management goals. The CEA should address whether thresholds could be exceeded because of the contribution of the proposed actions to other cumulative activities affecting resources.

Overall the purposes of this amendment 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 (SEDAR 61 2019) and subsequent OFL and ABC recommendations from the SSC. These actions are not being implemented because a resource, ecosystem, or human community is approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold.

i. Ecosystem

The stresses associated with the proposed actions in relation to regulatory thresholds are not likely to cause beneficial or adverse effects on the ecosystem. The actions would not change the way the reef fish fishery as a whole is prosecuted. Actions in the amendment would directly affect red grouper fishing and not fishing for the other species in the fishery management unit with the possible exception of gag, which can be caught with red grouper multi-use IFQ allocation. Thus, significant effects on the ecosystem are not expected. The overall Gulf-wide fishing effort would remain constrained by actions that keep quotas and ACLs from being exceeded. As described in Steps 4 and 5, red tide and climate change may affect red grouper. Effects from red tide have been shown to have adverse effects on the red grouper population as described in SEDAR 61 (2019). Effects from climate change are poorly understood as described in Section 3.3.

ii. Reef Fish/Red Grouper Stock

Amendment 1 to the Reef Fish FMP (GMFMC 1989), implemented in 1990 before the Sustainable Fisheries Act (SFA) was passed, established the minimum spawning stock biomass at 20% SPR for all reef fish species as well as established the shallow-water grouper quota, which included red grouper. The commercial shallow-water quota was increased through two 1991 framework actions (GMFMC 1991a and 1991b). The Generic Sustainable Fisheries Act (SFA) Amendment (GMFMC 1999) proposed SFA definitions for OY, MSST, and MFMT for reef fish species. The red grouper definition of MFMT was $F_{30\%SPR}$. Definitions for OY and MSST were disapproved because they were not biomass-based. Due to over harvest, Secretarial Amendment 1 (GMFMC 2004) established a rebuilding plan, set OY and MSST, and established a red grouper quota within the shallow water grouper quota. Amendment 30B (GMFMC 2008) established red grouper ACLs and AMs. In 2017, the definition of MSST was revised from $(1-m)*B_{MSY}$ to $0.50*B_{MSY}$.

Prior to the SEDAR assessment process, red grouper was assessed by the SEFSC on a periodic basis. A 1999 stock assessment (Schirripa et al. 1999) found the red grouper stock to be overfished, but a subsequent 2002 assessment (NMFS 2002) found the stock to no longer be overfished or undergoing overfishing. Subsequently, the red grouper

stock has been assessed through SEDAR stock assessments (SEDAR 12 2006, SEDAR 12 Update 2009, and SEDAR 42 2015) and these assessments have found the stock not to be overfished or undergoing overfishing. However, the assessments have found declines in the population that are likely associated with large-scale red tide events. A brief description of the stock and its status can be found in Section 3.3 and Step 5 of this CEA. Measures proposed in this amendment are not likely to adversely affect the red grouper stock status as long as landings do not exceed the OFL. At this time, it is unclear how climate change may affect these regulatory thresholds (see Steps 4 and 5).

The actions in this amendment, particularly those to set the OFL, ACLs, and ACTs are likely to benefit the stock as they provide harvest limits not to be exceeded. The actions are consistent with the Magnuson-Stevens Act and the Reef Fish FMP. Consistency with the Magnuson-Stevens Act and Reef Fish FMP requires, among other things, preventing overfishing, rebuilding declining reef fish stocks, monitoring the reef fish fishery, conserving and increasing reef fish habitats, and minimizing conflicts between user groups. Under all alternatives, red grouper fishing would remain subject to a Gulf-wide closure if the recreational sector total ACL is projected to be met. The commercial sector is managed under an IFQ program that limits harvest to the ACL due to strict management protocols commercial fishermen must follow.

iii. Reef Fish Fishing Communities

Regulatory thresholds for reef fish fishing communities would not be exceeded because of the combined effects of modifications to sector allocations, OFL, ABC, ACLs, ACTs and other activities affecting the fishery and fishing communities. For specific information regarding the effects of actions in this amendment on the economic and social environment of fishing communities see Sections 4.1.3-4.1.4 and 4.2.3-4.2.4. Fishing communities are subject to stress as a result of increases in fishing costs, increases in harvesting efficiency, more restrictive regulations (particularly for red grouper), and changes in the stock status of certain species (effort shifting). Reductions in dollars generated would likely be felt in the fishery infrastructure. The purposes of the actions in this amendment 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. Lack of consideration of the best scientific information available would result in a de facto reallocation between the commercial and recreational sectors.

iv. Administrative Environment

Thresholds would likely not be exceeded because of the combined effects of reallocating red grouper catch among the commercial and recreational sectors are actions that fall within the confines of the Magnuson-Stevens Act. For specific information regarding the effects of actions in this amendment on the administrative environment, see Sections 4.1.5 and 4.2.5. The effects on the administrative environment for the federal government are expected to be positive, because they are less likely to result in exceeding thresholds, although there could be minor periodic increases in administrative burden due to closures necessitated by exceeding recreation catch limits. However, federal entities

have mechanisms in place to help address any increase in administrative impacts, such as monitoring and enforcement programs. In addition, federal and state entities monitor the harvest of many species of fish and even if seasonal closures occurred with increased frequency, it would not significantly increase the existing burden.

Ultimately, if the actions in this amendment result in management using more accurate catch data, it should reduce stresses on the administrative environment because it would reduce the risk of overfishing and of the stock becoming overfished, which would necessitate implementation of a rebuilding plan.

7. Define a baseline condition for the resources, ecosystems, and human communities.

The purpose of defining a baseline condition for the resource and ecosystems in the area of the proposed actions is to establish a point of reference for evaluating the extent and significance of expected cumulative effects.

i. Ecosystem

A baseline for analysis of the physical environment, as discussed in Section 3.2, was conducted in the EIS for the Generic EFH Amendment. The Gulf has a total area of approximately 600,000 square miles (1.5 million km²), 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. 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 Feckhelm 2005). Gulf water temperatures range from 54° F to 84° F (12° C to 29° C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73° F through 83° F (23-28° C) including bays and bayous between 1982 and 2009, according to satellite-derived measurements.⁴⁸ In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters. In the Gulf, larval red grouper are found in the plankton across the west-Florida shelf (SEDAR 42 2015) and juvenile red grouper are generally found in shallow waters around structures and patch reefs. As red grouper mature, they move offshore to hard bottom areas (Moe 1969). Red grouper are known to alter the offshore hard bottom areas by removing 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).

ii. Reef Fish/Red Grouper Stock

The biological environment of the Gulf, including that of red grouper, is described in Section 3.3 of this amendment. Red grouper demonstrate the typical reef fish life history pattern. Eggs and larvae are pelagic while juvenile red grouper are generally found in shallow waters around structures and patch reefs. Juveniles then migrate offshore to hard-bottom habitats. Red grouper are protogynous hermaphrodites, transitioning from females to males at older ages, and form harems for spawning.

⁴⁸ NODC 2012: <http://accession.nodc.noaa.gov/0072888>

Red grouper is not considered overfished or undergoing overfishing. Recruitment remains highly variable with strong recruitment events observed in 1995, 1998, 2001, 2005, and 2013. However, episodic red tide events have been linked to significant mortality events, such as the one in 2018. As such, SEDAR 61 estimated the stock size to be below $B_{30\% SPR}$, although above MSST.

iii. Reef Fish Fishing Communities

See Sections 3.4 and 3.5 for more information relative to fishing communities.

Information on the social environment of the reef fish fishery is available, primarily for the commercial sector; information on the social environment for the recreational sector is general to reef fish and not specific to red grouper. Approximately 99.7% of red grouper recreational landings on average were recorded in Florida. However, as previously mentioned, red grouper landings for the recreational sector are not available at the community level, making it difficult to identify communities as dependent on recreational fishing for red grouper. Private vessels account for the majority of red grouper recreational landings on average (2014 through 2018), followed by charter vessels and headboats. In 2018, 376 commercial vessels harvested red grouper in the Gulf, and 89 dealers purchased red grouper landings. Also, see Section 5.b.iii in this CEA for more information about the baseline condition of the reef fish fishing communities.

iv. Administrative Environment

Federal fishery management is conducted under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 *et seq.*), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the exclusive economic zone, an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ. State waters refer to the area from shore out to the seaward boundary of each state. The seaward boundary of Florida on the Gulf coast and Texas is 9 nautical miles (nm) from shore. The seaward boundary of Alabama, Mississippi, and Louisiana is generally 3 nm from shore. However, the 2016 Department of Commerce Appropriations Act extended the seaward boundary of Alabama, Mississippi, and Louisiana to 9 nm from shore for purposes of management activities under the Reef Fish FMP, which includes the management of red snapper. Responsibility for federal fishery management is shared by the Secretary of Commerce and the Council for the federal waters of the Gulf.

Recreational red grouper landings in the Gulf are obtained through multiple sources (see Section 2.2). The Southeast Region Headboat Survey covers headboats in the Gulf and South Atlantic. The MRIP provides private angling and charter vessel landings and effort data for Gulf states other than Texas and Louisiana. Texas conducts its own sampling program (Marine Sport-Harvest Monitoring Program) and provides recreational landings, except for headboat landings, from Texas. Data from Louisiana's sampling program (LA Creel) has been used since 2013. The other Gulf states have developed sampling programs that have recently been certified by MRIP, which originated to monitor the

harvest of red snapper, including Mississippi (Tails n' Scales), Alabama (Snapper Check), and Florida (Gulf Reef Fish Survey); however, Alabama and Mississippi do not track red grouper landings. Commercial landings and effort are monitored through NOAA Fisheries' Grouper-Tilefish IFQ program and through trip ticket data. All sampling programs track red snapper landings, and may not sample red grouper.

The Southeast Region issues several fishing permits and endorsements for fisheries activities in federal waters. There are 41 permits and are as follows: 33 vessel permits and endorsements, 3 dealer permits, 1 operator permit, 1 high seas permit, 1 wreckfish permit, 1 aquaculture of live rock permit, and 1 Columbia treaty waters permit. In addition, there is an endorsement required to be able to bottom longline with a commercial reef fish permit. More details on the administrative environment can be found in Section 3.6.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.

Cause and effect relationships are presented in Table 4.3.1.

Table 4.3.1. The cause and effect relationship of fishing and regulatory actions for red grouper within the time period of the CEA.

Time Period	Cause	Observed and/or expected effects
1800-2022	Climate Change	Changes in ocean acidity and temperature modifies fish and prey distributions and productivity; threaten fishing communities through sea level rise and changing weather patterns.
1962-2004	Growth and recruitment overfishing	Declines in mean size and weight
1990	9.2 mp shallow-water grouper quota for commercial sector, 20-inch minimum size limit and 5-grouper fish bag limit	Slowed rate of fishing
1991-1992	9.8 mp shallow-water grouper quota for commercial sector	Increased rate of fishing
1999 - 2010	Prohibit commercial sale of red grouper from February 15- March 15	Slow commercial fishing and protect spawning stock
2004 - 2009	Establish 5.31 mp gw commercial quota and a 1.25 mp gw recreational target catch level, reduced the red grouper bag limit to two fish	Constrain harvest
2005 - 2010	Establish a series of trip limit reductions for the commercial sector's harvest of grouper; reduce recreational bag limit to one fish	Constrain commercial and recreational harvest
2006 - 2010	Establish a 6,000-pound gw aggregate deep-water grouper and shallow-water grouper trip limit, prohibit for-hire vessel captains and crews from retaining bag limits	Constrain commercial and recreational harvest
2007 – 2015	Recreational closed season for red grouper from February 15 to March 15	Slow commercial fishing and protect spawning stock
2009 - present	Establish ACLs and AMs for the commercial and recreational sectors, adjusted recreational grouper bag limits and seasons, reduced the red grouper commercial minimum size limit	Constrain commercial and recreational harvest
2010 - present	Prohibit the use of BLL gear shoreward of a line approximating the 35-fathom contour from June through August	Protect sea turtles

Time Period	Cause	Observed and/or expected effects
2010	Reduce the commercial quota from 5.75 to 5.23 mp gw, and the recreational catch limit from 1.82 to 1.65 mp gw	Constrain commercial and recreational harvest
2010 - present	Establish a grouper-tilefish IFQ program that includes red grouper	Manage the commercial grouper quotas so to stay within its ACLs
2012 - 2015	Increase the red grouper commercial ACL to 6.03 mp and the recreational ACL to 1.90 mp	Improved stock size allowing greater harvests
2015 - present	Reduce the red grouper bag limit from four fish to two fish per person. Revise fixed closed season of February 1 through March 31 to waters beyond the 20-fathom contour	Constrain recreational harvest of red grouper
2016-2018	Increase the red grouper commercial ACL to 6.19 mp and the recreational ACL to 2.58 mp	Improve stock size allowing greater harvests
2019 - present	Reduce the commercial ACL to 3.16 mp gw and the recreational ACL is 1.00 mp gw	Constrain commercial and recreational harvest and protect the stock spawning biomass

9. Determine the magnitude and significance of cumulative effects.

The primary objectives of this amendment and associated EIS 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 SEDAR 61 2019 stock assessment and subsequent OFL and ABC recommendations from the SSC. The short and long-term direct and indirect effects of each these actions are provided in Sections 4.1-4.2. The following discussion refers to the effects of past, present, and RFFAs on the various valued environmental components (VEC). Important VECs were identified for the overall actions to be taken with this amendment. VECs are “any part of the environment that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern” (Environmental Information Partnership 1998). For purposes of this analysis, an initial 22 VECs were identified, and the consequences of each alternative proposed in this amendment on each VEC were evaluated. Some of these VECs were combined into a revised VEC because many of the past, current, and RFFAs were similar. Based on this analysis, four VECs were determined to be the most important for further consideration. The four VECs are shown in Table 4.3.2.

Table 4.3.2. Valued environmental components (VEC) identified.

VECs considered for further evaluation	VECs consolidated for further evaluation	VECs not included for further evaluation
Ecosystem	Hard bottom/EFH Prey species Competitors Predators	Sharks Protected species
Reef Fish/Red Grouper Stock	Red grouper Other reef fish	
Reef Fish Fishery	Vessel owner Captain Crew Anglers Dealers Fishing Communities Fishing support businesses (ice and gear suppliers, marinas, fuel docks)	
Administration	Federal Rulemaking Federal Permitting Federal Education Federal Enforcement Federal Monitoring State Rulemaking State Education State Enforcement State Monitoring	

VECs not included for further analysis were sharks, protected resources, and consumers. Many longline vessels that target reef fish also target sharks. However, sharks were not considered as an important VEC because, as shark stocks have declined, the shark fishery has become more and more regulated, limiting the effects of this fishery and the stock on reef fish stocks. Protected resources were also eliminated from further analyses in this section. As described in Section 3.3, biological opinions have concluded the primary reef fish gear (longline and hook-and-line) were not likely to jeopardize listed species or their critical habitat. Because actions considered in this amendment are not expected to change how reef fish fishing gear is used in the prosecution of the reef fish fishery, any take associated with reef fish fishing should not exceed that considered in biological opinions. All other ESA-listed species have been found not likely to be adversely affected or not affected by the reef fish fishery. For marine mammals, gear used in the reef fish fishery were classified as Category III fisheries (see Section 3.3). This means this fishery has minimal impacts on marine mammals. Consumers were eliminated due to a lack of data for this aspect of the reef fish fishery.

i. Ecosystem

EFH, as defined for the Reef Fish FMP (GMFMC 2004a) consists of all Gulf estuaries; Gulf waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the Gulf and South Atlantic Fishery Management Councils from estuarine waters out to depths of 100 fathoms. Section 3.2 and GMFMC (2004a) describe the physical environment inhabited by red grouper as well as reef fish in general.

Red grouper is a carnivorous bottom dweller, generally associated (as adults) with hard-bottom substrates (GMFMC 2004a). Eggs and larvae are pelagic while juveniles are found in shallow waters around structures and patch reefs.

From fishing, the most sensitive gear/habitat combinations include EFH for reef fish species. These include fish otter trawls, shrimp otter trawls, roller frame trawls, and pair trawls over coral reefs; crab scrapes over coral reefs; oyster dredges over submerged aquatic vegetation, oyster reefs, or coral reefs; rakes over coral reefs; and patent tongs over submerged aquatic vegetation, oyster reefs, or coral reefs (GMFMC 2004a). Some of these gear/habitat interactions are unlikely to occur in actual practice (e.g., shrimp trawls towed through hard bottom areas can destroy shrimp nets and so are avoided). In general, gear that are actively fished by towing have the highest potential to alter habitats. However, some habitats, such as coral reefs and hard bottoms are sensitive to interactions with passive gear (e.g., traps) as well. Most directed reef fish fishing activities, as described previously in this document and CEA, use longlines and handlines, although a few fish are taken by spearfishing gear. These have low levels of impacts compared to other gear types.

In the past, some fishing practices have had detrimental effects on the physical environment. Gear such as roller trawls and fish traps damaged habitats while harvesting fish species. Because of these effects, the Council developed stressed areas to reduce these impacts. Further protections have been developed, primarily by either prohibiting fishing or limiting fishing activities that can occur within certain areas. Detailed information on the closures and preserves is provided in Coral Amendment 9 (GMFMC 2018). In addition, regulatory changes through Generic EFH Amendment 3 (GMFMC 2005; implemented in 2006) prohibited bottom anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots to protect coral reefs in several HAPCs. Generic EFH Amendment 3 also required a weak link in the tickler chain of bottom trawls on all habitats throughout the Gulf federal waters to minimize damage done to habitats should the chain get hung up on natural bottom structures.

Current allowable gear types can adversely affect hard bottom areas; however, these impacts are not considered significant (see Section 4.1.1). Vertical-line gear and longlines used in the reef fish fishery can damage habitat through snagging or entanglement. Longlines can also damage hard bottom structures during retrieval as the line sweeps across the seafloor. Additionally, anchoring over hard-bottom areas can also affect benthic habitat by breaking or destroying hard bottom structures. However, these gear types are not believed to have much negative impact on bottom structures and are considerably less destructive than other commercial gear, such as traps and trawls, which are not allowed for reef fish fishing.

Damage caused from reef fish fishing, although minor, is associated with the level of fishing effort (see Section 4.1.1). Therefore, actions reducing levels of effort would result in greater benefits to the physical environment, because fishing related interactions with habitat would be reduced. Thus, actions described in Steps 3 and 4 of this CEA which have reduced fishing effort for some species, and possibly the fishery on the

whole, have had a positive effect on hard bottom habitats. RFFAs, such as Coral Amendment 9 (GMFMC 2018) and the FGBNMS management plan, should also benefit these habitats as they would also reduce or limit fishing effort. As described in Sections 4.1-4.3, effects on the physical environment from the proposed actions would likely be minimal because prosecution of the fishery should not be changed.

Reef fish EFH, particularly coral reefs and submerged aquatic vegetation, are particularly susceptible to non-fishing activities (GMFMC 2004a). The greatest threat comes from dredge-and-fill activities (ship channels, waterways, canals, and coastal development). Oil and gas activities as well as changes in freshwater inflows can also adversely affect these habitats. As described in Step 4.b.i of this CEA, the potential harm to reef fish habitat was highlighted by the *Deepwater Horizon* MC252 incident. Essential fish habitat and HAPC designations are intended to promote careful review of proposed activities that may affect these important habitats to assure that the minimum practicable adverse impacts occur on EFH. However, NMFS has no direct control over final decisions on such projects. The cumulative effects of these alternatives depend on decisions made by agencies other than NMFS, as NMFS and the Council have only a consultative role in non-fishing activities. Decisions made by other agencies that permit destruction of EFH in a manner that does not allow recovery, such as bulkheads on former mangrove or marine vegetated habitats, would constitute irreversible commitments. However, irreversible commitments should occur less frequently as a result of EFH and HAPC designations. Accidental or inadvertent activities such as ship groundings on coral reefs or propeller scars on seagrass could also cause irreversible loss.

At this time, it is unclear what effects climate change will have on red grouper EFH. Factors associated with climate change such as ocean acidification could negatively affect important biotic components of red grouper EFH such as corals (IPCC 2014). Hollowed et al. (2013) has identified important ecosystem paths that deserve future study to determine climate change cause and effects.

Hypoxic events such as the Northern Gulf Hypoxic Zone and hypoxia associated with red tide can adversely affect fish including red grouper. However, red grouper is not likely to be adversely affected by the Northern Gulf Hypoxic Zone as is most commonly found in the eastern Gulf. Many marine species, including reef fish species, are adversely affected by red tide not only through hypoxia associated with red tide, but from the toxins released by the red tide algae itself. These adverse effects show themselves declines in stock abundance following events as shown for red grouper (see Section 3.3 and SEDAR 61 2019).

ii. Reef Fish/Red Grouper Stock

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). Of the stocks for which stock assessments have been conducted, the fourth quarter report of the 2020 Status of Stocks classifies greater amberjack as

considered overfished and two reef fish stocks are considered undergoing overfishing (lane snapper and the Gulf jacks complex).⁴⁹

In the past, the lack of management of reef fish allowed many stocks to undergo both growth and recruitment overfishing. This allowed some stocks to decline as indicated in numerous stock assessments. Red grouper were considered overfished in 1999 (Schirripa et al. 1999); however, as described in subsequent stock assessments in Section 6(ii), have found the stock not overfished. For red grouper, management measures including a minimum size limit, commercial quota, and aggregate bag limit were put in place as part of the initial Reef Fish FMP and Amendment 1 (Section 1.4). None of these measures halted increases in landings. However, over time, management measures have become more restrictive and held landings more closely to the quotas/ACLs.

The present red grouper ACLs are based on 2017 landings that are consistent with an interim stock assessment (SEFSC 2019). However, these ACLs are greatly reduced from values recommended after review of the SEDAR 42 (2015) for reasons explained in Section 1.1. The current recommendations for this action are based on SEDAR 61 (2019) would set the OFL, ABC, ACLs, and ACTs at a level of harvest that would reduce the likelihood of overfishing to occur. With respect to other actions, the grouper tilefish IFQ program has successfully held landings by the commercial sector below its quota since implementation in 2010. However, these measures, may have, at least for the commercial sector, redirected effort towards other non-IFQ managed reef fish species such as gray triggerfish and greater amberjack by fishermen without IFQ shares or allocation. Landings of these non-IFQ managed species are closely monitored to prevent them from exceeding their ACLs and protect them from overharvest. In fact, measures for gray triggerfish and greater amberjack allow the harvest to be closed if it is projected to meet their respective commercial and recreational quotas. For the recreational sector, bag limits, size limits, and season closures are the primary tool to control harvest. These measures have been successful for red grouper with landings only exceeding the ACL in 2013 (Table 4.3.3). The red grouper bag limit has varied from one to four fish within the aggregate grouper bag limit with changes occurring in response to changes in the health of the stock. Note that in 2014, the bag limit was reduced from four to three fish as a result of an accountability measure implemented in 2011, which reduced the bag limit because the ACL was exceeded in 2013. This accountability measure was removed in 2015 when the bag limit was reduced to two fish as a result of rulemaking from a 2014 framework action (GMFMC 2014b).

⁴⁹ Note a recent stock assessment has determined greater amberjack are undergoing overfishing, but this occurred after the fourth quarter report of the 2020 Status of Stocks was completed.

Table 4.3.3. Recreational landings of red grouper from 2010-2018, the recreational annual catch limit (ACL), and landings as a percent of the ACL. Landings are in pounds gutted weight.

Year	Landings*	ACL	Percent
2010	635,680	1,850,000	34.36
2011	643,745	1,650,000	39.01
2012	1,752,930	1,900,000	92.26
2013	2,377,111	1,900,000	125.11
2014	1,600,475	1,900,000	84.24
2015	1,847,573	1,900,000	97.24
2016	1,403,236	2,580,000	54.39
2017	807,085	2,580,000	31.28
2018	872,045	2,580,000	33.80

*Recreational landings data from the Gulf of Mexico Historical Recreational Landings and Annual Catch Limit Monitoring webpage (<https://www.fisheries.noaa.gov/southeast/recreational-fishing-data/gulf-mexico-historical-recreational-landings-and-annual-catch>)

Fishery management RFFAs are expected to benefit managed species. These actions are expected to manage the stocks at OY per National Standard 1 and are described in steps 3 and 4 of this CEA. This amendment is intended to improve the management of the red grouper in ways that are likely to better keep harvests within the ACLs. Other RFFAs described in steps 3 and 4 are intended to improve the management of reef fish stocks either through revising ACLs, improving data reporting, or allowing more flexibility in management.

Non-fishing activities are likely to adversely affect reef fish stocks as listed in Step 4. For example, severe red tide events are thought to negatively affect reef fish stocks including red grouper populations as described in Step 4. In 2005, 2014, and 2017-2018, severe red tide events occurred in the western Gulf. During these years, red grouper stock assessments showed declines in the spawning stock biomass. Other factors such as climate change, LNG facilities, hurricanes, and oil and gas extraction could have detrimental effects on reef fish species, but these effects are poorly understood.

iii. Reef Fish Fishing Communities

Adverse or beneficial effects of actions on vessel owners, captains, and crew are tied to the ability of a vessel to make money. In commercial fisheries, these benefits are usually derived from shares awarded after fishing expenses are accounted for. The greater the difference between expenses and payment (revenue) for harvested fish, the more profit is generated by the fishing vessel. For-hire businesses generate revenue by selling trips either at the vessel level (charter businesses) or passenger level (headboats).

Current management measures have been effective in maintaining the red grouper stock as the stock is neither overfished nor experiencing overfishing, based on the results of SEDAR 42 and of SEDAR 61. 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. 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.

Commercial Sector

Non-FMP factors have adversely affected the reef fish commercial fleets. Factors that have had an adverse effect on the commercial fleet include hurricanes, oil spills, red tide events, and increases in fishing costs, which may have pushed marginal fishing operations out of business. Hurricanes are unpredictable and localized in their effects. Increases in fishing costs, unless accompanied by an increase in prices or harvest quality, decrease the profitability of fishing. As described in Section 3.4.1, 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. Still, the number of vessels harvesting red grouper in each year from 2015 through 2018 was relatively stable.

Current management measures may have had a negative, short-term impact on the commercial sector. An April 2019 framework action reduced the annual catch limit for the commercial sector to 3.16 mp gw and the commercial quota to 3.00 mp gw. This was in response to concerns about red grouper stock decline due to environmental conditions and low landings from both the commercial and recreational sectors.

Recreational Sector

As with the commercial sector, non-management-related RFFAs that could affect anglers include hurricanes, oil and gas extraction, and increases in fishing costs. Hurricanes are unpredictable and localized in their effects. Oil spills, which are also unpredictable, can have extensive adverse impacts over large areas as evidenced by the Deepwater Horizon spill. Increases in fishing costs as well as lost fishing opportunities would likely reduce the amount of angler effort.

Current management measures may have had a negative, short-term impact on the recreational sector. A December 2014 framework action reduced the red grouper bag limit from four fish to two fish per person per day, in an effort to extend the recreational red grouper season. As detailed in Section 3.4.2, red grouper recreational target trips decreased from 40,144 to 34,797 for the charter component and from 703,390 to 380,124 for the private angling component from 2014 to 2018. An April 2019 framework action reduced the annual catch limit for the recreational sector to 1.00 mp gw and the recreational ACT to 0.92 mp gw. This was in response to concerns about red grouper stock decline due to environmental conditions and low landings from both the commercial and recreational sectors.

Infrastructure refers to fishing-related businesses and includes marinas, rentals, snorkel and dive shops, boat dockage and repair facilities, tackle and bait shops, fish houses, and lodgings related to the recreational fisheries industry. This infrastructure is tied to the commercial and recreational sectors and can be affected by adverse and beneficial economic conditions in those fisheries. Actions allowing the recreational and commercial sectors to expand have had a beneficial effect providing business opportunities to service the need of these industries. However, actions which have constrained the recreational sector likely have had an adverse effect, because lower revenues generated from the fishery would be available to support the infrastructure.

iv. Administrative Environment

Administration of fisheries is conducted through federal (including the Council) and state agencies that develop and enforce regulations, collect data on various fishing entities, and assess the health of various stocks. As more regulations are required to constrain stock exploitation to sustainable levels, greater administration of the resource is needed. The NMFS Office of Law Enforcement (OLE), in cooperation with state agencies, would continue to monitor regulatory compliance with existing regulations and NMFS would continue to monitor both recreational and commercial landings to determine if landings are meeting or exceeding specified quota levels. Further, stock status needs to be periodically assessed to ensure stocks are being maintained at proper levels.

Some recent actions have assisted the administration of fisheries in the Gulf. In 2010, an IFQ program was implemented for the commercial sector's harvest of red grouper, requiring NMFS to monitor the sale of red grouper IFQ shares. Recordkeeping requirements for IFQ shares have improved commercial quota monitoring and prevented overages from occurring. A vessel monitoring system (VMS) was implemented for all permitted commercial reef fish vessels in 2007 that has helped OLE identify vessels violating various fishing closures. The implementation of ACLs and AMs for most federally managed species has required careful monitoring of landings. For red grouper, NMFS prohibits harvest upon projected that landings will exceed the ACL within that season. In 2017, the Council approved new requirements for electronic reporting by for-hire vessels, which are scheduled to become effective at the beginning of 2021. This is expected improve quota monitoring and help constrain harvest to the ACL.

Setting the recreational ACL in MRIP-FES rather than MRIP-CHTS is expected to reduce burden on the administrative environment. Currently, recreational landings for red grouper (as well as many other reef fish) are calculated in MRIP-FES, and must be converted to MRIP-CHTS for quota monitoring. This conversion would no longer be required. Although this conversion will still be necessary for other reef fish species and thus will not affect the short-term administrative burden, this is a step in eliminating this conversion for all reef fish species, which would reduce long-term administrative burden.

Overall, the proposed changes in this Amendment are likely to have low positive to neutral impacts on the administrative environment. ACT buffers proposed in Action 2 for the commercial and recreational sector are expected to have negligible impacts to the administrative environment, no matter the alternative chosen in Action 2 or

in Action 1 (see Section 4.2.5 for discussion). In addition, the proposed change in the red grouper commercial and recreational allocation to more accurately reflect historic catch rates (based on NMFS and SSC has determination of best scientific information available) is not expected to affect administrative burden. This is because regardless of the allocation, no significant increase in risk of overfishing is expected. Each of the alternatives in Action 1 will result in ACLs that are below the OFL, and provisions are in place to decrease the chance of reaching or exceeding the OFL. However, Action 1 alternatives (coupled with any Action 2 alternative) may increase administrative burden in other ways. Each of the viable alternatives for Action 1 would result in reduced quota for the recreational sector, which is more likely to result in a minor administrative burden associated with seasonal closures. In addition, several alternatives in Action 1 would allocate a greater percentage of the ACL to the recreational sector, which has greater uncertainty with catch and landings than the commercial sector. Because these landings would not need to be converted back to MRIP CHTS for management, this would reduce uncertainty and result in beneficial effects to the administrative environment. On the other hand, because most of the alternatives would result in a reduced recreational ACL (relative to the current ACL), this would increase the likelihood of needing to implement an in-season closure. Alternatives that result in larger allocations to the recreational sector could increase the likelihood of overfishing because of the uncertainty in determining recreational landings as discussed in Section 4.1.5. The ACL in each alternative is set below the overfishing limit (OFL) to decrease the likelihood of overfishing even if the ACL is exceeded or if recreational landings are higher than estimated. Previous estimates of recreational catch were lower (often by 2-3 times) than current estimates, and thus the likelihood of unknowingly overfishing the stock, and potentially approaching an overfished state, was higher. The risk of overfishing associated with an increase in recreational allocation, in spite of uncertainty in recreational landings, may be partially or fully mitigated by the use of more accurate landings data in quota monitoring.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The primary objectives of this amendment and associated EIS are revise the red grouper allocation between the commercial and recreational sectors using the best scientific information available, modify the total and sector annual catch limits based on results of the SEDAR 61 2019 stock assessment and subsequent OFL and ABC recommendations from the SSC, and modify ACTs to reduce the likelihood the ACL would be exceeded. The cumulative effects of revising the red grouper sector allocation and ACLs (Action 1) and ACTs (Action 2) on the biophysical environment are likely neutral because it should not have much effect on overall reef fish fishing effort (see Sections 4.1.1, 4.1.2, 4.2.1, and 4.2.2), but may influence red grouper fishing effort due to the influence of recreational fishing on ABCs. For the socioeconomic environment, depending on the sector, some effects would be likely be positive and some negative (see Sections 4.1.3, 4.1.4, 4.2.3, and 4.2.4). However, short-term negative impacts on the fisheries' socioeconomic environment may occur due to the need to limit directed harvest and reduce bycatch mortality. These negative impacts can be minimized when actions are considered for the recreational sector by using combinations of bag limits, size limits and closed seasons and for the

commercial sector through individual fishing quota programs, size limits, and season-area closures.

11. Monitor the cumulative effects of the selected alternatives and adapt management.

NMFS would continue monitoring the harvest of red grouper. Monitoring the harvest is necessary to determine if the ACLs are exceeded and to prohibit further harvest to insure the OFL is not also exceeded. It is uncertain if the states would be able to constrain harvest within their allocation and whether the monitoring data would provide timely data to prevent overages. The timing of the data may be critical for NMFS to determine if the quota has been met. The effects of the proposed actions are, and will continue to be, monitored through collection of landings data by NMFS and the Gulf states, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. Landings data for the recreational sector in the Gulf is collected through MRIP, NMFS' Headboat Survey, Florida's Gulf Reef Fish Survey, Louisiana's LACreel Survey, and the Texas Marine Recreational Fishing Survey. In addition, red snapper landings are monitored through Alabama's Snapper Check program and Mississippi's Tails n' Scales program. MRIP replaced the previous MRFSS program and this program has moved from the Coastal Household Telephone Survey to the mailed Fishing Effort Survey. Port sampling through MRIP is conducted through the Access Point Angler Intercept Survey. Commercial data is collected through trip ticket programs, port samplers, and logbook programs. Currently, no SEDAR assessments of Gulf red grouper are scheduled between the present and 2025, but if the need for an assessment in the short-term arises, an assessment or interim analysis could be scheduled.

CHAPTER 5. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM A COPY OF THE EIS IS SENT

AGENCIES and ORGANIZATIONS CONSULTED

National Marine Fisheries Service
 - Southeast Fisheries Science Center
 - Southeast Regional Office
 - Office for Law Enforcement
 National Oceanic Atmospheric Administration General Counsel

Environmental Protection Agency (Region 4 and 6)
 United States Coast Guard
 United States Fish and Wildlife Services
 Department of Interior, Office of Environmental Policy and Compliance
 Department of State, Office of Marine Conservation
 Marine Mammal Commission

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

CHAPTER 6. LIST OF PREPARERS AND REVIEWERS

PREPARERS

Name	Expertise	Responsibility	Agency
Matthew Freeman	Economist	Co-Team Lead – Amendment development, economic effects, Regulatory Impact Review, cumulative effects analysis	GMFMC
Peter Hood	Fishery biologist	Co-Team Lead – Amendment development, biological environment, cumulative effects analysis	SERO
Ava Lasseter	Anthropologist	Social effects	GMFMC
Mike Travis	Economist	Economic environment	SERO
Mike Jepson	Anthropologist	Social analyses	SERO
Daniel Luers	Fishery biologist	Biological environment, biological effects, administrative environment, administrative effects, cumulative effects analysis	SERO

Jeff Pulver	Fishery biologist/data analyst	Data analyst	SERO
Skyler Sagarese	Fishery biologist	Assessment analyst	SEFSC

REVIEWERS (Preparers also serve as reviewers)

Name	Expertise	Responsibility	Agency
Noah Silverman	Natural resource management specialist	National Environmental Policy Act review	SERO
Mara Levy	Attorney	Legal review	NOAA GC
John Froeschke	Fishery biologist	Review	GMFMC
Assane Diagne	Economist	Review	GMFMC
Ryan Rindone	Fishery biologist	Review	GMFMC
Jennifer Lee	Protected resource specialist	Protected resources review	SERO
Scott Sandorf	Regulatory writer	Regulatory preparation and review	SERO
Carrie Simmons	Fishery biologist	Review	GMFMC
Larry Perruso	Economist	Review	SEFSC
John McGovern	Fishery biologist	Review	SERO

GMFMC = Gulf of Mexico Fishery Management Council; NOAA GC = National Oceanic and Atmospheric Administration General Counsel; SEFSC = Southeast Fisheries Science Center; SERO = Southeast Regional Office of the National Marine Fisheries Service

CHAPTER 7. REFERENCES

Abbott, B, A. Siger, and M. Spiegelstein. 1975. Toxins from the blooms of *Gymnodinium breve*. In: LoCicero, V.R. (ed). Proceedings of the first international conference on toxic dinoflagellate blooms. Massachusetts Science and Technology Foundation, Wakefield, Massachusetts

Abbott, J. and D. Willard. 2017. Rights-based management for recreational for-hire fisheries: Evidence from a policy trial. *Fisheries Research*, 196: 106-116.

Asche, F. 2020. Supply chains and markets for red snapper. Report prepared for NOAA.

Baden, D. 1988. Public health problems of red tides. In: Tu, A.T. (ed) Handbook of natural toxins, book 3. Marcel Dekker, New York, p 259–277

Barnette, M. C. 2001. A review of the fishing gear utilized within the Southeast Region and their potential impacts on essential fish habitat. NOAA Technical Memorandum. NMFS-SEFSC-449. National Marine Fisheries Service. St. Petersburg, Florida.

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

Burton, M. 2008. Southeast U.S. Continental Shelf, Gulf of Mexico, and U.S. Caribbean. In Osgood, K. E. (ed). Climate Impacts on U.S. Living Marine Resources: National Marine Fisheries Service Concerns, Activities and Needs. U.S. Dep. Commerce, NOAA Tech. Memo. NMFSF/ SPO-89, pp 31-43.

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

Carter, D.W. and C. Liese. 2012. The Economic Value of Catching and Keeping or Releasing Saltwater Sport Fish in the Southeast USA. *North American Journal of Fisheries Management*, 32:4, 613-625. <http://dx.doi.org/10.1080/02755947.2012.675943>

Coleman, F.C., C.C. Koenig, and L.A. Collins. 1996. Reproductive styles of shallow-water groupers (Pisces: Serranidae) in the eastern Gulf of Mexico and the consequences of fishing on spawning aggregations. *Environmental Biology of Fishes* 47: 129-141.

Coleman, F. C., C. C. Koenig, K. M. Scanlon, S. Heppell, S. Heppell, and M. W. Miller. 2010. Benthic habitat modification through excavation by red grouper, *Epinephelus morio*, in the Northeastern Gulf of Mexico. *The Open Fish Science Journal*, 3:1-15

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

Fischer, A. J., M. S. Baker, Jr., and C. A. Wilson. 2004. Red snapper (*Lutjanus campechanus*) demographic structure in the northern Gulf of Mexico based on spatial patterns in growth rates and morphometrics. *Fishery Bulletin* 102:593–603.

Fitzhugh, G.R., H.M. Lyon, W.T. Walling, C.F. Levins, and L.A. Lombardi-Carlson. 2006. An update of Gulf of Mexico red grouper reproductive data and parameters for SEDAR 12. Draft working document for SEDAR 12 Data Workshop. 17p. SEDAR 12-DW-04.

Fodrie, F. J., K. L. Heck, Jr., S. P. Powers, W. M. Graham, and K. L. Robinson. 2010. Climate-related, decadal-scale assemblage changes of seagrass-associated fishes in the northern Gulf of Mexico. *Global Change Biology*, 16(1):48-59.

Foster, J., F.J. Breidt, and J.D. Opsomer. 2018. APAIS data calibration methodology report. 10 pp. <https://www.fisheries.noaa.gov/webdam/download/68183814>

Gomez, E.D., A.C. Alcala, and H.T. Yap. 1987. Other fishing methods destructive to coral. pp. 65-75 in *Human Impacts on Coral Reefs: Facts and Recommendations*. Antenne Museum, French Polynesia.

GMFMC. 1981. Environmental impact statement and fishery management plan for the reef fish resources of the Gulf of Mexico and environmental impact statement. Gulf of Mexico Fishery Management Council, Tampa, Florida. 328 pp.
<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/RF%20FMP%20and%20EIS%201981-08.pdf>

GMFMC. 1989. Amendment 1 to the reef fish fishery management plan includes environmental assessment, regulatory impact review, and regulatory flexibility analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 356 pp.
<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/RF%20Amend-01%20Final%201989-08-rescan.pdf>

GMFMC. 2003. Corrected amendment for a charter/vessel headboat permit moratorium amending the fishery management plans for: reef fish (Amendment 20) and coastal migratory pelagics (Amendment 14) including environmental assessment, regulatory impact review, and initial regulatory flexibility act. Gulf of Mexico Fishery Management Council, Tampa, Florida.
<http://www.gulfcouncil.org/Beta/GMFMCWeb/downloads/CBAmendmentFINAL-corrected.pdf>

GMFMC. 2004a. Final environmental impact statement for the generic essential fish habitat amendment to the following fishery management plans of the Gulf of Mexico: Shrimp fishery of the Gulf of Mexico, red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico, stone crab fishery of the Gulf of Mexico, coral and coral reef fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, coastal migratory

pelagic resources of the Gulf of Mexico and South Atlantic. Gulf of Mexico Fishery Management Council. Tampa, Florida. 682 pp.

<https://gulfcouncil.org/wp-content/uploads/March-2004-Final-EFH-EIS.pdf>

GMFMC. 2004b. Final amendment 22 to the reef fish fishery management plan to set red snapper sustainable fisheries act targets and thresholds, set a rebuilding plan, and establish bycatch reporting methodologies for the reef fish fishery, includes final supplemental environmental impact statement and regulatory impact review. Gulf of Mexico Fishery Management Council. Tampa, Florida. 291 pp.

<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/Amend%2022%20Final%2070204.pdf>

GMFMC. 2004c. Final amendment 23 to the reef fish fishery management plan to set vermilion snapper sustainable fisheries act targets and thresholds and to establish a plan to end overfishing and rebuild the stock, including a final supplemental environmental impact statement and regulatory impact review. Gulf of Mexico Fishery Management Council. Tampa, Florida. 296 pp.

<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/VS%2023%20Oct%20Final%2010-21-04%20with%20Appendix%20E.pdf>

GMFMC. 2005. Final generic amendment 3 for addressing essential fish habitat requirements, habitat areas of particular concern, and adverse effects of fishing in the following fishery management plans of the Gulf of Mexico: Shrimp fishery of the Gulf of Mexico, United States waters, red drum fishery of the Gulf of Mexico, reef fish fishery of the Gulf of Mexico, coastal migratory pelagic resources (mackerels) in the Gulf of Mexico and South Atlantic, stone crab fishery of the Gulf of Mexico, spiny lobster fishery of the Gulf of Mexico and South Atlantic, coral and coral reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council, Tampa, Florida. 106 pp.

<https://gulfcouncil.org/wp-content/uploads/March-2005-FINAL3-EFH-Amendment.pdf>

GMFMC. 2007. Final amendment 27 to the reef fish fishery management plan and amendment 14 to the shrimp fishery management plan, including supplemental environmental impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 480 pp.

<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/Final%20RF%20Amend%2027-%20Shrimp%20Amend%2014.pdf>

GMFMC. 2008a. Amendment 29 to the reef fish fishery management plan – effort management in the commercial grouper and tilefish fisheries, including final environmental impact statement and regulatory impact review. Gulf of Mexico Fishery Management Council. Tampa, Florida. 88 pp.

<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/Final%20Reef%20Fish%20Amdt%2029-Dec%2008.pdf>

GMFMC. 2008b. Final reef fish amendment 30A: Greater amberjack – revise rebuilding plan, accountability measures; gray triggerfish – establish rebuilding plan, end overfishing,

accountability measures, regional management, management thresholds and benchmarks, including supplemental environmental impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 346 pp.

<http://www.gulfcouncil.org/docs/amendments/Amend-30A-Final%20208.pdf>

GMFMC. 2008c. Final amendment 30B: gag – end overfishing and set management thresholds and targets. Red grouper – set optimum yield, TAC, and management measures, time/area closures, and federal regulatory compliance including environmental impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 462 pp.

https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/Final%20Amendment%2030B%2010_10_08.pdf

GMFMC. 2010a. Final amendment 31 to the fishery management plan for reef fish resources in the Gulf of Mexico (revised) addresses bycatch of sea turtles in the bottom longline component of the Gulf of Mexico reef fish fishery, includes revised final environmental impact statement and regulatory impact review. Gulf of Mexico Fishery Management Council. Tampa, Florida. 305 pp.

<https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/Final%20Amendment%2031%20-%20revised%20-%2002-2010.pdf>

GMFMC. 2010b. Regulatory amendment to the reef fish fishery management plan to set 2011 total allowable catch for red grouper and establish marking requirements for buoy gear. Gulf of Mexico Fishery Management Council, Tampa, Florida. 125 p.

GMFMC. 2011a. Final generic annual catch limits/accountability measures amendment for the Gulf of Mexico Fishery Management Council's red drum, reef fish, shrimp, coral and coral reefs fishery management plans, including environmental impact statement, regulatory impact review, regulatory flexibility analysis, and fishery impact statement. Gulf of Mexico Fishery Management Council, Tampa, Florida. 406 pp.

<https://gulfcouncil.org/wp-content/uploads/Final-Generic-ACL-AM-Amendment-September-9-2011-v.pdf>

GMFMC. 2011b. Final reef fish amendment 32 – gag grouper – rebuilding plan, annual catch limits, management measures, red grouper – annual catch limits, management measures, and grouper accountability measures, including final environmental impact statement, regulatory impact review, regulatory flexibility analysis, and fishery impact statement. Gulf of Mexico Fishery Management Council, Tampa, Florida. 406 pp.

[http://www.gulfcouncil.org/docs/amendments/Final%20RF32_EIS_October_21_2011\[2\].pdf](http://www.gulfcouncil.org/docs/amendments/Final%20RF32_EIS_October_21_2011[2].pdf)

GMFMC. 2012a. Final amendment 38 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Modifications to the shallow-water grouper accountability measures, including an environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 94 pp.

<http://www.gulfcouncil.org/docs/amendments/Final%20Amendment%2038%2009-12-2012.pdf>

GMFMC. 2012b. Final amendment 35 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Modifications to the greater amberjack rebuilding plan and adjustments to the recreational and commercial management measures, including an environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 226 pp.

https://gulfcouncil.org/wpcontent/uploads/FISHERY%20MANAGEMENT/REEF%20FISH/Final_Amendment_35_Greater_Amberjack_Rebuilding_8_May_2012.pdf

GMFMC. 2012c. Final amendment 37 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Modifications to the gray triggerfish rebuilding plan including adjustments to the annual catch limits and annual catch targets for the commercial and recreational sectors. Gulf of Mexico Fishery Management Council, Tampa, Florida. 193 pp.

[http://www.gulfcouncil.org/docs/amendments/Final_Reef_Fish_Amend_37_Gray_Triggerfish_12_06_12\[1\].pdf](http://www.gulfcouncil.org/docs/amendments/Final_Reef_Fish_Amend_37_Gray_Triggerfish_12_06_12[1].pdf)

GMFMC. 2012d. Framework action to set the 2013 gag recreational fishing season and bag limit and modify the February-March shallow-water grouper closed season. Gulf of Mexico Fishery Management Council, Tampa, Florida. 111 p.

<http://www.gulfcouncil.org/docs/amendments/2013GagRecreationalSeason.pdf>

GMFMC. 2014a. Final amendment 40 to the fishery management plan for the reef fish resources of the Gulf of Mexico Recreational red snapper sector separation, including final environmental impact statement, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 304 pp.

<http://www.gulfcouncil.org/docs/amendments/RF%2040%20-%20Final%2012-17-2014.pdf>

GMFMC. 2014b. Framework Action to Modify the Red Grouper Recreational Management Measures of the Reef Fish Management Plan for the Reef Fish Resources of the Gulf of Mexico. Gulf of Mexico Fishery Management Council, Tampa, Florida. 97 p.

GMFMC. 2015a. Final amendment 28 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Red snapper allocation, including final environmental impact statement, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 328 pp.

<http://gulfcouncil.org/docs/amendments/Final%20Red%20Snapper%20Allocation%20-RF%20Amendment%2028.pdf>

GMFMC. 2015b. Modifications to greater amberjack allowable harvest and management measures. Framework action to the fishery management plan for the reef fish resources of the Gulf of Mexico including environmental assessment, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council. Tampa, Florida. 145 pp.

<http://gulfcouncil.org/docs/amendments/Greater%20AJ%20FINAL%20VERSION%207-10-15.pdf>

GMFMC. 2016a. Framework action to the fishery management plan for reef fish resources in the Gulf of Mexico, including environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Adjust red grouper allowable harvest. Gulf of Mexico Fishery Management Council, Tampa, Florida. 117 pp.

<http://gulfcouncil.org/docs/amendments/Red%20Grouper%20Allowable%20Harvest%20Framework%20Action%20060716%20final.pdf>

GMFMC. 2016b. Final amendment 43 to the fishery management plan for the reef fish resources of the Gulf of Mexico, including environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Hogfish stock definition, status determination criteria, annual catch limit, and size limit. Gulf of Mexico Fishery Management Council, Tampa, Florida. 164 pp.

http://gulfcouncil.org/docs/amendments/Final%20Amendment%2043%20-%20Hogfish_10-11-2016.pdf

GMFMC. 2017a. Final amendment 47 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Establish a vermilion snapper MSY proxy and adjust the stock annual catch limit, including environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 146 pp.

<http://gulfcouncil.org/wp-content/uploads/Final-Amendment-47-Vermilion-snapper-ACL-and-MSY-proxy.pdf>

GMFMC. 2017b. Final amendment 36A to the fishery management plan for the reef fish resources of the Gulf of Mexico: Modifications to commercial individual quota programs, including environmental assessment, fishery impact statement, regulatory impact review, and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 193 pp.

<http://gulfcouncil.org/wp-content/uploads/RF36A-Post-Final-Action-5-25-2017-with-bookmarks.pdf>

GMFMC. 2017c. Final amendment 44(revised) to the fishery management plan for the reef fish resources of the Gulf of Mexico: Minimum stock size threshold (MSST) revision for reef fish stocks with existing status determination criteria, including environmental assessment and fishery impact statement. Gulf of Mexico Fishery Management Council, Tampa, Florida. 124 pp.

<http://gulfcouncil.org/wp-content/uploads/Final-Amendment-44-revised-MSST-GOM-Reef-Fish-update-2.pdf>

GMFMC. 2018. Coral habitat areas considered for habitat area of particular concern designation in the Gulf of Mexico. Final Amendment 9 to the Fishery Management Plan for the Coral and Coral Reefs of the Gulf of Mexico, U.S. Waters including environmental impact statement. Gulf of Mexico Fishery Management Council, Tampa, Florida. 289 pp.

GMFMC. 2019a. Final framework action to the fishery management plan for the reef fish fishery of the Gulf of Mexico: Modification of Gulf of Mexico red grouper annual catch limits and annual catch targets, including environmental assessment, regulatory impact review, and

regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 87 pp.

<http://gulfcouncil.org/wp-content/uploads/FINAL-Red-Grouper-2019-ACL-Modification-042919-1.pdf>

GMFMC. 2019b. Final amendment 51 to the fishery management plan for the reef fish resources of the Gulf of Mexico: Establish gray snapper status determination criteria and modify annual catch limits. Gulf of Mexico Fishery Management Council, Tampa, Florida. 122 pp.

<https://gulfcouncil.org/wp-content/uploads/RF-Amendment-51-Gray-Snapper-11132019.pdf>

GMFMC. 2019c. Draft environmental assessment for an emergency rule to the fishery management plan for reef fish resources of the Gulf of Mexico: Modification of Gulf of Mexico red grouper annual catch limit, including regulatory impact review and regulatory flexibility act analysis. Gulf of Mexico Fishery Management Council, Tampa, Florida. 106 pp.

<https://www.fisheries.noaa.gov/action/emergency-rule-modify-gulf-mexico-red-grouper-annual-catch-limit>

GMFMC. 2020. Framework Action to the Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico Modifications to Gulf of Mexico Greater Amberjack Commercial Trip Limits. Gulf of Mexico Fishery Management Council, Tampa, Florida. 67 pp.

GMFMC and SAFMC. 1982. Fishery Management Plan for Coral and Coral Reefs in the Gulf of Mexico and South Atlantic Fishery Management Councils. Gulf of Mexico Fishery Management Council, Lincoln Center, Suite 881, 5401 W. Kennedy Boulevard, Tampa, Florida; South Atlantic Fishery Management Council, Southpark Building, Suite 306, 1 Southpark Circle, Charleston, South Carolina, 29407. 332 p.

<https://gulfcouncil.org/wp-content/uploads/Coral-FMP.pdf>

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

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

Hamilton, A. N., Jr. 2000. Gear impacts on essential fish habitat in the Southeastern Region. NOAA, NMFS, SEFSC, 3209 Frederick Street, Pascagoula, Mississippi 39567. 45 pp.

Hayes SA, Josephson E, Maze-Foley K, Rosel PE, Byrd B, Chavez-Rosales S, Col TVN, Engleby L, Garrison LP, Hatch J, Henry A, Horstman SC, Litz J, Lyssikatos MC, Mullin KD, Orphanides C, Pace RM, Palka DL, Soldevilla M, Wenzel FW. 2018. TM 245 US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments - 2017. NOAA Tech Memo NMFS NE-245; 371 p.

Heintz, R. A., J. W. Short, and S. D. Rice. 1999. Sensitivity of fish embryos to weathered crude oil: Part II. Increased mortality of pink salmon (*Oncorhynchus gorbuscha*) embryos incubating

downstream from weathered Exxon *Valdez* crude oil. *Environmental Toxicology and Chemistry* 18(3):494–503.

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

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

Incardona, John P., L.D. Gardner, T.L. Linbo, T.L. Brown, A.J. Esbaugh, E.M. Mager, J.D. Stieglitz, B.L. French, J.S. Labenia, C.A. Laetz, M. Tagal, C.A. Sloan, A. Elizur, D.D. Benetti, M. Grosell, B.A. Block, and N.L. Scholz. 2014. Deepwater Horizon crude oil impacts the developing hearts of large predatory pelagic fish. *Proceedings of the National Academy of Sciences* Apr 2014, 111 (15) E1510-E1518.

Karnauskas, M., M. McPherson, S. Sagarese, A. Rios, M. Jepson, A. Stoltz and S. Blake. 2019. Timeline of severe red tide events on the West Florida Shelf: insights from oral histories. White paper submitted to SEDAR 61. Southeast Fisheries Science Center.
https://sedarweb.org/docs/wpapers/S61_WP_20_Karnauskasetal_red_tide.pdf

Keithly W.R., Jr. and M. Tabarestani. 2018. The Gulf of Mexico grouper/tilefish fishery after introduction of an individual fishing quota program: the impact on ex-vessel prices.

Kennedy, V. S., R. R. Twilley, J. A. Kleypas, J. H. Cowan, and S. R. Hare. 2002. Coastal and marine ecosystems & global climate change: Potential effects on U.S. resources. Pew Center on Global Climate Change, Arlington, Virginia. 52 pp.
https://www.c2es.org/site/assets/uploads/2002/08/marine_ecosystems.pdf

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

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

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

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

Landsberg, J.H. 2002. The effects of harmful algal blooms on aquatic organisms. *Reviews in Fisheries Science* 10(2):113-390

Lombardi-Carlson, L.A., G.R. Fitzhugh, B.A. Fable, M. Ortiz, C. Gardner. 2006. Age, length and growth of gag from the NE Gulf of Mexico 1979-2005. NMFS Panama City Lab Contribution 06-03.57 p. SEDAR10-DW2.

Lombardi-Carlson, L., G. Fitzhugh, C. Palmera, C. Gardner, R. Farsky, and M. Ortiz. 2008. Regional size, age and growth differences of red grouper (*Epinephelus morio*) along the west coast of Florida. *Fisheries Research* 91(2-3): 239-251.

Lowerre-Barbieri, S., L. Crabtree, T.S. Switzer, and R.H. McMichael, Jr. 2014. Maturity, sexual transition, and spawning seasonality in the protogynous red grouper on the West Florida Shelf. SEDAR42-DW-7. SEDAR, North Charleston, SC. 21 pp.

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

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

Moe, M.A. 1969. Biology of the red grouper *Epinephelus morio* (Valenciennes) from the eastern Gulf of Mexico. Professional Papers Series Number Ten. Florida Department of Natural Resources, Marine Research Laboratory, St. Petersburg, Florida. 95 pp.

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

National Commission. 2010. The use of surface and subsea dispersants during the BP *Deepwater Horizon* oil spill. National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (National Commission). Staff Working Paper No. 4. 21 pp.
<https://cybercemetery.unt.edu/archive/oilspill/20130215212124/http://www.oilspillcommission.gov/sites/default/files/documents/Updated%20Dispersants%20Working%20Paper.pdf>

NMFS. 2002. Status of red grouper in United States waters of the Gulf of Mexico during 1986-2001. Sustainable Fisheries Division Contribution SFD-01/02-175. NMFS, Southeast Fisheries Science Center, Miami, FL. 47 p.

NMFS. 2011. Biological opinion on the continued authorization of reef fish fishing under the Gulf of Mexico reef fish fishery management plan. September 30, 2011. Available at:
<http://sero.nmfs.noaa.gov/pr/esa/Fishery%20Biops/03584%20GOM%20Reef%20Fish%20BiOp%202011%20final.pdf>

perspectives of the recreational for-hire fishing industry in the U.S. Gulf of Mexico. Center for Natural Resource Economics and Policy, LSU AgCenter and Louisiana Sea Grant College Program, Department of Agricultural Economics and Agribusiness, Louisiana State University, Baton Rouge, LA. 171 pp. Available at:

<http://www.laseagrant.org/wp-content/uploads/Gulf-RFH-Survey-Final-Report-2012.pdf>

Schirripa, M.J., C.M. Legault, and M.Ortiz. 1999. The red grouper fishery of the Gulf of Mexico: assessment 3.0 (with corrected tables). NMFS/SEFSC, Miami Laboratory, Sustainable Fisheries Division Contribution. No. SFD-98/99-56. 121 pp.

Scott-Denton, E., Cryer, P.F., Gocke, J.P., Harrelson, M.R., Kinsella, D.L., Pulver, J.R., Smith, R.C., Williams, J.A., 2011. Descriptions of the U.S. Gulf of Mexico reef fish bottom longline and vertical line fisheries based on observer data. Marine Fisheries Review, 73(2), 1–26.

SEDAR 12. 2006. Stock assessment report of Gulf of Mexico red grouper. Southeast Data, Assessment, and Review. North Charleston, South Carolina.

<http://sedarweb.org/docs/sar/S12SAR1%20Gulf%20Red%20Grouper%20Completev2.pdf>

SEDAR 12 Update. 2009. Stock assessment of red grouper in the Gulf of Mexico – SEDAR update assessment. Report of assessment workshop, Miami, FL.

http://sedarweb.org/docs/suar/Red_Grouper_2009_Assessment_Update_Report.pdf

SEDAR 42. 2015. Stock assessment report of Gulf of Mexico red grouper. Southeast Data, Assessment, and Review. North Charleston, South Carolina. <http://sedarweb.org/sedar-42>

SEDAR 47. 2016. Final stock assessment report: Southeastern U.S. goliath grouper. Southeast Data, Assessment, and Review. North Charleston, South Carolina. <http://sedarweb.org/sedar-47>

SEDAR 49. 2016. Stock assessment report for Gulf of Mexico data-limited species: red drum, lane snapper, wenchman, yellowmouth grouper, speckled hind, snowy grouper, almaco jack, lesser amberjack. Southeast Data, Assessment, and Review. North Charleston, SC.

<http://sedarweb.org/sedar-49-final-stock-assessment-report-gulf-mexico-data-limited-species>

SEDAR 61. 2019. Stock assessment report of Gulf of Mexico red grouper. Southeast Data, Assessment, and Review. North Charleston, South Carolina. <http://sedarweb.org/sedar-61>

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

Siebenaler, J.B., and W. Brady. 1952. A high speed manual commercial fishing reel. Florida Board of Conservation Tech. Series No. 4.

Simmons, C. M., and S. T. Szedlmayer. 2012. Territoriality, reproductive behavior, and parental care in gray triggerfish, *Balistes capricus*, from the northern Gulf of Mexico. Bulletin of Marine Science 88:197-209.

- Sindermann, C.J. 1979. Pollution-associated diseases and abnormalities of fish and shellfish: a review. *Fisheries Bulletin* 76: 717-749.
- Solangi, M.A. and R.M. Overstreet. 1982. Histopathological changes in two estuarine fishes, *Menidia beryllina* (Cope) and *Trinectes maculatus* (Bloch and Schneider), exposed to crude oil and its water-soluble fractions. *Journal of Fish Disease* 5: 13-35.
- Souza, Philip M., Jr. and Christopher Liese. 2019. Economics of the Federal For-Hire Fleet in the Southeast - 2017. NOAA Technical Memorandum NMFS-SEFSC-740, 42 p.
- Tarnecki, J.H. and W.F. Patterson III. 2015. Changes in Red Snapper Diet and Trophic Ecology. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 7: 135–147.
- Walter, J. 2011. Rerun of Gulf of Mexico red grouper assessment and projections with observer-derived discard estimates. NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, Florida. 19 p.
- Walter, J, M.C. Christman, J.H. Landsberg, B. Linton, K. Steidinger, R. Stumpf, and J. Tustison. 2013. Satellite derived indices of red tide severity for input for Gulf of Mexico gag grouper stock assessment. SEDAR33-DW08. SEDAR, North Charleston, SC, 43 pp.
- Whitehead, A., B. Dubansky, C. Bodinier, T. Garcia, S. Miles, C. Pilley, V. Raghunathan, J. L. Roach, N. Walker, R.B. Walter, C. D. Rice, F. Galvez. 2012. Genomic and physiological footprint of the Deepwater Horizon oil spill on resident marsh fishes. *Proceedings of the National Academy of Sciences* Dec 2012, 109 (50) 20298-20302
- Wilson, D., R. Billings, R. Chang, H. Perez, and J. Sellers. 2014. Year 2011 Gulf wide emissions inventory study. US Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2014-666.

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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. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

Bycatch is defined as fish harvested in a fishery, but not sold or retained for personal use. This definition includes both economic and regulatory discards. Economic discards are generally undesirable from a market perspective because of their species, size, sex, and/or other characteristics. Regulatory discards are fish required by regulation to be discarded, but also include fish that may be retained but not sold.

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

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

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

The red grouper fishery is currently regulated through a commercial individual fishing quota (IFQ) program, as well as measures such as quotas, size limits, bag limits, and seasonal/area closures. These measures are intended to protect red grouper during spawning and limit fishing mortality, while also specifying the size of fish that may be kept. However, these management tools have the unavoidable adverse effect of creating regulatory discards, which reduce yield from the directed fishery.

In this amendment, the Council is considering adjusting the red grouper allocation between commercial and recreational sectors to more accurately reflect historical recreational catch levels based on the best scientific information available, which was used in the 2019 stock assessment. In addition, the Council is considering revisions of the overfishing limit (OFL), allowable

biological catch (ABC), annual catch limits (ACL), and annual catch targets (ACT) based on the results of the 2019 stock assessment.

Red Grouper Release Mortality Rates

Discard mortality rates for red grouper in the most recent stock assessment (SEDAR 61 2019) were updated using NMFS observer data through 2017. SEDAR 61 (2019) estimated commercial discards using a weighted mean discard mortality rate based on the number of fishing sets in each depth bin. This method was previously employed in SEDAR 42 (2015).

In SEDAR 61 (2019), the commercial discard mortality in the Post-IFQ bottom longline fishery was estimated at 44.1% (+0.5% from SEDAR 42 2015), while the Pre-IFQ estimate remained at 41.4%. These values were calculated based on assumptions that 100% of fish that floated at the surface upon release suffer immediate mortality and 20% latent mortality for discards that re-submerge for each 10-m depth bin (i.e. 20% of fish that re-submerge in each depth bin are assumed to die). The discard mortality rates for each depth bin were combined using the weighted mean average based on the number of fishing sets in each bin.

In the commercial vertical line fishery, estimated discard mortality remained the same as in SEDAR 42 2015 at 19.0%. This value was based on the recreational hook-and-line gear depth-dependent discard mortality function from the 2014 FWC study (Sauls et al.) for live red grouper discarded in fishing depths between 41 meters and 50 meters, where the vertical line fishery primarily operates. This estimate assumes vertical line gear is fished similar to recreational hook-and-line gear (with regards to retrieval and handling time). Commercial observer data were used to select the mean fishing depth range for vertical line gear that is representative of the Gulf-wide fishery. Thus, this single mortality percentage was applied to estimated discards across regions in the Gulf.

The discard mortality rate used in SEDAR 61 (2019) for recreational discards was 11.6%, which remained unchanged from SEDAR 42 (2015). This estimate included all sources of latent discard mortality for fish that were able to re-submerge and those that were alive and floating after release. Dead discards were included in recreational landings estimates, and therefore, no immediate mortality was applied to recreational discards.

Estimates of red grouper release mortality used in SEDAR 61 (2019) were collected in a variety of ways, and mirrored the methods used in SEDAR 42 (2015). An ad-hoc panel convened during the SEDAR 42 (2015) Data Workshop to specifically discuss discard mortality and review new data and results from studies available since SEDAR 12 (2006), with the intent to formulate recommended mortality percentages to apply to estimated discards. Participants included data providers, analysts, and professionals from the fishing industry representing both commercial and private recreational sectors. For SEDAR 12 (2006), 10% discard mortality was recommended for both recreational hook-and-line gear and commercial vertical line gear, and 40% discard mortality was recommended for commercial bottom long-line gear. Two data sources that were explored between SEDAR 12 (2006) and SEDAR 42 (2015) are summarized here.

A Florida FWCC/FWRI (detailed by Sauls et al., 2014) study found that red grouper that re-submerged with assistance from venting (fair condition), and that demonstrated difficulty re-submerging or suffered internal hook injuries or gill injuries (poor condition) survived at lower rates (survival 82.7% and 60.9%, respectively) compared to fish that re-submerged on their own immediately without the need for venting (good condition). Point estimates for overall discard mortality across all depths fished were 10.4% and 12.9% in the charter fishery (for areas fished adjacent to Tampa Bay and the northwestern panhandle, respectively), and were comparable to the headboat fishery (9.7% to 13.8%, respectively per area). Confidence intervals for all four-point estimates overlapped, indicating that a single mean value may be applied across fleets and areas.

Pulver (2015) showed that red grouper retention rates in the commercial sector increased after implementation of the IFQ program in 2010, most likely due to the lowering of the commercial size limit to 18 in TL. Since 2006, NMFS has placed fishery observers on commercial vessels fishing with vertical line and bottom longline gears. Beginning in February 2009, increased observer coverage levels were directed at the bottom longline fishery in the eastern Gulf due to concerns regarding sea turtle interactions. Additionally, in 2011, increased funding allowed enhanced coverage of both the vertical line and bottom longline fisheries through 2014. The immediate discard mortality rate for red grouper was estimated by combining fish that were dead on retrieval or that were unable to re-submerge following release as a percentage of overall fish discarded (not including discards with unknown conditions). In the vertical line fishery, the mean immediate discard mortality rate (weighted based on the number of fishing sets for each depth bin) was 13.8%. Immediate discard mortality was higher in the bottom longline fishery (27.0% pre-IFQ; 29.5% post-IFQ), likely because these vessels typically fish in deeper depths than the vertical line fishery, and tend to have longer soak times.

Magnitude of Red Grouper Bycatch

Commercial discards are available by gear for trap, vertical line, and longline. Red grouper commercial dead discards were estimated beginning in 1990 with the implementation of federal minimum size limits. The numbers of discards for the commercial trap fishery were taken from red grouper stock assessments prior to SEDAR 61 (2019), since fish traps were banned in the Gulf of Mexico beginning in 2006.

During the SEDAR 42 (2015) Data Workshop, commercial red grouper discards for vertical line and longline were calculated using discard rates as reported by fisheries observers, with the discard rates multiplied by year-specific total effort reported to the coastal logbook program to estimate total discards. However, additional analyses were conducted post-SEDAR 42 (2015) due to concerns over the reliability of the logbook effort data, and as a result, commercial discards were re-estimated based on observed discard and kept rates from the NMFS Observer Program database. Even with the modifications during SEDAR 42 (2015), estimated commercial discards received considerable attention as they were substantially higher than previous assessments, but were maintained at the time due to anecdotal information supporting high discard fractions.

Prior to SEDAR 61 (2019), additional research was undertaken to investigate the methodology for calculating commercial discards, specifically by exploring available effort units for

estimating commercial discards. The general approach for estimating discards uses the Southeast Fisheries Science Center's (SEFSC) Reef Fish Observer Program (RFOP) and the Supplemental Discard Logbook (self-reported discard information). Catch per unit effort has been determined from the coastal observer program in which scientific observers on commercial fishing vessels recorded detailed information on catch and effort for a subset of trips. This investigation utilized data from the complete calendar years 2007-2017. RFOP observer coverage levels were not consistent through the years, with coverage levels ranging between 1% and 5% of sea days.

Total effort was determined from the commercial logbook program in which fishers reported basic information on effort and catch by species for every trip (complete calendar years 1993-2017). Logbook effort metrics were recorded at the trip level, whereas observer effort metrics were recorded at a finer scale (usually individual 'sets' within a trip). A suite of effort metrics recorded on commercial logbooks and collected by onboard observers were evaluated to identify unbiased and consistent effort variables between the two programs for carrying out the catch expansion.

In 2020, Pulver updated data (where available) from SEDAR 61 (2019) to further examine bycatch/discard patterns from 2012-2018 in IFQ fisheries (Grouper/Tilefish and Red Snapper). Despite the variations in coverage levels, RFOP data (accessed May 2019) are the best and most recent data available for the fishery. Commercial discards in numbers of red grouper are summarized in Table B.1.

Table B.1. Commercial vertical line and longline discards (number of red grouper) using the SEDAR 61 recommended approach.

Year	Vertical Line	Longline	Total	Year	Vertical Line	Longline	Total
1993	79,662	514,033	593,695	2006	146,203	506,568	652,771
1994	94,368	668,159	762,527	2007	150,881	405,702	556,583
1995	49,123	302,219	351,342	2008	127,661	480,530	608,191
1996	112,944	667,938	780,882	2009	219,006	153,431	372,437
1997	132,132	878,497	1,010,629	2010	198,729	177,525	376,254
1998	127,683	718,051	845,734	2011	290,423	346,979	637,402
1999	140,955	754,469	895,424	2012	178,703	402,936	581,639
2000	142,683	633,778	776,461	2013	96,399	209,867	306,266
2001	146,668	652,257	798,925	2014	59,449	324,659	384,108
2002	151,052	579,902	730,954	2015	86,568	195,727	282,295
2003	158,908	596,105	755,013	2016	96,899	242,272	339,171
2004	151,788	567,853	719,641	2017	71,658	216,046	287,704
2005	133,793	440,858	574,651				

Commercial longline fleet discards averaged 0.45 million pounds (mp) gross weight (gw) from 1990-2017, with a low of 0.08 mp gw in 2009 and a peak of 0.85 mp gw in 1993 (Figure B.1.).

Commercial vertical line fleet discards averaged 0.08 mp gw from 1990-2017, with a low of 0.02 mp gw in 2016 and a peak of 0.21 mp gw in 1990. Commercial trap fleet discards averaged 0.04 mp gw from 1990-2006, with a low of 0.01 mp gw in 1998 and a peak of 0.05 mp gw in 1995. Note that reef fish traps were banned in 2007.

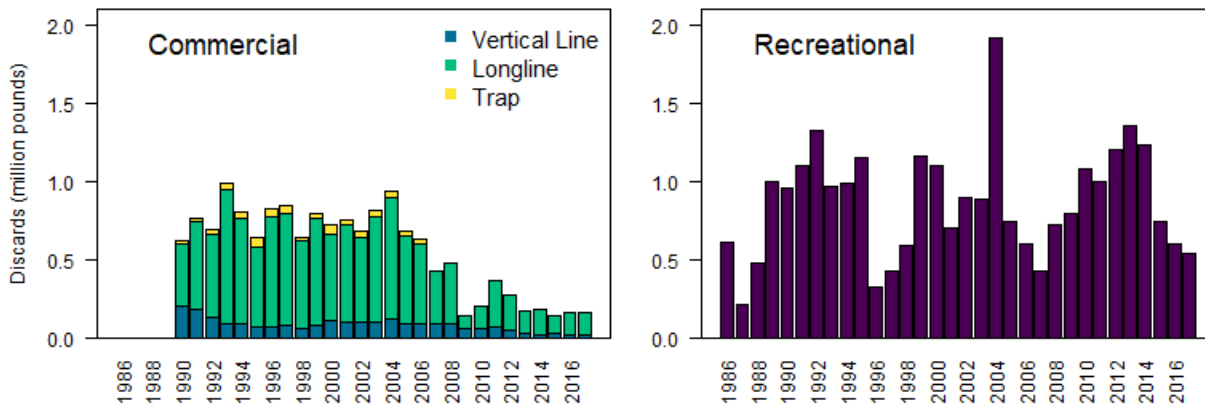


Figure B.1. Red Grouper dead discard estimates from SEDAR 61 (2019) assessment for commercial (left panel, by fleet) and recreational (right panel) fisheries in millions of pounds, 1986-2017.

Red Grouper recreational discards were derived from Marine Recreational Information Program (MRIP) estimates of live released fish between 1986 and 2017 and self-reported discards in the SRHS logbook since 2007 (Table B.1). Red Grouper discards from headboats for years prior to 2007 in Florida were estimated using the ratio of MRIP Charter to Southeast Region Headboat Survey (SRHS) discards as a proxy. Red Grouper recreational dead discard estimates averaged 0.87 mp gw from 1986 to 2017, with a low of 0.22 mp gw in 1987 and a peak of 1.92 mp gw in 2004 (Figure B.1.). This equates to about 15 % of the recreational removals and 27 % of the total dead discards of red grouper.

Table B.1. Recreational discards (number of Red Grouper) by fishing mode (using SEDAR 61 recommended approach).

Year	Charter	Headboat	Private	Total	Year	Charter	Headboat	Private	Total
1986	86,363	46,587	813,907	946,857	2002	228,016	63,624	3,909,476	4,201,116
1987	50,123	43,031	690,377	783,531	2003	343,210	136,745	3,752,560	4,232,515
1988	70,652	79,240	1,932,133	2,082,025	2004	423,964	160,995	7,512,527	8,097,486
1989	196,089	540,610	5,872,992	6,609,691	2005	248,419	92,489	2,701,327	3,042,235
1990	196,883	72,542	4,374,994	4,644,419	2006	123,352	32,695	2,220,260	2,376,307
1991	215,954	104,719	5,426,844	5,747,517	2007	111,913	17,365	1,599,693	1,728,971
1992	204,602	66,174	5,157,606	5,428,382	2008	367,994	89,615	6,294,612	6,752,221
1993	86,379	78,702	3,158,040	3,323,121	2009	398,022	153,829	6,276,296	6,828,147
1994	146,510	84,039	3,236,051	3,466,600	2010	497,987	117,879	5,379,955	5,995,821
1995	236,720	107,149	3,835,677	4,179,546	2011	433,964	134,114	6,021,306	6,589,384
1996	114,829	163,725	1,246,516	1,525,070	2012	464,256	117,809	4,392,740	4,974,805

1997	127,887	78,504	2,014,957	2,221,348	2013	620,479	112,266	4,895,361	5,628,106
1998	202,616	83,492	3,337,806	3,623,914	2014	435,470	84,237	4,293,342	4,813,049
1999	375,157	180,087	5,405,117	5,960,361	2015	326,901	74,376	2,550,817	2,952,094
2000	471,536	98,791	4,227,094	4,797,421	2016	322,165	79,409	2,164,044	2,565,618
2001	272,157	72,878	3,502,720	3,847,755	2017	299,920	73,658	2,202,611	2,576,189

Annually, the commercial sector dead discards averaged 0.6-0.9 mp gw of red grouper prior to IFQ implementation in 2009, and have been considerably lower since. Estimated red grouper discards for both commercial gears for the most recent years available (2012 through 2017) were some of the lowest of the time series. The number of discards dropped substantially beginning in 2013 with vertical line discards estimated under 100,000 fish through 2017. The lowest total number of discards in the entire time series was recorded in 2015. Some of the reduction in estimated discards from 2012 through 2017 is likely due to the reduction in the commercial minimum size limit from 20 to 18 inches total length in May 2009. The RFOP listed red grouper as the most common IFQ species observed with a relatively high percentage of 35% compared to other IFQ species (0-20.2%; Table B.2.). Data from the RFOP (2019) used to calculate the discard ratio (number discarded:one landed) stratified by year and gear found that less than one fish was being discarded for each fish being retained for almost all the time series, except in 2017 for longline and 2018 for both gears.

In addition to the number of self-reported discards per trip, the discard logbook attempts to quantify the reason why discarding occurs using four categories: 1) not legal size, 2) other regulation, 3) market conditions, and 4) out of season. For IFQ species, other regulation could include a lack of allocation. Using these categories, discard logbooks reported 97% of self-reported discards of red grouper were due to the minimum size limit from 2012-2018. Length data collected by the RFOP supports that the current minimum size limit is the principal reason discards were occurring from 2012-2018, although a small amount of discarding may have occurred due to lack of allocation.

The recreational fishery discards substantially more fish than the commercial fishery, averaging 4.14 million fish per year, versus approximately 600,000 fish/year in the commercial fishery. This difference is especially pronounced in the most recent 5 years (2013-2017), where commercial discards (~320k/year) have been less than a tenth of recreational discard (~3.71 million/year). Thus, despite a higher discard mortality rate in the commercial fishery (due largely to the bottom longline fishery), the recreational sector is responsible for more discards and more dead discards.

Table B.2. The number of captures and percentage for each disposition observed by the RFOP from 2012-2018 for IFQ species.

	Number Observed	Kept	Discarded
Red Grouper	283,879	64.9%	35.1%
Gag Grouper	14,570	79.8%	20.2%

Shallow-water Grouper			
Scamp	11,344	94.5%	5.5%
Black Grouper	298	87.6%	12.4%
Yellowmouth Grouper	83	91.6%	8.4%
Yellowfin Grouper	11	90.9%	9.1%
Deep-water Grouper			
Yellowedge Grouper	19,672	98.7%	1.3%
Snowy Grouper	3,268	98.7%	1.3%
Speckled Hind	1,205	88.0%	12.0%
Warsaw Grouper	205	100%	0.0%

Source: SEFSC RFOP (2019)

Other Bycatch

U.S. fisheries are classified under the Marine Mammal Protection Act according to the level of interactions that result in incidental mortality or serious injury of marine mammals. In the most recent List of Fisheries (84 FR 22051; May 16, 2019), the Gulf commercial reef fish fishery is listed as a Category III fishery under the Marine Mammal Protection Act. Category III contains fisheries where 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. The risk of serious injury or mortality to marine mammals resulting from the recreational sector of the reef fish fishery, which uses similar gear (i.e., handlines, rod and reel, spears, etc.), is also expected to be low, although interactions with dolphins are known to occur when dolphins prey on discarded fish (Powell and Wells, 2011).

NMFS has conducted specific analyses (“Section 7 consultations”) evaluating potential effects from the Gulf reef fish fishery, including the directed red grouper fishery, on sea turtles (as well as on other ESA-listed species and critical habitat) as required by the ESA. On September 30, 2011, the Southeast Regional Office (SERO) completed a biological opinion (Opinion), which concluded that the authorization of the Gulf reef fish fishery is not likely to jeopardize the continued existence of any sea turtles (loggerhead, Kemp’s ridley, green, hawksbill, and leatherback) (NMFS 2011). An incidental take statement was issued specifying the amount and extent of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes. The Opinion concluded that NMFS capture estimates produced using the NMFS (2005a) approach with updated data (i.e., 125 annual sea turtle captures or 375 sea turtles over any three-year period) is the most reasonable estimate of sea turtle captures in the recreational vertical line component of the Gulf reef fish fishery. In the commercial vertical line fishery, interactions are believed to be much lower, with an estimate 114 captures over any three-year period. The bottom longline fishery has a higher estimated sea turtle take, with NMFS estimating that in 2011 and subsequent years, a total of 208 turtles (204 loggerhead, 1 green, 1 hawksbill, 1

Kemp's ridley, 1 leatherback) would be taken on a yearly basis. On September 29, 2016, NMFS reinitiated consultation on the authorization of the Gulf reef fish fishery because new species (Nassau grouper and green sea turtle North Atlantic and South Atlantic distinct population segments) have been listed under the ESA that may be affected by the fishery. Since the consultation was reinitiated, three additional species that may be affected by the fishery have been listed under the ESA. These include the giant manta ray (2018), oceanic white tip shark (2018) and Bryde's whale (2019). This consultation is currently being conducted and results are not yet available.

Smalltooth sawfish are also adversely affected by the Gulf reef fish fishery, but are interacted with to a much lesser extent than sea turtles. Although the long, toothed rostrum of the smalltooth sawfish causes this species to be particularly vulnerable to entanglement in fishing gear, incidental captures in the commercial and recreational hook-and-line components of the reef fish fishery are rare events. Only eight smalltooth sawfish are anticipated to be incidentally caught every 3 years in the entire reef fish fishery, and none are expected to result in mortality (NMFS 2011). In the 2011 Opinion, NMFS concluded that the authorization of the Gulf reef fish fishery is not likely to jeopardize the continued existence of smalltooth sawfish. An incidental take statement was issued specifying the amount and extent of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes. Participants in this fishery are required to follow smalltooth sawfish safe handling guidelines.

NMFS determined that the following reasonable and prudent measures were necessary and appropriate to minimize stress and increase survival of sea turtles and smalltooth sawfish:

Avoiding and Minimizing Take Through Outreach and Education

Most, if not all, sea turtles and smalltooth sawfish released after capture experience some degree of physiological injury from forced submergence and/or abrasions/lacerations caused by hooking or entanglement. The ultimate severity of these events is dependent not only upon the actual capture, but the amount of gear remaining on the animal at the time of release. The handling of an animal also greatly affects its chance of recovery. Therefore, the experience, knowledge, ability, and willingness of fishers to remove gear is crucial to the survival of sea turtles and smalltooth sawfish following release. Certain behavior by fishermen may also help to reduce the likelihood of takes. For these reasons, NMFS shall conduct outreach and education to ensure that takes are avoided to the extent practicable and sea turtles and smalltooth sawfish are handled in a way that minimizes adverse effects from incidental take and reduces the likelihood of mortality.

Minimizing Future Gear Impacts through Research

Fishing gear and fishing behavior may influence the frequency and severity of interactions with sea turtles and smalltooth sawfish. However, fishing characteristics and behavior vary from vessel to vessel. To achieve a better understanding of how these characteristics differ and how these differences may affect sea turtles and smalltooth sawfish, NMFS shall conduct research to better characterize the fishery and its interactions with sea turtles and smalltooth sawfish.

Monitoring the Frequency, Magnitude, and Impact of Incidental Take

Monitoring and tracking both the level of take occurring specific to the reef fish fishery and the status of listed species are important aspects of sustainable management of protected species. NMFS shall ensure that monitoring and reporting of any sea turtles or smalltooth sawfish encountered: (1) detect any adverse effects resulting from the Gulf reef fish fishery; (2) provide an assessment that confirms the ITS has not been exceeded, and if the ITS may have been exceeded, determine the actual level of incidental take in comparison with the anticipated incidental take, and (3) collect improved data from individual encounters.

The Council originally addressed protected species bycatch in Amendment 18A to the Reef Fish FMP (GMFMC 2005b), which established regulations to minimize stress to endangered species incidentally caught in the reef fish fishery. Since then, the Council and NMFS have implemented several other actions aimed at reducing sea turtle bycatch and enhancing survival of captured turtles including:

- Reef Fish Amendment 31 (75 FR 21512, 4/26/2010)- Established a longline endorsement requirement; restricted fishing to outside the 35-fathom depth contour from June – August; and limited vessels to 1000 hooks onboard, of which only 750 could be rigged at any time. The 1000 hook limitation was removed in a 2018 framework action (83 FR 5210, 2/26/2018), but the limitation on the 750 hooks rigged at any time remains in place.
- Reef Fish Amendment 49 (84 FR 25009, 5/30/2019)- Added three new sea turtle release and handling devices; updated requirements for several previously approved devices for clarity; and allowed changes to handling/release gear requirements to be made through the Council's Framework process.

There are three primary orders of seabirds present in the Gulf including Procellariiformes (petrels, albatrosses, and shearwaters), Pelecaniformes (pelicans, gannets and boobies, cormorants, tropic birds, and frigate birds), and Charadriiformes (phalaropes, gulls, terns, noddies, and skimmers) (Clapp et al., 1982; Harrison, 1983). Several other bird species also occur in the Gulf, and are listed as threatened or endangered by the U.S. Fish and Wildlife Service, including piping plover, roseate tern, and brown pelican (the brown pelican is endangered in Mississippi). Human disturbance of nesting colonies and mortalities from birds being caught on fishhooks and/or entangled in monofilament line are primary factors affecting seabirds. Oil or chemical spills, erosion, plant succession, hurricanes, storms, heavy tick infestations, and unpredictable food availability are other threats. There is no evidence that the directed grouper fishery adversely affects seabirds.

Other species of reef fish are also incidentally caught and often intentionally targeted when targeting red grouper. Gag or black grouper may be targeted or incidentally captured on trips targeting red grouper. In the eastern Gulf, scamp and other shallow-water grouper (SWG; grouping includes black grouper, scamp, yellowfin grouper, and yellowmouth grouper), red snapper, greater amberjack, and vermilion snapper are also caught when targeting red grouper. Neither black grouper nor gag are overfished or are undergoing overfishing (SEDAR 19, 2010 and SEDAR 33 Update, 2016, respectively). Vermilion snapper are not overfished or undergoing overfishing (SEDAR 67, 2020) and bycatch is not expected to jeopardize the status of this stock. Greater amberjack (SEDAR 33 Update 2016) are overfished but are not undergoing overfishing. Greater amberjack release mortality is estimated to be fairly low, ranging from 10% to 20%. Discards are slightly higher for commercially caught greater

amberjack than they are for recreationally caught greater amberjack because of differences in minimum size limits (36 inches FL commercial vs. 34 inches FL recreational). Because greater amberjack are pelagic and grouper are bottom fish, bycatch of greater amberjack is relatively low when fishing for red grouper and likely not greatly affected by changes in grouper management measures. Red snapper are not overfished or undergoing overfishing, but are under a rebuilding plan because stocks are below targeted population levels (SEDAR 52, 2017). Red snapper have been increasing in abundance in the eastern Gulf over the past two decades and fishermen have indicated they are discarding more red snapper. Most commercial grouper fishermen in the eastern Gulf were allocated few red snapper IFQ shares and therefore are unable to retain large quantities of red snapper when fishing for grouper (GMFMC, 2008c). Bycatch is a significant source of mortality in the red snapper fishery, resulting in the Council approving actions in Amendment 27/14 to reduce directed fishery bycatch such as the requirement to carry dehooking devices and venting tools as well as use circle hooks (note the venting tool requirement was rescinded in a 2013 framework action). The status of other shallow-water grouper species are unknown. Bycatch is not known to be significant for other SWG and deep-water grouper species, since many (e.g., yellowmouth grouper, rock hind, scamp, and red hind) have no or small minimum size limits (e.g. scamp – 16 inches TL).

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

Bycatch and bycatch mortality can negatively affect a stock by reducing the number of fish that survive and become susceptible to harvest. Fishery management regulations are intended to constrain effort and control fishing mortality, but in some cases increase bycatch or bycatch mortality. When proposing fishing regulations, managers must balance the competing objectives of maximizing yield, ending overfishing, and reducing bycatch to the extent practicable.

The following describes current management measures and their relative impact on bycatch and bycatch mortality in the directed red grouper fishery. The commercial red grouper fishery is managed under an IFQ program, whereby catch shares are allocated among shareholders with measures to prevent fishermen from harvesting more than their individual allocation. The fishery also has gear restrictions and requirements, seasonal management measures (requirement for longline vessels to fish outside 35 fathom contour from June through August and outside 20 fathom contour for the rest of the year), and minimum size limits. The recreational red grouper fishery is managed with size limits, bag limits (four grouper aggregate bag limit of which two can be red grouper), gear restrictions, and a closed season from February 1 through March 31 where SWG cannot be possessed if captured in waters beyond the 20-fathom contour. There are also several restricted fishing areas intended to protect reef fish (in particular gag) spawning aggregations.

Size limits

Size limits are the greatest factors contributing to bycatch in the red grouper IFQ fishery (Pulver & Stephen, 2019). Currently, there is an 18-inch total length (TL) commercial and a 20-inch recreational red grouper minimum size limit. There are also minimum size limits for gag (24-inch TL minimum size limit for both the recreational and commercial), black grouper (24-inches TL), yellowfin grouper (20-inches TL), and scamp (16-inches TL). Recent analysis of observer

data from 2012-2018 indicate that over 99% of all commercially discarded red grouper and gag are discarded due to regulations. The minimum size limit is the primary regulatory reason cited for discarding red grouper (97.0% of discards), gag (54.3%), and other SWG (46.4%-89.2%) in the commercial sector. Size limits are also the primary reason for red grouper discards in the recreational red grouper sector. Size limits are intended to protect immature fish and reduce fishing mortality. The red grouper minimum size limit in the commercial sector is similar to the size at 50% maturity (~16- 20 inches; Moe 1969; Collins et al. 2002). Gag minimum size limits are at or slightly above the size at 50% maturity (~21 inches; SEDAR 33 Update 2016). Sizes at maturity for black grouper, yellowfin grouper, and scamp are 33 inches TL (NMFS 2005), 20 inches TL (Cummings, 2007), and 14 inches TL (NMFS 2005), respectively. Size limits for yellowfin grouper and scamp are at or above the size at 50% maturity, while the size limit for black grouper is below the size at 50% maturity.

SEFSC conducted analyses (Ortiz 2007; Walter 2007) for gag and red grouper to identify the sizes that best balance the benefits of harvesting fish at larger sizes against losses due to natural mortality. Walter (2007) found that yield per recruit (YPR) would increase as minimum size decreased for the red grouper commercial sector, but that there would be a corresponding decrease in spawning per recruit (SPR). By reducing the red grouper size limit from 20 to 18 inches, the study predicted an increase in YPR of 2.6%, and a corresponding decrease in SPR of 1.5 percent. Observer data collected onboard reef fish vessels during 2006 and 2007 supported the findings of Walter (2007), suggesting that red grouper longline discards would be reduced by approximately 38%, and handline discards would be reduced by approximately 33 percent upon reduction of the size limit to 18-inches TL. Other analyses indicated that a reduction in size limit would reduce discard mortality by reducing the number of fish released after catch. Coggins et al. (2007) found minimum size limits did not help fisheries for long-lived low-productivity species, such as groupers, achieve sustainability if discard mortality exceeded five percent. Rudershausen et al. (2005) also concluded minimum size limits are only moderately effective for reef fish caught in shallower portions of their depth ranges, and nearly ineffective in deep waters.

A comparison of discards in the five year prior to the reduction in the commercial size limit from 20 to 18 inches (2004-2008) to the most recent 5 years available (2013-2017) reveals a vast decrease in discards in both the vertical line fishery (average decrease from 142,100 to 82,200 fish) and the longline fishery (480,300 to 237,700 fish). The reduced minimum size is believed to be the primary reason behind this decrease.

Closed Seasons and Quota Closures

The commercial sectors of the Gulf reef fish fishery for groupers (including deep water grouper (DWG) and SWG) is managed under an IFQ program composed of four share categories: red grouper, gag, DWG (which includes yellowedge grouper, warsaw grouper, snowy grouper, speckled hind, and scamp) and SWG (which includes black grouper, scamp, yellowfin grouper, yellowmouth grouper, warsaw grouper, and speckled hind). IFQ shares are assigned to shareholders in percentages of the annual commercial quotas for DWG, red grouper, gag, and Other SWG, based on their applicable historical landings. Shares determine the amount of IFQ allocation for Gulf groupers (in pounds gutted weight) a shareholder is initially authorized to

possess, land, or sell in a given calendar year. Fishing is open to shareholders throughout the fishing year, provided they have allocated quota available to them. For more information on the IFQ program, see the NMFS's Southeast Regional Office Catch Shares webpage at <http://portal.southeast.fisheries.noaa.gov/cs/main.html>.

Discards by individual fishermen who have exhausted their red grouper annual allocation are not thought to be significant in the commercial sector, as several measures are available that may allow catch after harvested after a shareholder has exhausted their annual allocation (Pulver & Stephen, 2019). Both red grouper and gag have a “multi-use allocation,” which allows for, under certain conditions, continued harvest of either species after an IFQ account holder's allocation for that species has been landed and sold, or transferred. This allocation is intended to reduce bycatch of both red grouper and gag by allowing fishermen to retain catch that they would otherwise be required to release as bycatch. In addition, shareholders that have exhausted their annual allocation are permitted to purchase additional annual allocation from other entities with annual allocation. This provision allows fishermen to retain catch that would otherwise be required to be released as bycatch.

The recreational SWG fishery is closed from February 1 through March 31 in waters beyond the 20-fathom contour (the recreational gag fishery is closed in Gulf waters from January through May). This closed season was originally implemented for the recreational sector in all Gulf waters, but was modified in a 2012 framework to apply only in waters deeper than 20 m as specified by NMFS. The closure is intended to protect SWG (especially gag, black, and red grouper) during spawning. The closure is intended to reduce bycatch, since these species are commonly caught in the same areas and habitat. Closed season discards are not believed to be significant in the recreational red grouper sector, as closures of other species that often occupy similar habitats (e.g. other SWG, gag) occur simultaneously. Anglers are more likely to fish in other areas (i.e. less likely to be occupied by red grouper and other SWG) when the red grouper season is closed.

Bag and Trip Limits

The recreational SWG fishery is regulated by a 4-grouper aggregate bag limit, which may not include more than 1 speckled hind, more than 1 warsaw grouper, more than 2 red grouper, or more than 2 gag. Recreational red grouper discards are primarily the result of the capture of undersized fish prior to reaching the bag limit, and the targeting of other reef fish in areas where red grouper are present after the red grouper bag limit has been reached. In addition, some fishers may discard legally sized fish in effort to catch larger fish of the same species (high-grading). High-grading is thought to be underreported in fisheries worldwide (Batsleer et al., 2016), and its prominence in the Gulf red grouper fishery is unknown. However, discards of legal-size grouper occur less frequently at larger sizes, indicating that high-grading may occur.

Allowable Gear

Vertical hook-and-line gear (bandit rigs, manual handlines) and bottom longlines are the primary gears used in the commercial grouper sector. Fish traps accounted for a small portion (generally 10-15%) of grouper catch prior to 2007, when they were prohibited in federal waters of the Gulf of Mexico. In 2008, regulations were implemented requiring commercial and recreational

fishermen to use circle hooks, venting tools, and dehooking devices when harvesting reef fish in the Gulf of Mexico. Circle hooks were commonly used in the commercial grouper industry prior to implementation of this new regulation. In a 2013 framework, the venting tool requirement was rescinded. It is unknown how extensively dehooking devices were used prior to these new gear requirements.

Longlines account for a majority of the red grouper commercial discards. From 2013 through 2017, approximately 74 percent of red grouper commercial discards were from the bottom longline fishery (see Table B.2 above). In addition, the bottom longline has a higher estimated discard mortality rate at 44.1 percent (post-IFQ; SEDAR 62 2019), so this fishery contributes to a proportionally higher percentage of red grouper dead discards, as well as to dead discards of other reef fish species.

Recreational discards are primarily due to the recreational size limit, but allowable gears can affect release mortality rates. Rod-and-reel is the primary gear used in the recreational sector. Circle hooks are required gear for all hook and line anglers to harvest grouper and other reef fishes. Brulé et al. (2015) found that larger circle hooks caught significantly larger sizes of red grouper. Garner et al. (2020) also projected that larger circle hooks could modestly increase retained catch while drastically reducing the number of discarded fish. We don't currently have adequate information on the size of circle hooks used by anglers in the Gulf or on the affect that has on bycatch of undersized species. Recreational anglers also use spears to capture grouper. Spearfishing does not affect release mortality since all fish caught are killed. Only undersized grouper mistakenly killed while spearfishing would contribute to dead discards.

No gear restrictions are proposed in this amendment to further limit bycatch or bycatch mortality of reef fishes, including grouper.

Time/Area Closures

The Council created two restricted fishing areas to specifically protect spawning aggregations of gag in 2000. The Madison-Swanson and Steamboat Lumps marine restricted fishing areas are located in the northeastern Gulf of Mexico at a depth of 40 to 60 fathoms. Both areas prohibit bottom fishing and possession of Gulf reef fish (except during transit under certain conditions). The Council and NMFS are currently considering more stringent regulations in these areas that would prohibit trolling (except for HMS species) and possession of reef fish at all times. All fishing is also prohibited in the Tortugas marine reserves in the southern Gulf of Mexico near the Dry Tortugas. Marine reserves and time/area closures benefit fish residing within reserve boundaries by prohibiting their capture during part or all of the year. Within marine reserves, fish that are undersized potentially have an opportunity to grow to legal size without the threat of being captured by fishing gear. If these fish emigrate from the marine reserve (i.e., spillover effect), then they may be caught as legal fish outside the reserve, thereby reducing bycatch. However, anglers and commercial fishermen may redistribute their effort to areas surrounding the marine reserve. If fishing pressure in these areas is increased, then any benefits of reduced bycatch of fish in the marine reserve may be partially or fully offset by increases in bycatch of fish residing outside the marine reserve.

In addition, the Council created several seasonal restrictions to protect red grouper. Commercial fishermen with a bottom longline endorsement must fish outside the 35-fathom contour from June – August (must fish outside 20 fathom contour the rest of the year). The recreational red grouper fishery has a seasonal closure each year from February 1 through March 31.

Alternatives being considered to minimize bycatch

No measures are proposed in this amendment to directly reduce the bycatch of red grouper and other species. However, the choice of alternatives in Action 1 is likely to impact the amount of bycatch. **Alternative 2** would result in an increase in the commercial ACL and a decrease in the recreational ACL. A decrease in the recreational red grouper ACL (as proposed in Action 1, **Alternative 2**) is likely to indirectly reduce bycatch, as it is expected to result in reduced effort in the recreational sector. The recreational sector is responsible for higher levels of bycatch and bycatch mortality than the commercial sector, and thus the reduced effort and catch in this sector is expected to reduce bycatch and mortality. Although the commercial ACL would increase under **Alternative 2**, the increase is outweighed by the larger decrease in the recreational sector ACL (where bycatch is higher), and thus **Alternative 2** is expected to result in a net decrease in bycatch and bycatch mortality. **Alternatives 3-5** in Action 1 would result in a decrease in both the recreational and commercial ACL, which is expected to reduce bycatch and bycatch mortality. **Alternative 6** would implement an ACL that is in between **Alternative 2** and **Alternatives 3-5**. The commercial ACL would remain the same as it is currently (3.16 mp), and the recreational ACL would be higher than **Alternative 2**, but lower than **Alternatives 3-5**. Because the commercial ACL would not change, there is expected to be no change in impact on bycatch species in the commercial fishery. The decrease in recreational quota under **Alternatives 2-6** is expected to result in a corresponding decrease in overall bycatch and bycatch mortality, although this decrease may be partially mitigated by an increase in regulatory discards by reef fishermen targeting other species.

The alternatives in Action 2, which set the ACT for the commercial and recreational sector, are expected to have only minor impacts on bycatch. Alternative 1 (no action), which would maintain the buffers currently in place, would have no impact beyond that discussed above in Action 1. **Alternative 2** would have the largest impact of the three alternatives, as it would eliminate the commercial buffer (from 5%). Elimination of the 5% buffer would in effect negate the multi-use provision in which red grouper can be captured and kept while fishing for gag. If this buffer is eliminated, then all red grouper captured in the gag fishery (by those without available red grouper shares) would be required to be released. This would result in greater bycatch of and mortality of red grouper. Both **Alternatives 2** and **3** would increase the recreational buffer from 8% to 9%, but the relatively small scope of the additional buffer is expected to have minor to negligible impacts on bycatch.

Practicability Analysis

Criterion 1: Population effects for the bycatch species

Measures being considered in this action would 1) modify the allocation of red grouper catch among the recreational and commercial fisheries and set the OFL, ABC, and ACLs (Action 1),

and 2) set the ACTs for the commercial and recreational sectors (Action 2). These actions are intended to ensure that the historical participation by the recreational and commercial sectors are accurately reflected and that recreational catch levels are consistent with the data used to monitor recreational landings and trigger accountability measures.

The impact on populations of red grouper as a result of the measures considered in this action are likely to be both positive and negative. Action 1 includes alternatives that either maintain current sector allocations percentages (**Alternatives 1 and 2**) or decrease the commercial allocation percentage with a corresponding increase recreational sector allocation percentage (**Alternatives 3-6**). **Alternative 1** (No Action) is not a legally defensible option, so will not be analyzed here. **Alternatives 2-6** would update the recreational ACL to MRIP-FES units as opposed to MRIP-Coastal Household Telephone Survey (CHTS) units. The MRIP-FES dataset is a more accurate representation of actual catch by the recreational sector. Because recreational catch estimates are higher under MRIP-FES than they were under MRIP-CHTS, there is a resultant increase in recreational and decrease in commercial sector allocation percentages under **Alternatives 3-6**, which would likely affect red grouper bycatch rates and totals.

Alternative 2 would maintain the current percentages used for sector allocations, but would update the OFL, ABC, and ACL based on SSC recommendations, which are derived from the projections that use the MRIP-FES time series of recreational landings. Therefore, **Alternative 2** would implement a slightly higher total ACL and a substantially higher commercial ACL than any other alternative (including the no action), while also resulting in the largest decrease in the recreational ACL. Because the recreational sector is responsible for greater red grouper bycatch/mortality than the commercial sector, **Alternative 2** would have more positive impacts on the populations of red grouper than the other alternatives. Because the recreational quota would be substantially reduced (by ~44%), it is expected to result in a reduction in recreational fishing effort for red grouper, and thus a decrease in bycatch/mortality of red grouper. This beneficial impact could be partially offset by an increase in regulatory discards that could occur when red grouper are captured by fishermen targeting other species. Although the commercial ACL would increase (by ~15%), the increase would be small relative to the decrease in the recreational ACL, and would still be expected to result in a net reduction in bycatch from the current rate. In addition, when compared to other recent years, the ACL (and thus expected bycatch) will be substantially lower, and would be expected to result in greatly reduced bycatch of red grouper when compared to levels from the recent past.

Alternatives 3-5 in Action 1 are very similar (a 1.2% difference in quota allocation is the largest disparity), and differences between them are likely insignificant in how they would affect populations of bycatch species. However, each of the three action alternatives would likely result in a decrease in bycatch and in dead discards of red grouper when compared to current management. Each of these alternatives would have a lower ABC and ACL due to the higher discard and discard mortality in the recreational sector. A decrease would occur because the action alternatives would decrease both the recreational ACL (by 0.37-0.40 mp) and the commercial ACL (by 0.56-0.63 mp). The decreases in both quotas are expected to result in a corresponding decrease in red grouper bycatch and bycatch mortality.

Alternative 6 would implement an ACL that is in between **Alternative 2** and **Alternatives 3-5**. The commercial ACL would remain the same as it is currently (3.16 mp), and the recreational ACL would be higher than **Alternative 2**, but lower than **Alternatives 3-5**. Because the commercial ACL would not change, there is expected to be no change in impact on red grouper bycatch in the commercial fishery. The decrease in recreational quota under **Alternative 6** is expected to result in a corresponding decrease in red grouper bycatch and bycatch mortality, although this decrease may be partially mitigated by an increase in regulatory discards by reef fishermen targeting other species.

All alternatives in Action 2 are likely to have similar and negligible impacts on red grouper bycatch in the recreational sector. All of the Action 2 alternatives would either maintain or slightly increase the recreational buffer (by 1%, or 11,800-17,300 lb). In spite of relatively high bycatch rates in the recreational sector, the potential increase in the buffer is small relative to the ACL, especially when compared to the higher red grouper ACLs in recent years. Thus, none of the recreational buffers in the Action 2 alternatives are likely to appreciably impact the populations of red grouper.

The alternatives in Action 2 are likely to have impacts on red grouper populations in the commercial sector that range from negligible to slightly negative. **Alternatives 1 and 3**, which would maintain the current 5% buffer in the commercial sector, are expected to have negligible impacts on red grouper bycatch as they are not expected to increase bycatch compared to current levels. **Alternative 2**, which would eliminate the 5% commercial buffer, is likely to have negative impacts on bycatch, but more so for gag grouper than red grouper. 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, which is equal to the difference between each species' ACL and the ACT. The intent of the multi-use provision is to provide for allocation if either gag or red grouper are landed as incidental catch. If this buffer is eliminated, then all gag grouper captured in the red grouper fishery (by those without available gag grouper shares) would be required to be released. This would result in greater bycatch of and mortality of gag grouper.

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

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. The most recent red grouper stock assessment (SEDAR 61 2019) indicates that although the red grouper stock in the Gulf of Mexico is not overfished nor undergoing overfishing, it remains below the target spawning stock biomass (SSB) in 2017.

Alternatives in Action 1 of this amendment vary, but all of the alternatives are expected to have a similar impact on fishing mortality for red grouper. Increases in the recreational ACLs in **Alternatives 3-6** relative to **Alternative 2** are only due to how catch is estimated in the recreational sector, and none of the alternatives is expected to result in greater landings of red grouper. However, as explained in criterion 1 above, **Alternative 2** is likely to result in lower

bycatch because of the higher allocation to the commercial sector over the recreational sector, and the decrease in allocation to the recreational sector. However, this may be partially offset by regulatory discards of red grouper by fishermen targeting other species during the closed season. **Alternative 2** does increase the commercial ACL from current management, but the increased bycatch expected from the higher ACL is expected to be outweighed by the decrease in the recreational bycatch associated with that lower ACL. In addition, when compared to the substantially higher ACLs in the red grouper fishery (and likely bycatch totals) in the recent past, any impacts of **Alternative 2** are expected to be relatively minor. **Alternatives 3-6** are expected to decrease fishing effort and catch/mortality for bycatch species by decreasing the ACL to both the recreational and commercial sectors of the fishery.

With regard to recreational fishing, all alternatives in Action 2 are likely to have similar and negligible ecological impacts. These alternatives would either maintain or slightly increase the recreational buffer. Although the recreational sector has high bycatch, the 1% increase in the recreational buffer (**Alternatives 2 and 3**) is small relative to the ACL, especially when compared to the higher ACLs in the red grouper fishery in recent years. The recreational buffers in the Action 2 alternatives are likely to maintain or nominally reduce fishing effort, and are unlikely to have appreciable ecological effects.

With regard to commercial fishing, the alternative in Action 2 are likely to have ecological impacts that range from negligible to slightly negative. **Alternatives 1 and 3**, which would maintain the current 5% buffer in the commercial sector, are expected to have negligible ecological impacts as they are not expected to increase catch, bycatch, or alter fishing practices (beyond the potential impacts discussed in Action 1). **Alternative 2**, which would eliminate the 5% commercial buffer, is likely to have slightly negative ecological impacts. This is because elimination of the 5% buffer would in effect negate the multi-use provision in which gag grouper can be captured and kept while fishing for red grouper. If this buffer is eliminated, then all gag grouper captured in the red grouper fishery (by those without available red grouper shares) would be required to be released. This would result in greater bycatch of and mortality of gag grouper, which may have slightly negative ecological impacts.

SEDAR 61 (2019) projected that biomass for red grouper is estimated to increase until 2020, after which stocks may decline due to the diminishing size of the large 2013 recruitment year class. Additionally, much is unknown about the effect that the 2018 red tide event had on red grouper populations. The model that the SSC used for projections assumed a mortality rate similar to the 2005 event. However, another scenario that was modelled in the assessment that assumed higher mortality in the 2018 red tide event resulted in a greatly increased probability of overfishing. In spite of this, the best science available supports that the proposed alternatives for OFL, ABC, ACL, and ACT would result in stable or increased red grouper stocks. Because red grouper stocks are currently lower than recent and historic high levels, it is unlikely that any population increases resulting from this amendment would be substantively detrimental to other species. However, it is possible that forage species and competitor species could decrease in abundance in response to an increase in grouper abundance. Changes in the bycatch of red grouper is not expected to directly affect other species in the ecosystem. Although birds, dolphins, and other predators may feed on grouper discards, there is no evidence that any of these species rely on grouper discards for food.

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

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. Other SWGs, gag, snappers, greater amberjack, gray triggerfish and other reef fishes are commonly caught in association with red grouper (Scott-Denton et. al, 2011). Most of these species are not undergoing overfishing and are not overfished, with the exception of greater amberjack (overfished/undergoing overfishing). Because greater amberjack are pelagic, they are uncommonly captured when fishing for demersal species such as SWG and red grouper. Regulatory discards significantly contribute to fishing mortality in all of these reef fish fisheries, except gray triggerfish and vermilion snapper.

No measures are proposed in this amendment to directly reduce the bycatch of other reef fish species. However, changes in the commercial red grouper ACL and ACT are likely to indirectly affect bycatch totals. Each alternative in Action 1 is likely to result in reduced overall bycatch due to decreased recreation fishing effort for red grouper. However, this reduction may be partially mitigated by regulatory discards of red grouper that are captured by fishermen targeting other reef fish species. Likewise, alternatives in Action 2 are expected to result in decreased bycatch, except that **Alternative 2** is likely to result in greater bycatch/mortality of red grouper. However, none of the alternatives in Action 2 are likely to result in increased bycatch/mortality of other fish or invertebrates. In any case, due to the relatively modest proposed changes in ACL and ACT in any of the alternatives, the effect of any alternative on bycatch and bycatch mortality of other species of fish and invertebrates, and resulting population and ecosystem effects, are expected to be minimal and positive.

Criterion 4: Effects on marine mammals and birds

The effects of current management measures on marine mammals and birds are described above. Bycatch minimization measures evaluated in this amendment are not expected to significantly affect marine mammals and birds. There is no information to indicate marine mammals and birds rely on grouper for food.

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

If the red grouper commercial sector allocation is reduced relative to the recreational sector, it would result in a reduction in allocation for commercial fishermen and is thus expected to result in economic loss. However, the economic loss to commercial fishermen may be partially offset by increased market prices as a result of the decrease in domestic harvest and supply.

Recreational anglers would be allotted similar or slightly decreased levels of catch through this action, so it is unlikely to have a substantive negative effect on that sector. In general, changes to the ACTs in Action 2 are small in scope relative to current management levels, and are unlikely to result in appreciable economic loss or gain. However, **Alternative 2** of Action 2, which would eliminate the commercial buffer, would result in reduced revenue for gag fishers who do not have red grouper annual allocation because they would be required to release all captured red grouper. For a more complete discussion of the changes in fishing costs associated with the various management actions, see Section 3.4 of this document.

Criterion 6: Changes in fishing practices and behavior of fishermen

Measures proposed in this action are expected to have negative impacts on fishing practices for recreational red grouper anglers. All of the alternatives in Action 1 (except for the No Action- which is not legally viable) would set recreational catch limits that are reduced from current measures. Each of these alternatives would require monitoring the recreational landings in MRIP-FES currency. As explained previously in Section 1.1 of this document, this currency is more than double MRIP-CHTS currency which is currently used in management. Thus, even though the recreational ACL values would increase over the No Action alternative, it would equate to a reduction in recreational ACL no matter the alternative selected. **Alternative 2** would result in the greatest reduction to recreational component (~44%) while **Alternatives 3-6** would result in more modest reductions (~21-31%). Thus, any of the alternatives are likely to reduce fishing opportunities, effort, and landings in the recreational sector.

Measures proposed in this action could also result in changes to fishing practices and behavior of commercial fishermen. **Alternative 6** would maintain the current commercial allocation, and thus is not expected to impact commercial fishing practices or behavior. **Alternative 2** would increase the commercial ACL, and would provide larger IFQ shares for the commercial sector. This increase would potentially result in greater fishing effort and increased landings. However, because the increase would be small in scope, it is not expected to appreciably change fishing practices and behavior beyond a modest increase in effort. The reduced allocations for the commercial sector proposed in **Alternatives 3-5** are expected to result in reduced annual allocation for those with IFQ shares. These shareholders would have a smaller quota which is expected to reduce effort and may affect decisions about when and where to fish. These shareholders are likely to spend additional time targeting other fish species. In addition, these shareholders may choose to fish only when red grouper market prices are high in attempt to maximize profits from their reduced allocation. While all impacts of the reduced commercial allocation are not known, these are a few of many potential changes in fishing practices and behaviors that could occur.

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

Proposed measures are not expected to significantly impact administrative costs. The impetus for implementing changes in allocation between the recreational and commercial sectors is to more accurately reflect what has been occurring in the fishery. None of the actions are expected to diminish regulatory effectiveness.

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

Constraining red grouper catch to the ACLs is expected to positively benefit the red grouper stock by reducing the likelihood of overfishing and increasing the ABC and ACL in the future. However, if allocation to the commercial sector is reduced, it is likely to reduce profits and potentially shift fishing effort to other species and fisheries. Any reduction in bycatch may result

in an increase in the red grouper stock, which will positively affect the social and economic value of fishing activities. For a more complete discussion, see sections 3.4 and 3.5 and sections 4.1.3, 4.2.3, 4.1.4, and 4.2.4 of this document.

Criterion 9: Changes in the distribution of benefits and costs

Currently, the red grouper ACL is split between the commercial sector (76% of the allocation) and the recreational sector (24%) of the allocation. This ratio was developed based on historical catch from each sector using the best data available at the time. However, new data collection techniques in the recreational sector, have resulted in revised estimates of recent and historic recreational catch. This action would consider revising the commercial/recreational allocation ratio based on this new technique.

Alternative 2 is expected to result in net long-term economic benefit to the commercial fishery and reduced benefits to the recreational sector, while Alternatives 3-5 are expected to result in net long-term economic reductions in benefits to both the commercial and recreational sector, although the reductions to the recreational sector would be less than under Alternatives 2. Alternative 6 would result in no change in economic benefit to the commercial fishery, but would reduce economic benefits to the recreational sector (the reduction in benefits would be about midway between that of Alternative 2 and that of Alternatives 3-5). The recreational sector discards a much larger amount of red grouper as bycatch, but the increases in recreational allocation are accompanied by a decrease in overall ACL to mitigate the effects of the increased bycatch. The allocation splits proposed in **Alternatives 3-5** (and to a lesser extent **Alternative 6**) are more representative of tradition and recent fishery harvest. If the change in allocation results in an increase in the red grouper stock relative to the current population level, there would be longer-term economic benefits to both the recreational and commercial sectors. However, Alternatives 3-5 may be perceived by the commercial sector as inequitable, since the total commercial sector ACL would be reduced (thus decreasing pounds of allocation for shareholders) relative to the recreational sector. This is likely to reduce profits in the commercial sector, especially in the short-term, and may result in a shift in focus to fishing for other species.

Criterion 10: Social effects

Bycatch is considered wasteful because it reduces overall yield obtained from the fishery. Because this action is expected to indirectly reduce bycatch and mortality, it will increase efficiency, reduce waste, and benefit stocks, thereby resulting in net social benefits. Higher recreational catch limits should have positive social effects, while reduced commercial catch limits, and the resulting economic loss to the commercial sector, are likely to have negative social effects.

CONCLUSIONS

Analysis of the ten bycatch practicability factors indicates there would likely be neutral to low positive biological impacts associated with reallocating catch among the recreational and commercial sectors by further reducing bycatch and bycatch mortality in the directed grouper fishery. This reallocation is intended to more accurately follow historical catch rates, and the implementation of new catch levels will reduce overall catch in the fishery, including both targeted catch and bycatch. The main benefits of reducing grouper bycatch are: 1) less waste and

2) increased yield in the directed fishery. Reducing discards and discard mortality rates would result in less forgone yield. Reducing red grouper ACLs is expected to reduce bycatch and discard mortality. The benefits of the ACL reduction on red grouper bycatch may be partially offset by the regulatory discards that would occur by fishermen that target other species and catch red grouper after the closure. There are likely to be negative social and economic effects to the commercial sector, stemming largely from the expected reduction in income that is likely if this Amendment is implemented. The Council will have to weigh the benefits of reducing bycatch with the negative social and economic effects that the commercial sector would face.

Additional Citations

Thierry Brulé, T., J. Montero-Muñoz, N. Morales-López and A. Mena-Loria. 2015. Influence of Circle Hook Size on Catch Rate and Size of Red Grouper in Shallow Waters of the Southern Gulf of Mexico, *North American Journal of Fisheries Management*, 35:6, 1196-1208, DOI: Batsleer J., K. G. Hamon, H. M. J. van Overzee, A. D. Rijnsdorp & J. J. Poos. High-grading and over-quota discarding in mixed fisheries. *Rev Fish Biol Fisheries* **25**, 715–736 (2015). <https://doi.org/10.1007/s11160-015-9403-0>

Coggins, L.G., M.J. Catalano, M.S. Allen, W.E. Pine, and C.J. Walters. 2007. Effects of cryptic mortality and the hidden costs of using length limits in fishery management. *Fish and Fisheries* 8:196-210.

Collins, L. A., G. R. Fitzhugh, L. A. Lombardi-Carlson, H. M. Lyon, W. T. Walling, and D. W. Oliver. 2002. Characterization of red grouper (Serranidae: *Epinephelus morio*) reproduction from the eastern Gulf of Mexico: 1992-2001. NMFS SEFSC Panama City Lab Contrib. Ser 2002-07.

Cummings, N.J. 2007. Important aspects of the life history of the yellowfin grouper, *Mycteroperca venenosa*, with emphasis on populations in the Caribbean. SEDAR 14. National Marine Fisheries Service, Southeast Fisheries Science Center, Sustainable Fisheries Division, Miami, FL. Sustainable Fisheries Division Contribution SFD 2007-005 (SEDAR14-DW-01). 20 pp.

Garner, S.B., W.F. Patterson III, J.F. Walter, and C.E. Porch, 2020. Simulating effects of hook-size regulations on recreational harvest efficiency in the northern Gulf of Mexico red snapper fishery. *Fisheries Research* **228**, 105561 (2020). <https://doi.org/10.1016/j.fishres.2020.105561>

Moe, M.A., Jr. 1969. Biology of red grouper (*Epinephelus morio* Valenciennes) from the eastern Gulf of Mexico. Prof. Pap. Ser. Mar. Lab. Fla. 10, 95 p.

NMFS (2005). Stock Assessment and Fishery Evaluation for the Snapper Grouper Fishery of the South Atlantic. NOAA, NMFS, SERO, 263 13th Ave. South, St. Petersburg, Florida. 130pp.

Ortiz, M. 2007. Analysis on the effects of yield per recruit of alternative minimum size limit regulations for the fisheries of gag grouper Gulf of Mexico. NOAA Fisheries Service, SEFSC, Miami, Florida. SFD Contribution No. SFD-2007- 030. 10 pp.

Powell, J.R. and Wells, R.S. 2011. "Recreational fishing depredation and associated behaviors involving common bottlenose dolphins (*Tursiops truncatus*) in Sarasota Bay, Florida". Publications, Agencies and Staff of the U.S. Department of Commerce. 308.
<https://digitalcommons.unl.edu/usdeptcommercepub/308>

Pulver, J.R., and J.A. Stephen. 2019. Factors that influence discarding in the Gulf of Mexico commercial grouper-tilefish IFQ reef fish fishery. *Fisheries Research* 218 (2019), 218-228.
<https://doi.org/10.1016/j.fishres.2019.05.018>

Pulver, Jeffrey Robert (2015). Modeling Community Structure and Abundance Using Observer Data for the U.S. Gulf of Mexico Deepwater Reef Fishery. Master's thesis, Texas A & M University. Available electronically from <http://hdl.handle.net/1969.1/155417>.

Rudershausen, P.J., A. Ng, and J.A. Buckel. 2005. By-catch, discard composition, and fate in the snapper/grouper commercial fishery, North Carolina. NC Sea Grant 04-FEG-08.

Sauls, B. 2005. Headboat at-sea sampling protocols. Florida Fish and Wildlife Conservation Commission Internal Report. 8 pp.

Scott-Denton, E., Cryer, P. F., Gocke, J. P., Harrelson, M. R., Kinsella, D. L., Pulver, J. R., Smith, R. C. & Williams, J. A. (2011). Descriptions of the U.S. Gulf of Mexico reef fish bottom longline and vertical line fisheries based on observer data. *Marine Fisheries Review* **73**, 1– 26.

SEDAR 33 Update Report. 2016. SEDAR 33 Update Report Gulf of Mexico Gag Grouper. NOAA Fisheries Service, SEFSC, Miami, Florida. 123 pp.

Walter, J. 2007. Yield per recruit analysis for red grouper. NOAA Fisheries Service, SEFSC, Miami, Florida. 21 pp.

APPENDIX C. 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

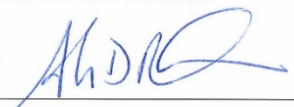
- a. All allocations and reallocations must be consistent with the Gulf of Mexico Fishery Management Council's principles for allocation.
- b. An approved Council motion constitutes the only appropriate means for requesting the initiation of allocation or reallocation of a fishery resource. The motion 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 D. 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. The focus of the CCC working group’s exploration is the first of those steps – triggering an allocation review. 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 policies 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.

Steps in the Adaptive Management of Allocations

May 29, 2015

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.
	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: 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 as 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 limited¹. 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

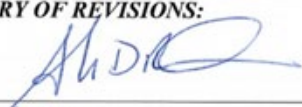
Edwards, Steven F. 1990. An Economics Guide to Allocation of Fish Stocks Between Commercial and Recreational Fisheries. U.S. Dept. of Commerce, NOAA Technical Report NMFS 94, 29 p.

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.

Filename: CCC Allocation Procedural Directive 7.27
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APPENDIX E. 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 ALLOCATION DECISIONS	
NOTICE: This publication is available at: http://www.nmfs.noaa.gov/op/pds/index.html	
OPR: F/SF (W. Morrison) Type of Issuance: Initial	Certified by: F/SF (A. Risenhoover)
SUMMARY OF REVISIONS:  Signed _____ Alan Risenhoover Director, Office of Sustainable Fisheries	

Recommended practices and factors to consider when reviewing¹ 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 document⁷ 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.

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 practices¹¹ 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.

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 government¹⁵ 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 Council²⁰ 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 change²¹) 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 species²²? 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 efficient²⁵ 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 consumption²⁶; 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 communities³⁰, 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.

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 businesses³³; 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 Quality³⁴, 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 entities³⁵ (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. 2014⁴¹).

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.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 data⁴³ 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 fishery⁴⁹. 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—

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 share⁶⁹ 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.

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 F. 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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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 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 G. 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 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				
	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-AP AIS
2017	Recreational	739,073	21	2,580,000	No		MRIP-AP AIS
2018	Recreational	913,978	21.5	2,580,000	No		MRIP-AP AIS
2019*	Recreational	725,105	21.6	1,000,000	No		MRIP-AP AIS

Source: Source: SERO ACL Monitoring dataset, retrieved 8 May 2020 (recreational). *2019 recreational data are preliminary.

APPENDIX H. 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 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		not applicable
		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 status	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		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 I. MODIFICATION OF MANAGEMENT FOR RED GROUPER IN THE GULF

Modification of Management for Red Grouper in the Gulf of Mexico: Amendment 53

Jeff Pulver; March 23, 2021

LAPP/DM Branch

Southeast Regional Office

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 ACL and annual catch target (ACT) being considered in Amendment 53 (Tables 1 and 2). The predicted closure dates for the ACL and ACT options span from July 23 to no closure (Tables 1 and 2). There is considerable uncertainty in the predictions since the confidence intervals range from early June to no closure needed (Table 1; Figure 2).

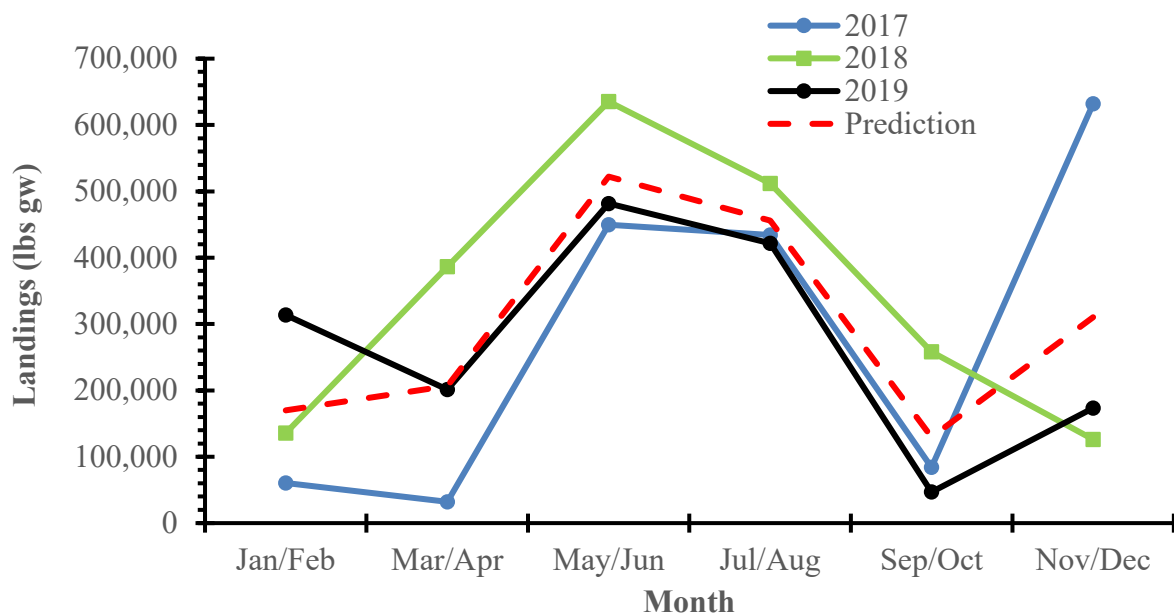


Figure 1. Gulf of Mexico recreational landings by two-month wave and predicted future landings. Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

Table 1. The predicted closure dates for each recreational ACL (mp gw) currently in Amendment 53 generated from predicted landings with 95% confidence intervals.

Action 1 Alternative	ACL	Predicted Closure Date	Season Length (95% Confidence Interval)
Alternative 1	2.10	No Closure	October 25 - No Closure
Alternative 2	1.18	August 8	June 13 - No Closure
Alternative 3	1.73	December 19	August 15 - No Closure
Alternative 4	1.70	December 13	August 11 - No Closure
Alternative 5	1.72	December 17	August 14 - No Closure
Alternative 6	1.44	October 11	July 10 - No Closure

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

Table 2. The predicted closure dates for each recreational ACT (mp gw) currently in Amendment 53 generated from predicted landings with 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	Sep 15 - No Closure
1-2	1.18	8%	1.09	July 26	June 5 - No Closure
2-2; 3-2	1.18	9%	1.07	July 23	June 3 - No Closure
1-3	1.73	8%	1.59	November 20	July 29 - No Closure
2-3; 3-3	1.73	9%	1.57	November 16	July 26 - No Closure
1-4	1.70	8%	1.56	November 14	July 25 - No Closure
2-4; 3-4	1.70	9%	1.55	November 12	July 24 - No Closure
1-5	1.72	8%	1.58	November 18	July 27 - No Closure
2-5; 3-5	1.72	9%	1.57	November 16	July 26 - No Closure
1-6	1.44	8%	1.32	August 27	June 27 - No Closure
2-6; 3-6	1.44	9%	1.31	August 25	June 26 - No Closure

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

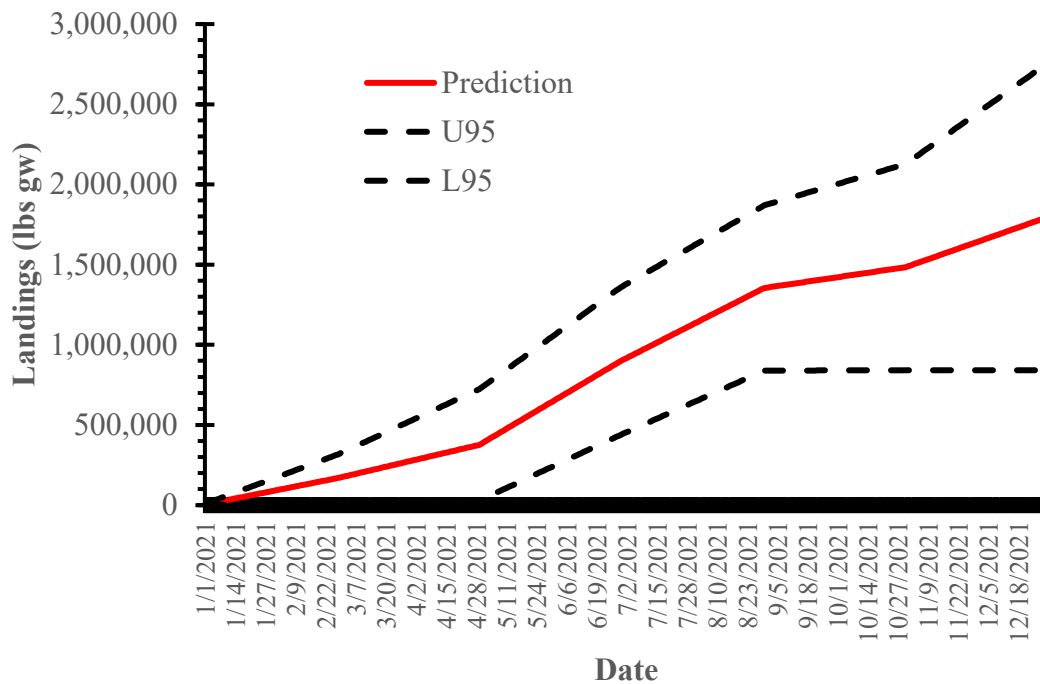


Figure 2. Cumulative predicted Gulf of Mexico red grouper recreational landings with 95% confidence interval (dashed lines). Source: SEFSC MRIP FES Recreational ACL Dataset (May 8, 2020).

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.