Modifications to Catch Limits, Sector Allocation, and Recreational Fishing Seasons for Gulf of Mexico Gag

Final Amendment 56
to the Fishery Management Plan for
Reef Fish Resources of the Gulf of Mexico

including Regulatory Impact Review, Initial Regulatory Flexibility Analysis, and Bycatch Practicability Analysis

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Amendment 56 to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico: Modifications to Catch Limits, Sector Allocation, and Fishing Seasons for Gulf of Mexico Gag, including Regulatory Impact Review, Initial Regulatory Flexibility Analysis, and Bycatch Practicability Analysis.

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Type of Action

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This Environmental Assessment is being prepared using the 2020 CEQ NEPA Regulations as modified by the Phase I 2022 revisions. The effective date of the 2022 revisions was May 20, 2022, and reviews begun after this date are required to apply the 2020 regulations as modified by the Phase I revisions unless there is a clear and fundamental conflict with an applicable statute. This Environmental Assessment began on May 28, 2022, and accordingly proceeds under the 2020 regulations as modified by the Phase I revisions.

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
AM	accountability measure
AP	Advisory Panel
APAIS	Access Point Angler Intercept Survey
BiOp	biological opinion
BPA	bycatch practicability analysis
CFpA	net cash flow per angler
CFR	code of federal regulations
CHTS	coastal household telephone survey
Council	Gulf of Mexico Fishery Management Council
CS	consumer surplus
CVA	climate vulnerability analysis
DLMToolkit	Data Limited Methods Toolkit
DPS	distinct population segment
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EFP	exempted fishing permit
EIS	environmental impact statement
EJ	environmental justice
E.O.	executive order
ESA	Endangered Species Act
F	fishing mortality
FES	fishing effort survey
FHS	for-hire survey
FMP	Fishery Management Plan
F_{MSY}	maximum sustainable yield
FWC	Florida Fish and Wildlife Conservation Commission
GRFS	Gulf Reef Fish Survey
GT	grouper-tilefish
Gulf	Gulf of Mexico
HAPC	habitat area of particular concern
HHI	Hertindahl-Hirschman Index
IFQ	individual fishing quota
IPCC	Intergovernmental Panel on Climate Change
IRFA	initial regulatory flexibility analysis
LAPP	Limited Access Privilege Program
LKE	lowest known entity
LQ	local quotient
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act

mp	million pounds
MPA	marine protected area
MRIP	Marine Recreational Information Program
MRFSS	Marine Recreational Fisheries Statistics Survey
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	overfishing limit
OST	Office of Science and Technology
OY	optimum yield
PAH	polycyclic aromatic hydrocarbons
PS	producer surplus
PW	product weight
Reef Fish FMP	Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future actions
RG	red grouper
RQ	regional quotient
RIR	regulatory impact review
RS	red snapper
SDC	status determination criteria
Secretary	Secretary of Commerce
SEDAR	Southeast Data and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SMZ	special management zone
SOI	segments of interest
SPR	spawning potential ratio
SSB	spawning stock biomass
SSC	Scientific and Statistical Committee
SRFS	State Reef Fish Survey
SRHS	Southeast Region Headboat Survey
SWG	shallow-water grouper
T	time
TF	tilefish
TL	total length
VOC	volatile organic compounds
ww	whole weight

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CHAPTER 1. INTRODUCTION

1.1 Background

Gulf of Mexico (Gulf) gag, a type of grouper, is managed under the Fishery Management Plan (FMP) for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP). Amendment 56 to the Reef Fish FMP is intended to end overfishing of the Gulf gag stock and follows an interim action to reduce overfishing of Gulf gag, which was developed by the National Marine Fishery Service (NMFS), as recommended by the Gulf of Mexico Fishery Management Council (Council). This amendment is being developed because the most recent update to the Southeast Data, Assessment, and Review (SEDAR) 72 stock assessment (2022) estimated that gag is overfished and is undergoing overfishing as of 2019. The gag stock is managed under a stock annual catch limit (ACL), which is divided between the commercial and recreational sectors. The commercial ACL is currently set at 39% of the stock ACL, and the recreational ACL is set at 61% of the stock ACL. The current sector allocation was set in Amendment 30B to the Reef Fish FMP and was based on the average landings from 1986 – 2005 (GMFMC 2008a). Amendment 30B set an interim sector allocation that would be in effect until such time the Council, through the recommendations of the (now former) Ad Hoc Allocation Committee, could implement a separate amendment to allocate grouper resources between recreational and commercial sectors. This interim sector allocation was based on all available years during which grouper were identified by species. It also used the longest and most robust time series to reduce the influences of short-term shifts in landings resulting from changes in recruitment or regulations. Because the Council ultimately did not initiate another amendment to the Reef Fish FMP to revisit grouper allocations, the 39:61 gag sector allocation remains in effect.

Commercial Sector

Commercial harvest of gag has been managed under an individual fishing quota (IFQ) program since 2010 (GMFMC 2008b). Anyone commercially fishing for gag must possess a federal commercial reef fish permit and gag allocation under the IFQ program. IFQ allocation is determined at the beginning of each calendar year by multiplying a shareholder's IFQ gag share (represented as a fraction of the total commercial quota) times the commercial quota for gag. The current commercial quota is approximately 21.6% below the commercial ACL. The commercial quota is set at 86% of the commercial annual catch target (ACT; GMFMC 2011b). The difference between the quota and the ACT was put in place to account for uncertainty with discards as a result of the implementation of the IFQ program, and it was noted that this buffer could be re-evaluated with time. The difference between the commercial ACL and quota allows for multi-use allocation, as described below. The IFQ program acts as the accountability measure (AM) for the commercial gag portion of the reef fish fishery, and the commercial quota has never been exceeded under the IFQ program.

Gag Multi-Use (GGM) Allocation

At the time the commercial quota for gag is distributed to IFQ shareholders, a percentage of each shareholder's initial gag allocation is converted to gag multi-use allocation. This percentage is determined by a formula based on the gag and red grouper ACLs and quotas in a given year.

GGM allocation may be used to possess, land, or sell either gag or red grouper under certain conditions. GGM allocation can only be used to possess, land, or sell gag after an IFQ account holder's (shareholder and vessel account) gag allocation has been landed and sold, or transferred; and to possess, land, or sell red grouper, only after both red grouper and red grouper multi-use allocation have been landed and sold, or transferred. However, if red grouper is under a rebuilding plan, the percentage of GGM allocation is equal to zero.

Red Grouper Multi-Use (RGM) Allocation

At the time the commercial quota for red grouper is distributed to IFQ shareholders, a percentage of each shareholder's initial red grouper allocation is converted to red grouper multi-use allocation. This percentage is determined by a formula based on the red grouper and gag ACLs and quotas in a given year. RGM allocation may be used to possess, land, or sell either red grouper or gag under certain conditions. RGM allocation can only be used to possess, land, or sell red grouper after an IFQ account holder's (shareholder and vessel accounts) red grouper allocation has been landed and sold, or transferred; and to possess, land, or sell gag, only after both gag and gag multi-use allocation have been landed and sold, or transferred. However, if gag is under a rebuilding plan, the percentage of RGM allocation is equal to zero.

Recreational Sector

Both an in-season and a post-season AM apply to harvest of gag by the recreational sector. The in-season AM requires NMFS to close the recreational sector when gag recreational landings reach or are projected to reach the recreational ACL. If these landings exceed the gag ACL in a fishing year, the post-season AM requires NMFS to shorten the duration of the following recreational fishing year by the amount necessary to ensure landings do not exceed the prior year's ACT, unless NMFS determines that managing to the prior year's ACT in the following year is unnecessary. If gag is overfished and landings exceed the recreational sector ACL, the recreational ACL and ACT must be reduced in the following year by the amount of the previous year's overage.

Gag Recreational Data

Federal Data Collection Programs

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

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

MRIP also transitioned from the legacy Coastal Household Telephone Survey (CHTS) to a new mail survey (Fishing Effort Survey [FES]) beginning in 2015, and in 2018, MRIP-FES replaced MRIP-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. MRIP-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 FES and CHTS are so different, NMFS conducted side-by-side testing of the two methods and found that 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, albeit while recognizing a greater degree of uncertainty in those landings estimates. This increase in estimated effort is not because there was a sudden rise in fishing effort, but rather because FES better targets actual fishery participants through the directed mail survey. Likewise, the increase in uncertainty about the effort estimates reflects uncertainty that was likely also present in CHTS, but went unaccounted due to biases that were identified as FES was developed. NMFS developed a calibration model to allow historic effort estimates using MRIP-CHTS to be compared to new estimates from MRIP-FES.

State of Florida's Supplemental Effort Survey

In 2017, the State of Florida formally created the Gulf Reef Fish Survey to monitor private angling landings and discards of red snapper, gag, and several other species harvested in state and federal waters in the Gulf. In 2020, that survey was expanded statewide and renamed the State Reef Fish Survey (SRFS), and additional species were added.[1] SRFS was created to be compatible with MRIP-CHTS; however, calibrated historical landings for SRFS are somewhat larger for the recreational sector than that estimated by MRIP-CHTS, but much lower than estimated by MRIP-FES. SRFS reports landings and discards monthly in numbers, with a conversion to weight based on that used by MRIP. SRFS uses a combination of dockside intercepts from SRFS and APAIS to estimate catch-per-unit-effort from private recreational vessels. In order to obtain complete estimates of recreational catch for stock assessment, SRFS private recreational landings and discard estimates have to be combined with recreational shore and charter for-hire catch informed by MRIP-FES, as well as headboat catch informed by the Southeast Region Headboat Survey (SRHS). Thus, when "SRFS" is referred to further in this

[1] https://myfwc.com/research/saltwater/fishstats/srfs/program/

document with respect to SEDAR 72, it encompasses all of these sources of data combined. SRFS/GRFS (Gulf Reef Fish Survey) has only been running since 2015, so the time series of private recreational landings/discards used in SEDAR 72 and in this report are MRIP-FES landings/discards converted to SRFS currency based on a ratio calculated using overlapping years of the two surveys (2015-2019) (see Cross et *al.* 2020).

Recent Gulf landings of gag are shown in Table 1.1.1. Landings are shown by sector, with recreational landings shown in MRIP-FES units,[2] and SRFS units, commensurate with the data that were used in the initial and subsequent model runs of SEDAR 72 in 2021 and 2022, respectively.[3]

[2] Although MRIP-CHTS, MRIP-FES, and Florida SRFS generate estimates measured in pounds of fish, these estimates are not directly comparable, as described above. The references to "MRIP-CHTS units," "MRIP-FES units," and "SRFS units" signify that the estimates use different scales.

[3] Recreational data input in SEDAR 72 is in numbers, not weight (as shown in Table 1.1.1.), and includes a gag-black grouper misidentification correction factor 1986-1989, which is also not reflected in Table 1.1.1.

Table 1.1.1. Commercial and recreational landings of Gulf gag from 1986 – 2021. 2022 data are preliminary and incomplete for the recreational sector at the time of this publishing. Recreational landings are shown in MRIP-FES units (column: Recreational MRIP-FES) and SRFS/MRIP-FES units (column: Recreational SRFS), commensurate with their use in both runs of SEDAR 72. Landings are in pounds gutted weight (lb gw).

Commercial		Recreational MRIP-FES		Recreational SRFS	
Year	lb gw	Year	lb gw	Year	lb gw
1986	862,116	1986	6,265,404	1986	3,456,394
1987	744,331	1987	6,309,885	1987	2,155,734
1988	585,161	1988	5,954,254	1988	1,756,438
1989	746,175	1989	6,272,971	1989	1,773,168
1990	935,001	1990	5,083,882	1990	2,229,729
1991	1,100,329	1991	4,672,847	1991	2,198,013
1992	1,467,349	1992	4,681,105	1992	2,812,580
1993	1,748,451	1993	6,019,967	1993	3,316,708
1994	1,514,781	1994	3,728,156	1994	2,037,649
1995	1,576,527	1995	6,970,327	1995	3,398,144
1996	1,498,447	1996	3,744,673	1996	2,283,282
1997	1,647,768	1997	6,272,092	1997	3,496,571
1998	2,649,811	1998	9,099,607	1998	5,475,402
1999	2,053,390	1999	9,089,569	1999	4,866,590
2000	2,258,656	2000	10,283,747	2000	5,203,698
2001	3,277,225	2001	9,321,001	2001	4,477,080
2002	3,140,484	2002	9,904,826	2002	4,794,637
2003	2,698,157	2003	6,788,877	2003	3,384,618
2004	3,069,788	2004	11,191,910	2004	5,226,485
2005	2,718,304	2005	9,029,661	2005	4,824,577
2006	1,452,644	2006	4,962,693	2006	2,278,256
2007	1,370,119	2007	4,680,935	2007	2,225,100
2008	1,496,740	2008	6,959,786	2008	3,510,786
2009	844,660	2009	3,283,394	2009	1,693,243
2010	496,826	2010	4,114,337	2010	2,043,467
2011	318,663	2011	2,131,406	2011	936,974
2012	523,138	2012	1,995,142	2012	1,069,391
2013	575,335	2013	3,352,774	2013	1,445,422
2014	586,362	2014	2,740,718	2014	1,160,592
2015	542,774	2015	2,394,461	2015	1,042,233
2016	910,996	2016	1,965,832	2016	916,352

Commercial		Recreational MRIP-FES		Recreational SRFS	
2017	492,095	2017	2,388,215	2017	1,001,954
2018	492,934	2018	2,538,889	2018	964,028
2019	532,015	2019	2,187,540	2019	1,121,147
2020	475,714	2020	2,949,058	2020	1,571,768
2021	562,849	2021	2,627,698	2021	1,667,099
2022*	693,616	2022*	1,542,215	2022*	

Source: Commercial data from 1986 – 2009: SERO ACL files; 2010 – 2022: SERO Catch Share Database (pulled February 2023). Recreational data from 1986 – 2021: MRIP-FES (pulled February 2023); recreational data using SRFS from 2016 – 2021: FWC (pulled January 2023).
*2022 data are preliminary.
Note: MRIP-FES landings estimates are higher than SRFS/MRIP estimates due to the higher fishing effort by private recreational vessels estimated by MRIP-FES.

Recent Gag Stock Assessments

The Gulf gag stock was most recently assessed in SEDAR 72 (2021). Prior to SEDAR 72, gag was assessed in 2016 (SEDAR 33 Update) using female-only spawning stock biomass (SSB) and using a proxy for fishing mortality (F) at maximum sustainable yield (MSY) of F_{MAX}, and was found to be sustainably managed at the time. Several data inputs used in the SEDAR 33 Update were modified in SEDAR 72. Most notably was the change in the recreational catch and effort data to MRIP-FES from MRIP-CHTS. Additionally, since gag is vulnerable to episodic red tide mortality, SEDAR 72 accounted for observations of these disturbances in 2005, 2014, 2018, and 2021 (projections only) directly within the model. Lastly, changes were made to improve retention and recreational fleet selectivities (i.e., estimates of length compositions of gag retained by the private angling, for-hire, and commercial directed fleets), improve fits to the fishery-independent indices, and better quantify commercial discards by using improved methodologies and differentiating between black grouper and gag. Updated information on the maturity schedule, sex transition timing, and these influences on the observed sex ratio were informed by recent research. The base model for SEDAR 72 found gag to be overfished and undergoing overfishing for both females-only and sexes-combined estimates of SSB. The Council's Scientific and Statistical Committee (SSC) reviewed the results in November 2021 and concluded that the SEDAR 72 stock assessment base model, using the sexes-combined SSB estimate, an F_{MSY} proxy of $F_{30\%SPR}$, and a moderate estimate of red tide mortality in 2021 compared to 2005, was consistent with the best scientific information available and suitable for informing fisheries management. The Council's SSC agreed with revising the F_{MSY} proxy from F_{MAX} to the more conservative $F_{30\%SPR}$, in light of the stock's vulnerability to episodic red tide mortality, recent low recruitment, and consideration that gag may be experiencing sperm limitation as a result of a lack of males in the population.

Alternative Base Model Run for SEDAR 72

At its January 2022 meeting, the Council requested that the Southeast Fisheries Science Center (SEFSC) update the SEDAR 72 base model by replacing MRIP-FES calibrated landings for the Florida private angling mode with landings estimated by SRFS. This alternative model run ("SRFS Run") was presented to the SSC for consideration at its July 2022 meeting. Because the

majority of gag are landed in Florida (greater than 98% annually for 2011 – 2020), the SRFS sampling frame includes over 95% of all gag landed by private anglers, making it an appropriate survey for estimating private angling landings of gag. The calibration of SRFS to historical gag landings was reviewed and approved by peer-review through the National Oceanic and Atmospheric Administration (NOAA) Office of Science and Technology in May 2022.[4] SRFS estimates a historically larger harvest by private anglers and state charter vessels than MRIP-CHTS, but does so to a much lesser magnitude than MRIP-FES (see Table 1.1.1). Because SRFS requires MRIP data to produce complete estimates, SRFS landings estimates would not be available until several weeks after MRIP data are available, which is generally about 45 days after the end of each two-month wave. The SSC-evaluated SEDAR 72 SRFS Run was found to be consistent with the best scientific information available at the SSC's July 2022 meeting. The SSC determined SRFS to be a suitable and comprehensive survey for gag for the private angling component of the recreational sector given that the majority (greater than 95%) of private angling landings of gag were captured by the SRFS sampling frame and that the SRFS-calibrated historical landings data had been certified. In addition, with further consideration of gag's susceptibility to episodic mortality from red tide and guidance from Harford et al. (2019) regarding the spawning potential ration (SPR) level needed to achieve MSY in a hermaphroditic species like gag, the SSC determined that an F_{MSY} proxy of $F_{40\%SPR}$ was more appropriate than the proxy of $F_{30\%SPR}$ or F_{Max}. In recommending this more conservative F_{MSY} proxy, the SSC recognized that episodic red tide mortality was to be expected in the future. The SSC also reiterated the potential for sperm limitation in the stock, given the low estimated proportion of the SSB that is male. This may be leading to skipped spawning by mature females, which could be resulting in lower recruitment. Overall, there was no difference in the stock status determination using the recreational MRIP-FES time-series versus the recreational SRFS time-series. The SSC rationalized that the higher SPR target for the F_{MSY} proxy would allow the stock to rebuild to a more robust level of SSB, making it more resilient to environmental influences like red tide, and to changes in fishing mortality. Using an F_{MSY} proxy of $F_{40\%SPR}$, the SSC determined that gag is overfished and undergoing overfishing as of 2019. A summary of the SRFS Run estimates relative to status determination criteria is shown in Table 1.1.2.

[4] https://gulfcouncil.org/wp-content/uploads/05h.-SRFS-gag-calibration-review-05-28-2022.pdf

Table 1.1.2. Summary of Magnuson-Stevens Reauthorization Act benchmarks and reference points for the SRFS Run for Gulf gag using an FMSY proxy of F40%SPR. SSB is in metric tons, whereas F is a harvest rate (total biomass killed / total biomass age 3+).

Criteria	Definition	$F_{40\%SPR}$
Base M	Target M for fully selected ages in Lorenzen (2005) scaling	0.159
Steepness	Steepness of fixed Beverton-Holt stock-recruit relationship	0.855
R0	Virgin Recruitment (1000s)	8903.2
Generation Time	Fecundity-weighted mean age	7.88
SSB0	Virgin spawning stock biomass (mt)	67052
	Mortality Rate Criteria	
F_{MSY} proxy	F_{MSY} proxy used	$F_{40\%SPR}$
MFMT	F_{MSY} proxy	0.098
$F_{Current}$	Geometric mean of the last 3 years of the assessment (F2017-2019), excluding red tide mortality	0.352
$F_{Current}$ /MFMT	Current stock status based on MFMT	3.578
	Biomass Criteria	
SSB_{MSY} proxy	Equilibrium SSB at F_{MSY} proxy	25039
MSST	0.5*SSB F_{MSY}	12520
$SSB_{Current}$	SSB2019	1706.4
$SSB_{Current}$/SSB F_{MSY}	Current stock status based on SSB F_{MSY}	0.068
$SSB_{Current}$/MSST	Current stock status based on MSST	0.136
Yr rebuilt at F=0	First year rebuilt fishing at F=0 starting in 2023	2035
$SSB_{Current}$/SSB0	SSB ratio in 2019	0.025

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires that the Council prepare and implement a rebuilding plan within two years of notification that the stock is overfished. The Council was notified by NMFS of the overfished status of the gag stock on January 26, 2022, following the SSC's review of the first iteration of the SEDAR 72 model using MRIP-FES. The Council is developing Amendment 56 with the goal of having the management measures contained herein implemented by NMFS in January 2024. Given that Amendment 56 would not be implemented until 2024, the Council recognized that maintaining the 2023 catch limits (in MRIP-CHTS) would result in negative biological effects and may lengthen the amount of time necessary to rebuild the stock. Therefore, the Council sent a letter to NMFS, dated July 15, 2022 (Appendix A), *requesting a reduction of the Gulf gag stock ACL to 661,901 lb gw, while maintaining the current allocation split of 61% recreational and 39% commercial, and maintaining RGM and GGM. In addition, the Council requested that the recreational fishing season begin on September 1 (rather than the traditional date of June 1), and that the season close on November 10.* NMFS implemented these interim measures effective May 3, 2023.[5] These measures are expected to reduce overfishing, but still provide for gag harvest in 2023 while the Council continues to develop Amendment 56. Because

the SSC's review of the SRFS Run of SEDAR 72 predates the initiation of the request for interim measures for gag, that interim rule uses MRIP-FES calibrated landings and projections to reduce overfishing, while Amendment 56 will use SRFS calibrated landings (supplemented by MRIP-FES as noted above) and projections to end overfishing and rebuild the stock.

1.2 Purpose and Need

The purpose of this action is to modify the status determination criteria, optimum yield, catch limits, accountability measures, sector allocations, and the recreational fishing season and establish a rebuilding timeline for Gulf gag.

The need for this action is to use the best scientific information available to end overfishing of Gulf gag and rebuild the stock to a level commensurate with MSY, consistent with the authority under the Magnuson-Stevens Act.

1.3 History of Management

Amendment 1, including an Environmental Assessment (EA), regulatory impact review (RIR), and regulatory flexibility analysis (RFA), implemented in 1990, set objectives to stabilize long-term population levels of all reef fish species by establishing a survival rate of biomass into the stock of spawning age fish to achieve at least 20% spawning stock biomass per recruit by January 1, 2000. It also set a 20-inch total length (TL) minimum size limit on gag; set a five-grouper recreational daily bag limit; set an 11.0 million pound (mp) commercial quota for grouper, with the commercial quota divided into a 9.2 mp shallow-water grouper (black grouper, gag, red grouper, Nassau grouper, yellowfin grouper, yellowmouth grouper, rock hind, red hind, speckled hind, and scamp) quota and a 1.8 mp deep-water grouper (misty grouper, snowy grouper, yellowedge grouper, and warsaw grouper, and scamp once the shallow-water grouper quota was filled) quota; allowed a two-day possession limit for charter vessels and headboats on trips that extend beyond 24 hours; established a longline and buoy gear boundary at the 50-fathom depth contour west of Cape San Blas, Florida, and the 20-fathom depth contour east of Cape San Blas, inshore of which the directed harvest of reef fish with longline gear and buoy gear was prohibited, and the retention of reef fish captured incidentally in other longline operations (e.g., sharks) was limited to the recreational daily bag limit; limited trawl vessels to the recreational size and daily bag limits of reef fish; established fish trap permits (up to 100 fish traps per permit holder); and established a commercial reef fish vessel permit.

Amendment 5, including an EA, RIR, and RFA implemented in February 1994, established restrictions on the use of fish traps in the Gulf exclusive economic zone (EEZ); implemented a three-year moratorium on the use of fish traps by creating a fish trap endorsement for fishermen with historical landings; created a special management zone (SMZ) with gear restrictions off the Alabama coast; created a framework procedure for establishing future SMZ's; required that all finfish except for oceanic migratory species be landed with head and fins attached; and closed the region of Riley's Hump (near Dry Tortugas, Florida) to all fishing during May and June to protect mutton snapper spawning aggregations.

A Framework Action, including an EA, RIR, and RFA implemented in June 2000, increased the commercial size limit for gag and black grouper from 20 to 24 inch TL; increased the recreational size limit for gag from 20 to 22 inch TL; prohibited commercial sale of gag, black, and red grouper each year from February 15 to March 15 (during the peak of gag spawning season); and established two marine reserves (Steamboat Lumps and Madison-Swanson) that are closed year-round to fishing for all species under the Council's jurisdiction.

Amendment 29 including an EA, RIR, and RFA, implemented January 2010, established an IFQ system for the commercial harvest of grouper and tilefish, including gag.

Amendment 30B including a final Supplemental Environmental Impact Statement (SEIS), RIR and an Initial Regulatory Flexibility Analysis (IRFA), implemented May 2009, established ACLs and AMs for gag and red grouper; managed shallow-water grouper to achieve optimum yield (OY) and improve the effectiveness of federal management measures; defined the gag minimum stock size threshold (MSST) and OY; set interim allocations of gag and red grouper between recreational and commercial sectors, setting gag at 61% recreational and 39% commercial based on average landings from 1986 – 2005; made adjustments to the gag and red grouper ACLs to reflect the current status of these stocks; established ACLs and AMs for the commercial and recreational gag harvest, and commercial aggregate shallow-water grouper harvest; adjusted recreational grouper bag limits and seasons; adjusted commercial grouper quotas; replaced the one-month February 15 through March 15 commercial grouper closed season with a four-month seasonal area closure at the Edges, a 390 square nautical mile area in the dominant gag spawning grounds; eliminated the end date for the Madison-Swanson and Steamboat Lumps marine reserves; and required that vessels with federal commercial or charter reef fish permits comply with the more restrictive of state or federal reef fish regulations when fishing in state waters.

Amendment 31 including a final SEIS, RIR and IRFA, implemented May 2010, prohibited the use of bottom longline gear shoreward of a line approximating the 35-fathom contour from June through August; established a longline endorsement; and restricted the total number of hooks onboard each reef fish bottom longline vessel to 1,000, only 750 of which may be rigged for fishing.

An Interim Rule published December 1, 2010. While management measures for the gag rebuilding plan were being developed through Amendment 32, the Interim Rule reduced gag landings consistent with ending overfishing; implemented conservative management measures while a rerun of the update stock assessment was being completed; reduced the commercial quota to 100,000 lb gutted weight (gw); suspended the use of red grouper multi-use IFQ allocation so it would not be used to harvest gag, and; temporarily halted the recreational harvest of gag until recreational fishing management measures being developed in Amendment 32 could be implemented to allow harvest at the appropriate levels.

An Interim Rule, effective from June 1, 2011, through November 27, 2011, and was extended for another 186 days or until Amendment 32 was implemented. The gag 2009 update stock assessment was rerun in December 2010 addressing the problems with discards identified earlier in 2010. This assessment was reviewed in January 2011 by the Council's SSC and presented to the Council at its February 2011 meeting. The assessment indicated that the gag commercial

quota implemented on December 1, 2010, interim rule could be increased and that a longer recreational season could be implemented. In response, the Council requested an interim rule while they continued to work on long-term measures including a gag rebuilding plan in Amendment 32. The interim rule set the commercial gag quota at 430,000 lb gw (including the 100,000 lb gw previously allowed) for the 2011 fishing year, and temporarily suspended the use of red grouper multi-use IFQ allocation so it could not be used to harvest gag. It also set a two-month recreational gag fishing season from September 16 through November 15.

Amendment 32, including a final Environmental Impact Statement (EIS), RIR and IRFA implemented in March 2012, set the commercial and recreational gag ACLs and ACTs for 2012 through 2015 and beyond; implemented gag commercial quotas for 2012 through 2015 and beyond that included a 14% reduction from the ACL to account for additional dead discards of gag resulting from the reduced harvest; modified grouper IFQ multi-use allocations; reduced the commercial minimum size limit of gag from 24 to 22 inches TL to reduce discards; set the gag recreational season from July 1 through October 31 (the bag limit remained two gag in the four-grouper aggregate bag limit); simplified the commercial shallow-water grouper AMs by using the IFQ program to reduce redundancy; and added an overage adjustment and in-season closure to the gag and red grouper recreational AMs to avoid exceeding the ACL.

Amendment 38, including EA, RIR, and RFA implemented in March 2013, revised the postseason recreational AM that reduces the length of the recreational season for all shallow-water grouper in the year following a year in which the ACL for gag or red grouper is exceeded. The modified AM reduces the recreational season of only the species for which the ACL was exceeded.

A 2016 Framework Action revised the gag recreational closed season to January 1 to May 31, annually. This revised closed season was expected to reduce dead discards of gag during the Gulf recreational red snapper season that begins on June 1, annually, and extend the gag recreational fishing season. The framework action also increased the recreational minimum size limit in Gulf federal waters to 24 inches TL to be consistent with the federal waters of the South Atlantic and state waters off Monroe County, Florida. This final rule was effective May 25, 2016.

Reef Fish Amendment 44 standardized the MSST for certain reef fish species, including gag. The MSST is used to determine whether or not a stock is considered to be overfished; if the biomass of the stock falls below the threshold, then the stock is considered to be overfished. The MSST for gag and other reef fish species was set equal to 50% of the biomass at MSY. This amendment was approved on December 21, 2017.

A 2018 Framework Action increased the commercial minimum size limit for gag to 24 inches TL. This final rule was effective July 23, 2018.

NMFS implemented interim measures to reduce gag overfishing for the 2023 fishing year on May 3, 2023. This temporary rule decreases the stock ABC for Gulf gag to 661,000 lb gw. The sector allocation was retained at 61% recreational and 39% commercial. The recreational fishing season was modified to open on September 1 and close on November 10. The purpose of this

interim rule is to reduce overfishing ahead of the development of Amendment 56 to the Reef Fish FMP.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1: Modification of Gulf of Mexico (Gulf) Gag Status Determination Criteria (SDC)

Alternative 1: No Action. Retain the SDC for gag as defined in Amendments 30B and 44 to the Fishery Management Plan for Reef Fish Resources of the Gulf (Reef Fish FMP). Maximum sustainable yield (MSY) is defined as the fishing mortality rate (F) assuming the maximum yield per recruit (F_{MAX}). The current definition for the maximum fishing mortality threshold (MFMT) is F_{MAX}. The minimum stock size threshold (MSST) is defined as 50% of the biomass at F_{MAX} (B_{MAX}). The optimum yield (OY) is defined as 75% of the yield at F_{MAX}.

Preferred Alternative 2: Revise the SDC for gag based on the results of the updated Southeast Data, Assessment, and Review (SEDAR) 72 stock assessment State Reef Fish Survey (SRFS) Run as reviewed by the Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) in July 2022. MSY is defined as the yield when fishing at a 40% spawning potential ratio (SPR) or $F_{40\%SPR}$. The MFMT is equal to the fishing mortality at the F_{MSY} proxy (e.g., $F_{40\%SPR}$). The MSST is defined as 50% of the biomass at MSY or its proxy. The OY is defined as being conditional on rebuilding plan, such that: if the stock is under a rebuilding plan, OY is equal to the stock annual catch limit (ACL); if the stock is not under a rebuilding plan, OY is equal to 90% of MSY or its proxy.

Discussion:

This action would modify Gulf gag SDC to use the best scientific information available. There is only one alternative other than the no-action alternative because the Council's SSC determined that the best scientific information available supports only one proxy based on the yield at $F_{40\%SPR}$. SEDAR 72 (2022) estimated that the spawning stock biomass (SSB) for gag when accounting for both mature males and females is below the MSST, or 50% of the biomass at MSY (B_{MSY}). In its initial review of SEDAR 72 in November 2021, the SSC determined that F_{MAX} was an inappropriate F_{MSY} proxy for gag because of the species hermaphroditism (changing sex from female to male) and susceptibility to episodic mortality from red tide harmful algal blooms. The SSC also reviewed guidance from Harford et al. (2019)[6] regarding the SPR level needed to achieve MSY in a hermaphroditic species like gag, and ultimately determined that an F_{MSY} proxy of the yield when fishing at $F_{40\%SPR}$ was more appropriate than a proxy of the yield when fishing at $F_{30\%SPR}$ or F_{MAX}.

[6] Harford, W.J., S.R. Sagarese, and M. Karnauskas. 2019. Coping with information gaps in stock productivity for rebuilding and achieving maximum sustainable yield for grouper–snapper fisheries. Fish and Fisheries 20(2):303-321. The SSC discussed this publication during its consideration of guidance to the Council for setting F_{MSY} proxies for hermaphroditic species, namely gag. The SSC thought the empirically- based recommendations from Harford et al. 2019 were particularly appropriate for gag, and supported its resultant recommendation of a revised F_{MSY}proxy of $F_{40\%SPR}$.

Alternative 1 would retain the current SDC for gag as defined in Amendments 30B and 44 to the Reef Fish FMP. F_{MSY} is defined as the yield when fishing at F_{MAX}. The MFMT is equal to F_{MAX}; MSST is defined as 50% of B_{MAX}; and, OY is defined as 75% of the yield at F_{MAX}. These SDC, based on F_{MAX}, are not consistent with the best scientific information available. As such, **Alternative 1** is not a viable alternative.

Preferred Alternative 2 would revise the SDC for gag based on the results of the SEDAR 72 (2022) stock assessment as reviewed by the SSC in July 2022 (i.e., the State Reef Fish Survey (SRFS) Run). SEDAR 72 (2022) used recreational landings data for private vessels from the State of Florida's SRFS in place of the same from the Marine Recreational Information Program's (MRIP) Fishing Effort Survey (FES). SRFS must use recreational shore and charter for-hire landings informed by MRIP-FES, as well as headboat landings informed by the Southeast Region Headboat Survey (SRHS) in order to obtain catch estimates necessary for management. Thus, when "SRFS" is referred to further in these actions, it encompasses all of these sources of data necessary to make these landings estimates. SEDAR 72 (2022) using SRFS landing was determined by the SSC to be consistent with the best scientific information available (see Chapter 1 for more information on this assessment review). Under **Preferred Alternative 2** and based on the SSC's recommendation of an F_{MSY} proxy of $F_{40\%SPR}$, F_{MSY} is defined as the yield when fishing $F_{40\%SPR}$, the MFMT is equal to F_{MSY} or its proxy. The MSST would continue to be defined as 50% of the biomass at MSY or its proxy.

In addition to the change of the F_{MSY} proxy, **Preferred Alternative 2** would modify the definition of OY. Under **Preferred Alternative 2**, OY would be conditioned on stock status. If the stock is under a rebuilding plan, OY would equal the stock ACL and if the stock was not under a rebuilding plan, OY would equal 90% of MSY or its proxy. The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires, among other things, that management measures achieve OY on a continuing basis. Per the SSC's review of SEDAR 72 (2022), gag is overfished and undergoing overfishing as of 2019, and thus requires rebuilding from the current spawning stock biomass (SSB) to the SSB corresponding with MSY. As represented in Action 2 of this document, this necessitates setting catch limits at a fishing mortality rate corresponding to a rebuilding timeline ($F_{Rebuild}$). Scientific uncertainty, as it relates to the physical, biological, and ecological environments, is accounted for in the difference between the overfishing limit (OFL) and acceptable biological catch (ABC) as recommended by the SSC. Further reducing the sector-specific ACLs (which sum to the total stock ACL) from the ABC accounts for management uncertainty. The buffer between the ABC and ACL includes social and economic considerations by way of Council consideration and pertinent SSC recommendations (if any), which must also be accounted for when defining OY. Therefore, when the stock is under a rebuilding plan, OY is defined as being equal to the stock ACL (i.e., the sum of the recreational and commercial ACLs) because this is the amount of fish that, over the rebuilding time, would allow the stock to rebuild to a level that is consistent with producing

MSY.[7] Once the gag SSB reaches a level equal to or greater than the MSST, the stock would no longer be considered overfished; however, the stock would still be under a rebuilding plan until the SSB is equal to or greater than the SSB at MSY. Thus, it is at this point (when the stock is rebuilt) that **Preferred Alternative 2** specifies that OY is equal to 90% of MSY or its proxy. Ideally, management measures should be able to maintain the SSB at or above that level over time. Defining the OY as 90% of MSY or its proxy when the stock is considered healthy is consistent with the decision made with respect to other reef fish stocks in Amendment 48 to the Reef Fish FMP (GMFMC 2021a).

Council Conclusions:

The Council selected **Alternative 2** in Action 1 as preferred to ensure that subsequent management actions related to the gag rebuilding plan were consistent with the best scientific information available, as recommended by the SSC. The Council acknowledged that the change in MSY proxy to 40% SPR reflected a more conservative approach that would rebuild the gag stock to a more robust size, which should be more resilient to episodic mortality from red tide harmful algal blooms and sustainable levels of fishing mortality.

[7] Magnuson-Stevens Act, section (3)(33)), defines "optimum," with respect to the yield from a fishery, as the amount of fish that 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; that is prescribed on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor; and, in the case of an overfished fishery, that provides for rebuilding to a level consistent with producing the MSY in such fishery.

2.2 Action 2: Modification of Gulf Gag Catch Limits, Sector Allocation, and Rebuilding Timeline

Alternative 1: No Action. Retain the current catch limits and sector allocation of 61% recreational, 39% commercial for gag. The current OFL, ABC, and ACLs are based on a proxy for F_{MSY} of F_{MAX} and were derived, in part, using the MRIP Coastal Household Telephone Survey (CHTS) data. These catch limits in pounds (lb) gutted weight (gw) are as follows, with the recreational ACL in MRIP-CHTS units:

OFL	4,180,000
ABC	3,120,000
Stock ACL	3,120,000
Commercial ACL (39% of Stock ACL)	1,217,000
Recreational ACL (61% of Stock ACL)	1,903,000

The Council requested interim measures to reduce overfishing for the 2023 fishing year. The National Marine Fisheries Service (NMFS) implemented these measures on May 3, 2023, which will be effective for up to 366 days. Catch limits are in MRIP-FES units and in pounds gutted weight (lb gw) as follows:

OFL	4,180,000
ABC	3,120,000
Stock ACL	661,901
Commercial ACL (39% of Stock ACL)	258,142
Recreational ACL (61% of Stock ACL)	403,759

Alternative 2: Revise the catch limits for gag and establish a rebuilding time for the gag stock. The OFL, ABC, and ACLs are based on an F_{MSY} proxy of the yield when fishing at $F_{40\%SPR}$. The ABC is equal to the stock ACL, which equals the combined total ACLs from both sectors. Retain the current sector allocation percentages of 61% recreational, 39% commercial, which were based on the percentages of recreational to commercial landings from a 1986-2005 reference period using MRIP-CHTS recreational data. The catch limits in lb gw are rounded down to the nearest thousand pounds to ensure the sum of the sector ACLs does not exceed the ABC. The recreational ACL is informed by the State Reef Fish Survey (SRFS) for private recreational vessels, by MRIP-FES data for the for-hire and shore modes, and by the Southeast Region Headboat Survey (SRHS) for headboats, and are as follows for each rebuilding timeline option:

Option 2a: The minimum time to rebuild (T_{Min}) in the absence of direct fishing pressure (F = 0), equal to 11 years. This option does not include dead discards.

$F = F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.603	0	0	0
2025	0.821	0	0	0
2026	1.009	0	0	0
2027	1.222	0	0	0
2028	1.48	0	0	0

Option 2b: 75% of $F_{40\%SPR}$, which would rebuild the stock in 18 years.

$F = F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.603	0.453	0.276	0.176
2025	0.821	0.627	0.382	0.244
2026	1.009	0.783	0.477	0.305
2027	1.222	0.961	0.586	0.374
2028	1.48	1.177	0.718	0.459

Option 2c: T_{Min} * 2, which would rebuild the stock in 22 years.

$F = F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.603	0.547	0.333	0.213
2025	0.821	0.749	0.456	0.292
2026	1.009	0.926	0.564	0.361
2027	1.222	1.127	0.687	0.439
2028	1.48	1.371	0.836	0.534

Preferred Alternative 3: Revise the catch limits for gag and establish a rebuilding time for the gag stock. The OFL, ABC, and ACLs are based on the F_{MSY} proxy of the yield when fishing at $F_{40\%SPR}$. The ABC is equal to the stock ACL, which equals the combined total ACLs from both sectors. Revise the sector allocation to 65% recreational, 35% commercial, using average landings from 1986 – 2005, but using SRFS recreational landings data for the private recreational vessel fleet and MRIP-FES/SRHS for all other recreational landings data. The catch limits in lb gw are rounded down to the nearest thousand pounds to ensure the sum of the sector ACLs does not exceed the ABC; the recreational ACL is informed by SRFS for private recreational vessels, by MRIP-FES data for the for-hire and shore modes, and by the SRHS for headboats, and are as follows for each rebuilding timeline option:

Option 3a: The minimum time to rebuild (T_{Min}) in the absence of direct fishing pressure (F = 0) is equal to 11 years. This option does not include dead discards.

F = $F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.591	0	0	0
2025	0.805	0	0	0
2026	0.991	0	0	0
2027	1.200	0	0	0
2028	1.454	0	0	0

Preferred Option 3b: 75% of $F_{40\%SPR}$, which would rebuild the stock in 18 years.

F = $F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.591	0.444	0.288	0.155
2025	0.805	0.615	0.399	0.215
2026	0.991	0.769	0.499	0.269
2027	1.200	0.943	0.613	0.330
2028	1.454	1.156	0.751	0.404

Option 3c: T_{Min} * 2, which would rebuild the stock in 22 years.

F = $F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.591	0.537	0.349	0.188
2025	0.805	0.736	0.478	0.257
2026	0.991	0.911	0.592	0.319
2027	1.200	1.109	0.720	0.388
2028	1.454	1.349	0.876	0.472

Discussion:

This action would modify Gulf gag catch limits to end overfishing of gag and rebuild the stock. The alternatives in this action include rebuilding timelines based on the amount of time estimated to be required to rebuild the gag stock from its current overfished condition to a condition at which the gag SSB is equal to or greater than the SSB at MSY. SEDAR 72 (2022) estimated that the SSB for gag is below the MSST, or 50% of the B_{MSY}. The minimum time to rebuild the stock, or T_{Min}, was estimated to be 11 years, assuming an MSY proxy of the yield when fishing at $F_{40\%SPR}$, and assuming no fishing mortality (F = 0). In practice, closing all directed harvest of gag would not be expected to eliminate all fishing mortality, as some gag would still be expected to be discarded and die as fishermen continue fishing for other species that live in similar habitats as gag. Thus, the estimation of 11 years to rebuild the stock under T_{Min}, assuming no

fishing mortality, should be viewed as the minimum time to rebuild, and not accounting for dead discards related to fishing activity targeting other species. Similarly, for all rebuilding timelines presented in Action 2, the actual time to rebuild the stock is expected to be dependent on multiple factors besides just directed fishing mortality. Changes in fishing effort which change the frequency of gag dead discards, the frequency episodic mortality events like red tide harmful algal blooms, and fluctuations in reproduction and recruitment, can all result in changes to the year in which gag would be rebuilt.

Alternative 1 would retain the current catch limits which are based in part on MRIP-CHTS data, and is not considered consistent with the best scientific information available. These catch limits have remained in place since 2015, due in large part to the uncertainty expressed by the SSC when reviewing in the SEDAR 33 Update (2016) stock assessment. SEDAR 33 Update detailed a low proportion of males in the SSB, which the SSC thought may have a negative effect on the stock's reproductive ability. The SSC's uncertainty about the potential effects of a low proportion of males in the SSB on the stock's reproductive capacity was acknowledged by the Council, which decided not to increase the catch limits for gag following SEDAR 33 Update. Combined with current fishing mortality, it is expected that **Alternative 1** would result in removals in excess of those projected to be sustainable by the SEDAR 72 (2022) stock assessment. Therefore, **Alternative 1** is not considered viable because it would not end overfishing, and would allow harvest in excess of that projected to allow the stock to rebuild under any of the rebuilding timelines allowed under the Magnuson-Stevens Act. As such, **Alternative 1** will not be discussed further in this section.

Interim Rule – Catch Limits

NMFS, as recommended by the Council, implemented an interim temporary rule to reduce overfishing of gag for the 2023 fishing year, while this amendment is being developed. There are two actions in this interim rule, the first of which set the ACL for gag at 661,901 lb gw, based on the projections from the first version of SEDAR 72 (2021), which used MRIP-FES and the SRHS estimates for recreational landings and discards estimates. The SEDAR 72 2022 update using SRFS was not yet available when work on this interim rule began. The interim rule does not modify the sector allocation from that specified in Reef Fish Amendment 30B (GMFMC 2008a), but it does use a modified F_{MSY} proxy of $F_{30\%SPR}$. This modification was supported at the time by the Council's SSC based on the susceptibility of gag to episodic mortality from red tide, evidence of low recruitment since the late 2000s, and consideration that gag may be experiencing sperm limitation as a result of a lack of males in the population. This interim rule was implemented on May 3, 2023. According to the Magnuson-Stevens Act, an interim rule may be implemented for 180 days, and may be reauthorized for an additional 186 days, for a maximum effective time period of 366 days.

Multi-Use Individual Fishing Quota (IFQ) Shares

Under both **Alternative 2** and **Preferred Alternative 3**, gag would be under a rebuilding plan. Amendment 32 to the Reef Fish FMP (GMFMC 2011b) established provisions for multi-use IFQ shares for gag and red grouper. At the time the commercial quota for gag or red grouper is distributed to IFQ shareholders, a percentage of each shareholder's initial gag and/or red grouper allocation will be converted to multi-use allocation. This multi-use allocation, determined annually, is based on the following formula:

Red Grouper:
Red Grouper multi-use allocation (in %) = 100 * [Gag ACL—Gag commercial quota]/Red grouper commercial quota

Gag:
Gag multi-use allocation (in %) = 100 * [Red grouper ACL—Red grouper commercial quota]/Gag commercial quota

However, if gag is under a rebuilding plan, the percentage of red grouper multi-use allocation is set equal to zero. Red grouper multi-use allocation may be used to possess, land, or sell red grouper only after an IFQ account holder's (shareholder and vessel accounts) red grouper allocation has been landed and sold, or transferred; and to possess, land, or sell gag, only after both gag and gag multi-use allocation have been landed and sold, or transferred. Thus, so long as gag is in a rebuilding plan, zero percent of a shareholder's initial red grouper allocation will be converted to multi-use allocation. However, the amount of gag multi-use allocation would differ under both **Alternative 2** and **Preferred Alternative 3**, since red grouper is not in a rebuilding plan and because the gag commercial quota would differ annually from 2024 – 2028.

"SRFS data" as discussed in this section refers to a dataset including SRFS estimates for Florida private recreational vessels, MRIP-FES estimates for the for-hire and shore mode, and by the SRHS estimates for headboats. Both **Alternative 2** and **Preferred Alternative 3** modify the catch limits for gag by using SRFS data for both the setting and monitoring of catch limits, based on an SSC-recommended MSY proxy of the yield when fishing at $F_{40\%SPR}$. During its August 2022 meeting, the Council reviewed the SRFS-calibrated historical landings from six different historical reference periods from 1986 – 2019 to examine the effects on the sector allocation.[8] These options were shown to differ by less than 1% up to less than 4%. Because the options were so similar, the Council determined that the options presented (**Alternative 2** and **Preferred Alternative 3**) were sufficient for further consideration, and that additional options considering more recent years of landings data were unnecessary. The catch limits specified for each of these alternatives, however, are reliant on two other key decisions embedded in each alternative. For both **Alternative 2** and **Preferred Alternative 3**, the ABC is equal to the stock ACL, which equals the combined total ACLs from both sectors.

[8] https://gulfcouncil.org/wp-content/uploads/Tab-B-11d-RF56-August-2022-Council-OPTIONS-08252022.pdf

The first key decision point is with respect to the sector allocation between the commercial and recreational fishing sectors. **Alternative 2** uses a sector allocation of 61% recreational, 39% commercial, using the average landings from 1986 – 2005, as specified in Reef Fish Amendment 30B (GMFMC 2008a). This sector allocation uses historical landings data calibrated to MRIP-CHTS, which the SSC no longer supports as being consistent with the best scientific information available. The sector allocation ratio in **Alternative 2** results in a *de facto* reallocation to the commercial sector of approximately 4%. This is because SRFS-calibrated landings from 1986 – 2005 are slightly higher than MRIP-CHTS landings for the same years, upon which the status quo sector allocation was determined. This difference is evident in the sector allocation ratio in **Preferred Alternative 3**, which results in a sector allocation of 65% recreational, 35% commercial. Selecting **Alternative 2** would thus reallocate fish to the commercial sector; whereas, selecting **Preferred Alternative 3** would adjust the sector allocation to reflect the historical landings from the reference period (1986 – 2005) calibrated to SRFS units. **Alternative 2** would be expected to result in comparatively greater yields for the commercial sector due to this de facto reallocation in the change from MRIP to SRFS, and lower yields for the recreational sector compared to the status quo. Conversely, **Preferred Alternative 3** would be expected to result in a comparatively similar allocation of the stock ACL for both the commercial and recreational sectors compared to the status quo in **Alternative 1**.

The second key decision is the rebuilding time. The Magnuson-Stevens Act requires that the rebuilding time period be as short as possible, taking into consideration several factors, including the status and biology of the overfished stock and the needs of fishing communities.[9] The rebuilding time options in **Alternative 2** and **Preferred Alternative 3** include T_{Min}, which is 11 years, and two time periods based on the alternative methods to determine T_{Max} specified in the National Standard 1 Guidelines (50 CFR 600.310(j)(3)(i)(B)(*2*)), for stocks for which T_{Min} is greater than 10 years. Generally, the longer the rebuilding timeline, the greater the catch limits are in the earlier part of the projections; however, all of the rebuilding timelines rebuild the stock to a similar measure of total SSB. **Option a** for both alternatives would set the rebuilding timeline based on T_{Min}, or 11 years, which is contingent on the fishing mortality being set at zero. This would equate to an ABC of 0 lb gw for 2024 – 2028 and subsequent years, until the stock is rebuilt. **Option b** would set the rebuilding timeline based on the amount of time the stock or stock complex is expected to take to rebuild if fished at 75% of the yield at $F_{40\%SPR}$. This equates to an 18-year rebuilding period. **Option c** would set the rebuilding timeline based on twice the minimum time to rebuild or T_{Min} * 2, which equates to a 22-year rebuilding period.[10] It is important to note that any rebuilding timeline and the corresponding catch limits would be expected to be re-evaluated by subsequent stock assessments and interim analyses as reviewed

[9] 16 U.S.C. § 1854(e)(4).

[10] At its January 2023 meeting, the Council also reviewed a rebuilding timeline of T_{Min} plus one generation time (8 years for gag), which resulted in a total rebuilding period of 19 years. Because this option resulted in a rebuilding time similar to that using 75% of $F_{40\%SPR}$ (18 years, respectively), the Council moved this option in Alternatives 2 and 3 to the Considered but Rejected Appendix. The Council also discussed whether to consider in more detail a rebuilding time in between T_{Min} (11 years) and the shortest option for T_{Max} (18 years). The Council decided not to add an additional alternative because a slightly shorter rebuilding time would provide minimal benefits to the stock but increase the negative impacts to fishing communities.

by the SSC. These subsequent analyses, depending on the data evaluated, could be used to revise the rebuilding timeline based on contemporary data about recruitment, male:female sex ratio, SSB, and other measurables. The next interim analysis for gag will be conducted as a stock health check and reviewed by the SSC in September 2023. Another interim analysis will be expected in September 2024, and may be considered for revising catch advice. A stock assessment for gag will begin in 2025.

As more of the stock ACL is allocated to the recreational sector relative to the commercial sector, an increase in gag mortality for that sector is assumed due to the far greater number of discards that occur in the recreation sector, and the proportion of those discards that are expected to die. This increase in regulatory discards, stemming from regulations like minimum size and retention limits, and closed season discards, results in a decrease in allowable harvest compared to the status quo. Thus, the rebuilding timeline options in **Alternative 2** result in higher catch limits than those in **Preferred Alternative 3**, because of the lower total sector allocation to the recreational sector in **Alternative 2**. Excluding **Option a** (T_{Min} at F = 0; ABC = 0 lb gw for 11 years) for both **Alternative 2** and **Preferred Alternative 3**, the largest catch limits come from **Option 2c** of **Alternative 2**, and the smallest catch limits come from **Preferred Option 3b** of **Preferred Alternative 3**.

Council Conclusions:

The Council selected **Option 3b** in **Alternative 3** in Action 2 as its preferred alternative. **Alternative 3** modifies sector allocations based on historical SRFS landing estimates, resulting in an allocation of 65% to the recreational sector, and 35% to the commercial sector. **Option 3b** sets catch limits based on an 18-year rebuilding timeline. Any rebuilding timeline chosen would assume that discards are decreased proportionally to landings, which is likely not true in this case due to recreational discards of gag that would occur while fishermen target co-occurring species (e.g., red snapper, red grouper). However, the Council has taken additional action to reduce recreational catch and thereby recreational fishing mortality (e.g., larger recreational ACL/ACT buffers) to attempt to account for this discrepancy for discard mortality. Although an exact accounting of total mortality (harvest plus discard mortality) cannot be determined at this time, it is the Council's intent to reduce fishing mortality (in Action 3) to account for increased discard mortality. The Council determined that the historical SRFS landing estimates represented historical fishing effort, and that the revision of the sector allocation based on the same reference period used for the current allocation (1986 – 2005) was fair and equitable. The Council initially reviewed allocation options based on six different times series, but removed those options from further consideration because they resulted in relatively minor differences. The Council recognized that both **Alternatives 2** and **3** would promote conservation of the gag stock because they would modify the allowable harvest consistent with the result of the stock assessment and SSC's recommendations. With respect to the rebuilding time, the Council determined that **Option 3a** (11 years), which assumes no fishing mortality, is not feasible given the multi-species nature of the reef fish fishery but would result in greatest adverse impacts to fishing communities. **Option 3c** (22 years) would result in the least adverse impacts to fishing committees but would be the maximum time allowed under the National Standard 1 guidelines. **Preferred Option 3b** (18 years) is consistent with the statutory requirement to rebuild the stock

in the shortest time possible, considering the status and biology of the overfished stock and the needs of fishing communities.

2.3 Action 3: Modify the Gulf Gag Sector Annual Catch Targets (ACT) Based on the Catch Limits and Sector Allocation Selected in Action 2

Action 2 specifies the sector allocation, sets the ACLs for the recreational and commercial sector, and sets the rebuilding period for Gulf gag. Action 3 specifically addresses the ACTs for the recreational (Sub-Action 3.1) and commercial (Sub-Action 3.2) sectors, and the commercial quota for the Gag IFQ Program. The ACTs are used to account for additional management uncertainty, to reduce the likelihood that a sector's landings in a fishing year do not exceed that sector's ACL for that year. Typically, the buffer between a sector ACL and sector ACT accounts for uncertainty in the precision of fishing season duration projections, especially for fishing season durations that are only a few months or less.

2.3.1 Sub-Action 3.1: Modify the Recreational ACT

Alternative 1: No Action. Retain the current buffer between the recreational ACL and ACT. The recreational ACT is set equal to the yield at 75% of F_{MAX}, as specified in Amendment 30B to the Reef Fish FMP. This resulted in the recreational ACT being set at 89.75% of the recreational ACL.

Under Alternative 1 of Action 2, these catch limits in lb gw are as follows, with the recreational ACL and ACT in MRIP-CHTS units:

OFL	4,180,000
ABC	3,120,000
Stock ACL	3,120,000
Recreational ACL (61% of Stock ACL)	1,903,000
Recreational ACT	1,708,000

The Council requested interim measures to reduce overfishing for the 2023 fishing year. NMFS implemented these measures on May 3, 2023, which would be effective for up to 366 days. Catch limits are in MRIP-FES units and in lb gw as follows:

OFL	4,180,000
ABC	3,120,000
Stock ACL	661,901
Recreational ACL (61% of Stock ACL)	403,759
Recreational ACT	362,374

Alternative 2: Revise the recreational ACT using the Council's ACL/ACT Control Rule, based on the 2018 – 2021 recreational fishing years, using MRIP-CHTS units so as to properly compare the landings in those fishing years with the ACLs for the same years, which were defined using MRIP-CHTS. This calculation is demonstrated in Appendix D and results in a

10% buffer between the recreational ACL and recreational ACT. The recreational ACT would be determined based on the recreational ACL chosen in Action 2.

Preferred Alternative 3: Revise the recreational ACT by establishing a 20% buffer between the recreational ACL and recreational ACT. The recreational ACT would be determined based on the recreational ACL chosen in Action 2.

Discussion:

Alternative 1 (No action) would retain the current buffer between the recreational sector ACL and ACT for Gulf gag. The recreational sector's ACL is equal to that sector's allocation of the ABC, based on the alternative and option selected in Action 2. Under **Alternative 1**, the recreational ACT is set equal to the yield at 75% of F_{MAX}, as specified in Amendment 30B (GMFMC 2008a). As noted in Chapter 1, following the review of SEDAR 72 (2021), the Council's SSC no longer supported the use of F_{MAX} as a proxy for F_{MSY}, as it allowed for setting catch limits based on the maximum yield per recruit. Given the current low proportion of male gag (approximately 1 male per 50 females; SEDAR 72 2021), hermaphroditism, and the stock's susceptibility to red tide, the SSC thought F_{MAX} was too aggressive and not sustainable. Following the SSC's initial review of SEDAR 72 (2021), the SSC recommended a revised MSY proxy equal to the yield at $F_{30\%SPR}$, which was incorporated into the gag interim measures final temporary rule (See Chapter 1). Later, following its review of the SEDAR 72 run using SRFS for the private angling component of the recreational sector (SEDAR 72 2022), the SSC recommended revising the MSY proxy equal the yield at $F_{40\%SPR}$. Thus, F_{MAX} no longer represents the best scientific information available, making **Alternative 1** a non-viable alternative. Further, under **Alternative 1**, the recreational ACT is determined using a moving average, whereby the recreational ACT is defined as follows after a change in the catch limits: the recreational ACT equals the yield at 75% of F_{MAX} in the first year; the average of the ACTs in the first and second years for the second year; and, the average of the most recent three years in all subsequent years. The recreational accountability measures (AMs) are triggered based on the most recent three-year average of the recreational landings compared to the most recent three-year average of the recreational ACLs (GMFMC 2008a). This method predates the Generic ACL/AM Amendment (GMFMC 2011a) and the creation of the Council's ACL/ACT Control Rule (see **Alternative 2** below).

Alternative 2 would revise the recreational ACT using the Council's ACL/ACT Control Rule, based on the 2018 – 2021 recreational fishing years. The Council's ACL/ACT Control Rule was established in the Generic ACL/AM Amendment (GMFMC 2011a) and examines a combination of a sector's landings history relative to the sector ACL, the precision of the landings data, the type of in-season AM, and the stock status to create a weighted buffer between the sector ACL and sector ACT. The fishing years used in **Alternative 2** represent the most recent four full years of finalized recreational landings data at the time this analysis was completed. These calculations in the ACL/ACT Control Rule use MRIP-CHTS units to compare the landings as collected in those fishing years with the ACLs for the same years, which were also defined using MRIP-CHTS units. This calculation is demonstrated in Appendix D, and results in a 10% buffer between the recreational ACL and recreational ACT. The resultant recreational ACTs are demonstrated relative to the recreational ACLs in Table 2.3.1. The determination of whether the

recreational AMs are triggered would be based on the Council's preferred alternative in Action 4 of this document.

Alternative 2 and **Preferred Alternative 3** differ from **Alternative 1** in that they do not specify the recreational ACT relative to F_{MSY} or its proxy, but rather relative to the recreational ACL, as is typical of other federally managed species in the Gulf since the creation of the ACL/ACT Control Rule in 2011. **Preferred Alternative 3** would revise the recreational ACT by establishing a 20% buffer between the recreational ACT and ACL. **Preferred Alternative 3** effectively doubles the buffer calculated through the Council's ACL/ACT Control Rule in **Alternative 2**, which would increase the probability of rebuilding by accounting for uncertainty in managing recreational harvest and further reducing fishing mortality and discards that result from directed harvest.

Council Conclusions:

The Council selected **Alternative 3** in Action 3/Sub-Action 3.1 as the preferred alternative. This alternative would revise the recreational ACT by establishing a 20% buffer between the recreational ACT and ACL, effectively doubling the buffer calculated through the Council's ACL/ACT Control Rule in **Alternative 2**. The Council concluded that increasing the buffer between the ACL and ACT would reduce the probability of the recreational sector exceeding the ACL, which would reduce the likelihood of overfishing, and may reduce the level of discards associated with directed harvest. The Council concluded that this would increase the probability of meeting the timeline for rebuilding the gag stock (as selected in Action 2).

2.3.2 Sub-Action 3.2: Modify the Commercial ACT and Quota

Alternative 1: No Action. Retain the current buffer between the commercial ACL and ACT. The commercial ACL is equal to 39% (i.e., its sector allocation) of the stock ACL. The commercial ACT is set equal to the yield at 75% of F_{MAX}, as specified in Amendments 30B and 32 to the Reef Fish FMP. The commercial quota is set at 86% of the commercial ACT, as specified in Amendment 32 to the Reef Fish FMP. This results in a commercial quota that is approximately 77% of the commercial ACL. For the commercial sector, the IFQ program serves as the AM.

Under Alternative 1 of Action 2, these catch limits in lb gutted weight (gw) are as follows:

OFL	4,180,000
ABC	3,120,000
Stock ACL	3,120,000
Commercial ACL (39% of Stock ACL)	1,217,000
Commercial ACT	1,091,860
Commercial Quota	939,000

The Council requested interim measures to reduce overfishing for the 2023 fishing year. Upon implementation on May 3, 2023, these interim measures would be effective for up to 366 days.

The interim measures specified the commercial quota as 77% of the commercial ACL. Catch limits in lb gw are as follows:

OFL	4,180,000
ABC	3,120,000
Stock ACL	661,901
Commercial ACL (39% of Stock ACL)	258,000
Commercial ACT	*Not Specified*
Commercial Quota	199,000

Alternative 2: Set the commercial quota for the gag IFQ program equal to the commercial ACT. The commercial ACT will be fixed at 86% of the commercial ACL. The IFQ program functions as the AM for the commercial sector for gag.

Preferred Alternative 3: Set the commercial quota for the gag IFQ program equal the commercial ACT. The commercial ACT will be fixed at 95% of the commercial ACL. The IFQ program functions as the AM for the commercial sector for gag.

Discussion:

Under **Alternative 1**, the commercial quota is set at 86% of the commercial ACT, as specified in Amendment 32 (GMFMC 2011b). Therein, the Council determined that reductions in the gag quota under that rebuilding plan assumed a proportional reduction in dead discards of gag. However, due to the limited amount of gag IFQ allocation available in the initial years of that rebuilding plan, gag bycatch and discards from fishermen targeting red grouper or other fish were predicted to be higher than assumed in the assessment projections. Data to inform the effects of changes to commercial dead discards were sparse or lacking when Amendment 32 was developed. The Council decided to explicitly account for dead discards in the commercial sector that were not accounted for in the assessment analyses. This was done by reducing the gag commercial quota to 86% of the commercial ACT to compensate for these dead discards not being reduced sufficiently to the projected levels needed to achieve rebuilding of the gag stock in the chosen time frame. For the commercial sector, the IFQ program serves as the AM (Amendment 29; GMFMC 2008b). As with Alternative 1 in Sub-Action 3.1, **Alternative 1** in Sub-Action 3.2 is a non-viable alternative, since it uses F_{MAX}, which is no longer consistent with the best scientific information available.

Alternative 2 and **Preferred Alternative 3** would both set the commercial quota for gag equal to the commercial ACT. The commercial ACT would be set at a fixed percentage below the commercial ACL, as either 86% (**Alternative 2**) or 95% (**Preferred Alternative 3**) of the commercial ACL. The resultant commercial ACTs are demonstrated relative to the commercial ACLs in Table 2.3.1. The gag IFQ program serves as the AM for the commercial sector for both of these alternatives. Setting the commercial quota equal to the commercial ACT is consistent with the treatment of the ACT/quota relationship used in other IFQ program species in the Gulf (e.g., red grouper, shallow-water grouper). **Alternative 2** takes the current buffer between the

commercial ACT and commercial quota, as specified in **Alternative 1**, and applies it as the buffer between the commercial ACT and commercial ACL. The logic for this 14% buffer comes from the 2011 gag interim rule (NMFS 2011b) and Amendment 32 (GMFMC 2011b). At the February 2011 Council meeting, NMFS presented an analysis of best case and worst-case scenarios regarding reduction of commercial gag bycatch in proportion to the reduction in gag commercial quota under the temporary rule to set the 2011 quota. It was unknown at the time how commercial fishermen would behave under the newly implemented IFQ program. If commercial fishermen with little or no gag allocation actively sought to avoid gag while fishing for red grouper and other shallow-water grouper, then dead discards of gag would be reduced approximately in proportion to the reduction in quota. However, if fishermen maintained their pre-IFQ fishing patterns, then dead discards of gag would not be reduced and could increase. Under the best-case scenario in the 2011 analysis, no adjustment for dead discards would be necessary, and the quota could remain at 100% of the commercial allocation. Under the worst-case scenario in the 2011 analysis, the quota would need to be reduced to 47% of the unadjusted allocation in order to achieve the necessary reduction in total removals after accounting for dead discards to stay in line with the rebuilding plan. The Council thought the true scenario would be between the best- and worst-case scenarios, but likely closer to the best-case. The Council ultimately decided to place the adjustment at the 75th percentile between the worst and best case. This was calculated to be 86% of the unadjusted allocation, or a 14% reduction. This adjustment was applied in the 2011 temporary rule, and in Amendment 32.

Preferred Alternative 3 would reduce the buffer between the commercial ACT and commercial ACL to 5%. Since the analysis that resulted in the management decisions in Amendment 32, considerable improvements in the estimation of commercial landings and discards have occurred (SEDAR 72 2022). Commercial landings are considered to be known with greater precision and are modeled with a coefficient of variation in the stock assessment model of 0.01. Commercial discards and the fraction of commercial catch that is discarded are also included in the model and are factored into the yield projections that inform catch limit recommendations from the SSC. Further, the fraction of gag discarded compared to the total number of gag caught has remained low, especially for the commercial longline fleet (NMFS 2022b).

Table 2.3.1. Recreational and commercial ACLs and ACTs based on alternatives and options in Action 3 compared to viable alternatives in Action 2. Catch limits are expressed in mp gw.

			Action 3 Alternatives					
			Sub-Action 3.1			Sub-Action 3.2		
				Alternative 2	Preferred Alternative 3		Alternative 2	Preferred Alternative 3
Year	Action 2 Alternatives	Action 2 Options	Rec ACL	Rec ACT	Rec ACT	Com ACL	Com ACT/ Quota	Com ACT/ Quota
2024	Alternative 2	Option 2a	0	0	0	0	0	0
		Option 2b	0.276	0.248	0.220	0.176	0.151	0.167
		Option 2c	0.333	0.299	0.266	0.213	0.183	0.202
	Alternative 3	Option 3a	0	0	0	0	0	0
		Option 3b	0.288	0.259	0.230	0.155	0.133	0.147
		Option 3c	0.349	0.314	0.279	0.188	0.161	0.178
2025	Alternative 2	Option 2a	0	0	0	0	0	0
		Option 2b	0.382	0.344	0.305	0.244	0.209	0.231
		Option 2c	0.456	0.410	0.364	0.292	0.251	0.277
	Alternative 3	Option 3a	0	0	0	0	0	0
		Option 3b	0.399	0.359	0.319	0.215	0.184	0.204
		Option 3c	0.478	0.430	0.382	0.257	0.221	0.244
2026	Alternative 2	Option 2a	0	0	0	0	0	0
		Option 2b	0.477	0.429	0.381	0.305	0.262	0.290
		Option 2c	0.564	0.507	0.451	0.361	0.310	0.343
	Alternative 3	Option 3a	0	0	0	0	0	0
		Option 3b	0.499	0.449	0.399	0.269	0.231	0.255

			Action 3 Alternatives					
		Option 3c	0.592	0.532	0.473	0.319	0.274	0.303
2027	Alternative 2	Option 2a	0	0	0	0	0	0
		Option 2b	0.586	0.527	0.468	0.374	0.321	0.355
		Option 2c	0.687	0.618	0.549	0.439	0.377	0.417
	Alternative 3	Option 3a	0	0	0	0	0	0
		Option 3b	0.613	0.551	0.490	0.330	0.283	0.313
		Option 3c	0.720	0.648	0.570	0.388	0.333	0.368
2028	Alternative 2	Option 2a	0	0	0	0	0	0
		Option 2b	0.718	0.646	0.574	0.459	0.394	0.436
		Option 2c	0.836	0.752	0.668	0.534	0.459	0.507
	Alternative 3	Option 3a	0	0	0	0	0	0
		Option 3b	0.751	0.675	0.600	0.404	0.347	0.383
		Option 3c	0.876	0.788	0.700	0.472	0.405	0.448

Council Conclusions:

The Council selected **Alternative 3** in Action 3/Sub-Action 3.2 as the preferred alternative. This alternative would set the commercial quota equal to the commercial ACT, and would reduce the buffer between the commercial ACT and commercial ACL to 5% of the ACL. In making this decision, the Council considered the improvements that have been made in estimating commercial landings and discards since the 14% buffer between the ACL and ACT was implemented in Amendment 32 to the Reef Fish FMP. Commercial landings and discards are now known with much improved precision, and the uncertainty surrounding these estimates is much lower. In addition, the proportion of gag discarded compared to gag retained is low. Thus, the Council reasoned that the current 14% buffer was too high and unnecessarily limited catch in the commercial sector, and that a 5% buffer between the ACL and ACT was more appropriate.

2.4 Action 4: Modification of Gulf Gag Recreational Fishing Season Start Date and Accountability Measures (AM)

Alternative 1: No Action. Retain the current June 1 recreational fishing season opening for gag and the requirement that NMFS prohibit harvest when the recreational ACL is projected to be met. In addition, if recreational landings exceed the recreational ACL, NMFS will maintain the recreational ACT for the following fishing year at the level of the prior year's ACT, unless the best scientific information available determines that maintaining the prior year's ACT is unnecessary.

Alternative 2: Retain the current June 1 recreational fishing season opening for gag. Modify the AMs to direct to NMFS prohibit harvest when the recreational ACT is projected to be met. In addition, remove the provision that requires NMFS to maintain the prior year's ACT if the ACL is exceeded in the previous year.

Preferred Alternative 3: The federal recreational fishing season for Gulf gag would open on 12:01 am local time on September 1. Modify the AMs to direct to NMFS prohibit harvest when the recreational ACT is projected to be met. In addition, remove the provision that requires NMFS to maintain the prior year's ACT if the ACL is exceeded in the previous year.

Alternative 4: The federal recreational fishing season for Gulf gag would open on 12:01 am local time on October 1. Modify the AMs to direct to NMFS prohibit harvest when the recreational ACT is projected to be met. In addition, remove the provision that requires NMFS to maintain the prior year's ACT if the ACL is exceeded in the previous year.

Discussion:

This action would modify the start date for the Gulf federal gag recreational fishing season and modify the AMs. Action 3 in this document contains two viable alternatives for modifying the recreational ACT, which results in either a 10% or 20% buffer between the recreational ACT and recreational ACL. That buffer is assumed in the recreational fishing season duration analyses for Action 4 and in Appendix B. The intent of this action is to balance the number of days the season would be open with the necessity to reduce the overall mortality of gag, with special attention paid to reducing fishing mortality on male gag, which make up a historically unprecedented low proportion of the exploitable biomass (less than 2%, SEDAR 72 2022). Each of these alternatives, in concert with whichever alternatives are selected as preferred in Action 2 and Action 3, Sub-Action 3.1, constitutes a shorter fishing season duration compared to past fishing seasons, which have been open from June 1 – December 31 since 2018 (note that the 2023 temporary rule will reduce the recreational gag season to a maximum of 70 days). Because the season opening dates proposed in **Preferred Alternative 3** and **Alternative 4** would be in the fall, there would not be sufficient time for NMFS to receive landings data to analyze in-season or prior to the end of the fishing year. Thus, the season duration would be based solely on NMFS' projection of the season length without any possibility of re-opening. As such, the uncertainty in the recreational fishing season duration projections for all of the alternatives is

expected to be substantial until additional years of daily catch and effort data are available based on the season opening date selected. Because the 2023 recreational gag season will begin on September 1, rather than July 1, NMFS will have this 2023 data available for use with in-season duration projections for 2024, provided **Preferred Alternative 3** (September 1 start date) is implemented. These projections will not be available for this document. However, under **Alternatives 1** and **2**, if any portion of the recreational ACL or ACT, respectively, was not landed by the conclusion of the projected fishing season, NMFS could reopen the recreational fishing at some point before the end of the fishing year on December 31 after landings became available to determine if the catch limit had been met. Alternative 1 in Action 2 would not reduce overfishing, and Alternative 1 in Sub-action 3.1 of Action 3 are not consistent with the best scientific information available; therefore, neither is included in the discussion of Action 4 alternatives.

The compressed fishing season durations projected in Action 4 are not without an inherent risk of exceeding the recreational ACL. For the recreational sector, the current post-season AM, which would be employed in **Alternative 1**, is intended to prevent successive overages of the recreational ACL. The AM states that if gag is overfished and the recreational ACL is exceeded in a fishing year, then in the following fishing year, the amount of the overage will be deducted from the following fishing year's recreational ACL. Further, the recreational ACT from the previous season will be maintained, as reduced by the amount of the ACL overage from the previous year, and the fishing season duration will be set based on the revised recreational ACT. **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** would modify the AMs to direct to NMFS prohibit harvest when the recreational ACT is projected to be met, but allow NMFS to re-open if landings data shows that landings were below the ACT.[11] However, NMFS cannot currently provide landings estimates before the end of the calendar year under **Preferred Alternatives 3** and **Alternative 4**, so no re-opening would be possible under those alternatives. In addition, **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** would remove the provision that requires NMFS to maintain the prior year's recreational ACT if the recreational ACL is exceeded in the previous year.

The fishing season durations projected in Action 4 were determined by dividing the monthly landings for 2019 – 2021 by the number of days per month to determine the daily catch rates applicable to the season opening. An important caveat to these data is that daily landings estimates are assumed to be the same for both weekends and weekdays. Landings were estimated using SRFS data.

Modifications to when the fishing season begins within the fishing year are expected to have positive or negative consequences depending on the time of year when fishing effort occurs.

[11] Currently, the regulations at 50 C.F.R. § 622.8(c) allow NMFS to re-open if data indicate that a quota or ACL was not reached as projected. Several stocks have ACTs that are also codified as quotas. However, some ACTs, such as the gag recreational ACT, do not have corresponding quotas and therefore are not included in the current authority to re-open. NMFS intends to modify the regulations in section 622.8(c) to add a reference to ACTs. This will remove the discrepancy between ACTs that are also codified as quotas and those ACTs that are not codified as quotas.

Several other reef fish species are open to recreational harvest in federal waters in the Gulf during June (e.g., red snapper, red grouper, gray snapper, hogfish, vermilion snapper), and gag may be caught during fishing activity directed at these species. Thus, having a recreational fishing season for gag co-occurring during this peak in recreational reef fish fishing may reduce regulatory dead discards of gag during the overlapping season. Also, water temperatures along the west Florida Shelf during the summer months (i.e., June through September) are typically considerably warmer than in October through December. Fishermen have often reported that gag feed more aggressively when water temperatures are cooler, and particularly when nearshore waters (less than 20 meters depth) are cooler (public testimony at Council meetings). Further, studies on other reef fish describe variable discard mortality rates relative to the time of year when a fish is captured, noting that discard mortality has been observed to be lower when fish are caught and released into cool surface water compared to warm surface water (e.g., Campbell et al. 2014; Bohaboy et al. 2019, Pulver 2017). Thus, capturing and releasing gag during summer months, especially from deeper water (greater than 20 meters depth) where barotrauma becomes an increasingly influential factor on discard mortality for gag (Lazarre et al. 2021), may result in increased discard mortality compared to capturing and releasing gag during comparatively cooler fall and/or winter months. Because directed fishing effort for gag in summer months is typically conducted in greater average depths than in fall months, co-occurring with open fishing seasons for other reef fish, the probability of harvesting or discarding dead a male gag is higher by comparison in these summer months.

Recreational fishing season durations for the alternatives proposed in Action 4 are detailed in Table 2.4.1, and in further detail in Appendix B. **Alternative 1** would maintain the June 1 season start date and would maintain the current AM (i.e., managing to the ACL, and to the prior year's ACT in the year following an ACL overage). Under **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4**, NMFS would close harvest for gag when the recreational ACT is projected to be met. Based on the fishing season duration projections, a season starting June 1 that is managed to the ACL is projected to last 27 – 37 days depending on the alternative chosen in Action 3, and the duration would increase to 130 – 159 days by 2028 based on current rebuilding projections. **Alternative 2** would maintain the June 1 season start date, but manages to the ACT rather than the ACL. Based on the fishing season duration projections, a season starting June 1 is projected to last 22 – 31 days depending on the alternative chosen in Action 3, and the duration would increase to 88 – 145 days by 2028. Because the recreational gag fishing season has traditionally started on June 1, the estimated season duration for both **Alternative 1** and **Alternative 2** may be less uncertain relative to **Preferred Alternative 3** and **Alternative 4**, and thus may more likely constrain landings to the ACL or ACT. However, because the season would be compressed from the June 1 – December 31 fishing season to which recreational anglers have grown accustomed, the shorter fishing season under **Alternative 1** and **Alternative 2** may increase or compress effort and make accurately predicting the season duration problematic compared to previous fishing years. Unlike **Preferred Alternative 3** and **Alternative 4**, under **Alternative 1** and **Alternative 2**, if landings (when received after the season closure) were found to be substantially below the gag recreational ACL (or ACT for **Alternative 2**), NMFS could reopen the fishing season prior to the end of the fishing year, allowing for harvest of the remaining recreational ACL (or ACT), as applicable.

Table 2.4.1. Season duration, start date, and projected end date for Action 4 alternatives. The recreational catch limits shown in the table represent the proposed catch limits for the 2024 – 2028 fishing years under **Alternative 1** and **Preferred Alternative 3** of Sub-Action 3.1 in Action 3. The range of dates listed under the projected season closure date for 2024 represent the predicted margin of error in the projections, based on the landings data (catch and effort) from 2019 – 2021. Note: This table is identical to Table B2 in Appendix B.

	Action 2, Alternative 1 (No Action): 39% commercial | 61% recreational								
Action 2 Alternatives	Action 4, Alt 1	Rec ACT (lb gw)	Action 4, Alt 2	Action 4, Alt 3	Action 4, Alt 4	Rec ACT (lb gw)	Action 4, Alt 2	Action 4, Alt 3	Action 4, Alt 4
No Action		1,708,000	No Closure			1,708,000	No Closure		
	Action 2, Alternative 2: 39% commercial | 61% recreational								
	Jun 1 Open		Jun 1 Open	Sep 1 Open	Oct 1 Open		Jun 1 Open	Sep 1 Open	Oct 1 Open
	No Buffer	**Action 3.1, Alt 2: 10% ACT Buffer**				**Action 3.1, Alt 3: 20% ACT Buffer**			
Alt 2a: TMin at F=0	0	0	**No Season**	**No Season**	**No Season**	**0**	**No Season**	**No Season**	**No Season**
Alt 2b: 75% of F40% SPR									
2024	**Jun 27 Jun 25 – 30** (27 days)	248,000	**Jun 24 Jun 23 – 27** (24 days)	**Nov 1 Oct 10 – Dec 28** (62 days)	**Nov 13 Oct 24 – None** (44 days)	221,000	**Jun 22 Jun 20 – Jun 24** (22 days)	**Oct 27 Oct 7 – Dec 20** (57 days)	**Nov 9 Oct 22 – None** (40 days)
2025	**Jul 13** (43 days)	344,000	**Jul 6** (36 days)	**Nov 13** (74 days)	**Nov 25** (56 days)	305,000	**Jun 30** (30 days)	**Nov 8** (69 days)	**Nov 20** (51 days)
2026	**Jul 29** (59 days)	429,000	**Jul 21** (51 days)	**Nov 24** (85 days)	**Dec 5** (66 days)	381,000	**Jul 13** (43 days)	**Nov 18** (79 days)	**Nov 29** (60 days)
2027	**Aug 31** (92 days)	527,000	**Aug 12** (73 days)	**Dec 5** (96 days)	**Dec 15** (76 days)	468,000	**Jul 28** (58 days)	**Nov 28** (89 days)	**Dec 9** (70 days)
2028	**Oct 8** (130 days)	646,000	**Sep 19** (111 days)	**Dec 18** (109 days)	**Dec 28** (89 days)	574,000	**Aug 27** (88 days)	**Dec 10** (101 days)	**Dec 20** (81 days)
Alt 2c: TMin * 2									
2024	**July 4 Jun 30 – Jul 12** (34 days)	300,000	**Jun 29 Jun 27 – Jul 4** (29 days)	**Nov 7 Oct 15 – None** (68 days)	**Nov 19 Oct 29 – None** (50 days)	266,000	**Jun 26 Jun 24 – Jun 29** (26 days)	**Nov 3 Oct 11 – None** (64 days)	**Nov 15 Oct 26 – None** (46 days)
2025	**Jul 26**	411,000	**Jul 18**	**Nov 21**	**Dec 3**	364,000	**Jul 10**	**Nov 15**	**Nov 27**

	Action 2, Alternative 1 (No Action): 39% commercial | 61% recreational								
	(56 days)		(48 days)	(82 days)	(64 days)		(40 days)	(76 days)	(58 days)
2026	**Aug 24** (85 days)	508,000	**Aug 6** (67 days)	**Dec 3** (94 days)	**Dec 13** (74 days)	451,000	**Jul 25** (55 days)	**Nov 26** (87 days)	**Dec 7** (68 days)
2027	**Oct 1** (123 days)	619,000	**Sep 10** (102 days)	**Dec 15** (106 days)	**Dec 25** (86 days)	549,000	**Aug 19** (80 days)	**Dec 7** (98 days)	**Dec 18** (79 days)
2028	**Nov 1** (154 days)	752,000	**Oct 15** (137 days)	**Dec 29** (120 days)	No Closure	668,000	**Sept 26** (118 days)	**Dec 20** (111 days)	**Dec 30** (91 days)
	Action 2, Alternative 3: 35% commercial | 65% recreational								
			Jun 1 Open	Sep 1 Open	Oct 1 Open		Jun 1 Open	Sep 1 Open	Oct 1 Open
		Action 3.1, Alt 2: 10% ACT Buffer				**Action 3.1, Alt 3: 20% ACT Buffer**			
Alt 3a: TMin at F=0	0	0	**No Season**	**No Season**	**No Season**	0	**No Season**	**No Season**	**No Season**
Preferred Alternative 3b: 75% of F40% SPR									
2024	**Jun 28 Jun 26 – Jul 1** (28 days)	259,000	**Jun 25 Jun 23 – 28** (25 days)	**Nov 2 Oct 11 – None** (63 days)	**Nov 14 Oct 25 – None** (45 days)	230,000	**Jun 23 Jun 21 – Jun 25** (23 days)	**Oct 29 Oct 8 – Dec 22** (59 days)	**Nov 11 Oct 22 – None** (42 days)
2025	**Jul 16** (46 days)	359,000	**Jul 9** (39 days)	**Nov 15** (76 days)	**Nov 27** (58 days)	319,000	**Jul 2** (32 days)	**Nov 10** (71 days)	**Nov 22** (53 days)
2026	**Aug 3** (64 days)	449,000	**Jul 24** (54 days)	**Nov 26** (87 days)	**Dec 7** (68 days)	399,000	**Jul 16** (46 days)	**Nov 20** (81 days)	**Dec 1** (62 days)
2027	**Sep 8** (100 days)	551,000	**Aug 20** (81 days)	**Dec 8** (99 days)	**Dec 18** (79 days)	490,000	**Jul 31** (61 days)	**Dec 1** (92 days)	**Dec 11** (72 days)
2028	**Oct 15** (137 days)	676,000	**Sep 28** (120 days)	**Dec 21** (112 days)	No Closure	600,000	**Sep 4** (96 days)	**Dec 13** (104 days)	**Dec 23** (84 days)
Alt 3c: TMin * 2									
2024	**Jul 7 Jul 2 – Jul 16** (37 days)	314,000	**Jul 1 Jun 28 – Jul 7** (31 days)	**Nov 9 Oct 16 – None** (70 days)	**Nov 21 Oct 30 – None** (52 days)	279,000	**Jun 27 Jun 25 – Jun 30** (27 days)	**Nov 5 Oct 13 – None** (66 days)	**Nov 17 Oct 27 – None** (48 days)
2025	**Jul 29** (59 days)	430,000	**Jul 21** (51 days)	**Nov 24** (85 days)	**Dec 5** (66 days)	382,000	**Jul 13** (43 days)	**Nov 18** (79 days)	**Nov 29** (60 days)
2026	**Sep 2**	533,000	**Aug 14**	**Dec 6**	**Dec 16**	473,000	**Jul 28**	**Nov 29**	**Dec 9**

	Action 2, Alternative 1 (No Action): 39% commercial | 61% recreational								
	(94 days)		(75 days)	(97 days)	(77 days)		(58 days)	(90 days)	(70 days)
2027	**Oct 8** (130 days)	648,000	**Sep 20** (112 days)	**Dec 18** (109 days)	**Dec 28** (89 days)	576,000	**Aug 28** (89 days)	**Dec 10** (101 days)	**Dec 21** (82 days)
2028	**Nov 6** (159 days)	789,000	**Oct 23** (145 days)	No Closure	No Closure	700,000	**Oct 4** (126 days)	**Dec 24** (125 days)	No Closure

Source: SEFSC MRIP FES Recreational ACL Dataset (October 2022); FWC SRFS (January 2023)

Preferred Alternative 3 would modify the start date for the gag recreational fishing season to September 1. A season starting September 1 is projected to last 57 – 70 days in 2024, depending on the alternatives chosen in Actions 2 and 3, and the duration would increase to 101 – 122 days (no closure by December 31) by 2028. Thus, it is projected under one **Preferred Alternative 3** option that the 2028 catch limit would not be fully harvested. Also, the recreational gag season has never opened on September 1, so there is substantial uncertainty associated with effort and catch rates under **Preferred Alternative 3**. Because the gag season has traditionally already been open for three months by September 1, the projected harvest rates used in generating season duration projections may underestimate effort and catch for a season that opens on September 1. This is because there may be increased fishing pressure by anglers who can no longer target gag in June and could shift that effort to the new season. NMFS implemented an Interim Rule that will start the recreational season for gag on September 1, 2023, which is expected to provide better estimates of catch rates for 2024 and later years than are currently available for alternatives with later season start dates including **Preferred Alternative 3** and **Alternative 4**.

Alternative 4 would modify the start date for the gag recreational fishing season to October 1. It is projected that the season would last 40 – 52 days in 2024, depending on the alternatives chosen in Actions 2 and 3, and the duration would increase to 81 – 92 days (no closure by December 31) by 2028. Thus, it is projected under many **Alternative 4** options that the 2028 catch limit would not be fully harvested. Like **Preferred Alternative 3**, because the recreational gag season has never opened on October 1, there is substantial uncertainty associated with effort and catch rates under **Alternative 4**. Because the gag season has traditionally already been open for four months (for an October 1 opening), this projected harvest rate may underestimate effort and catch for these proposed recreational fishing seasons. This is because there may be increased fishing pressure by anglers that can no longer target gag beginning on June 1, and could shift that effort to the new season. **Alternative 4** proposes a maximum season of 52 days in 2024 (i.e., November 21); thus, there would be no data available to analyze in-season to verify whether landings would exceed the ACL. Like **Preferred Alternative 3**, landings under **Alternative 4** would not be expected to be available for analysis until after the end of the fishing year.

Preferred Alternative 3 is projected to result in the longest possible fishing season in 2024 (59 days based on preferred alternatives chosen in Actions 2 and 3.1) of the alternatives, followed by **Alternative 4** (42 days), **Alternative 1** (28 Days) and then **Alternative 2** (23 days). However, the duration of the fishing season would change in successive years. **Alternative 1** is projected to have a longer season length than **Preferred Alternative 3** (100 days vs. 92 days, respectively) by 2027. By 2028, **Alternative 1** would have the longest fishing season (137 days), followed by **Preferred Alternative 3** (104 days), **Alternative 2** (96 days), and **Alternative 4** (84 days). Unlike **Alternative 1** and **Alternative 2**, **Preferred Alternative 3** and **Alternative 4** would not allow fishing until the fall. If the ACT was projected to be met and harvest was closed, it could not be reopened before the end of the year because landings data would not yet be available to determine if the ACT had been met. **Alternative 1** has a similar level of uncertainty relative to **Alternative 2**, as the only difference is whether the landings are managed to the ACL or the ACT. Catch limits are less likely to be exceeded under **Alternative 2** than any other alternative, since it has similar uncertainty to **Alternative 1**, but manages to the ACT (which provides for a buffer below the ACL) rather than the ACL. **Preferred Alternative 3**, and **Alternative 4** would

also be constrained to the recreational ACT. However, compared to **Alternative 1** and **Alternative 2**, the other alternatives have greater associated uncertainty in projecting when the recreational ACT would be met because the season has never started at the beginning of September (**Preferred Alternative 3**), or October (**Alternative 4**), although a season starting September 1 will take place in 2023 under the interim measures temporary rule. However, given the reduction in the recreational ACL required to reduce overfishing under Action 2, it is uncertain how fishing behavior may change even with a June 1 (**Alternative 1** and **Alternative 2**) start date. Under any of the alternatives, NMFS would have to evaluate available information and consider uncertainty when estimating closure projections. All Action 4 alternatives project the recreational fishing season durations to increase in successive years as the recreational ACL and ACT increase.

Council Conclusions:

The Council selected **Alternative 3** in Action 4 as the preferred alternative. This alternative would set the Gulf recreational gag fishing season open date at September 1. In making this decision, the Council considered that **Preferred Alternative 3** is projected to result in the longest fishing season duration of the alternatives for each year from 2024 – 2026. A longer fishing season would result in more fishing opportunities for both the private recreational and for-hire components of the fishery. The Council discussed how shifting fishing effort to a historically low-effort month (September) may reduce the overall magnitude of recreational discards. Further, the Council thought that shifting fishing pressure to the fall would reduce directed fishing effort for gag in deeper waters, which may thereby further reduce the probability of harvesting or discarding dead any male gag.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Physical Environment

General Description of the Physical Environment

The physical environment for Gulf of Mexico (Gulf) reef fish is detailed in the Environmental Impact Statement (EIS) for the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004a), Generic EFH Amendment 3 (GMFMC 2005), and the Generic Annual Catch Limit/Accountability Measure (ACL/AM) Amendment (GMFMC 2011a), which are hereby incorporated by reference and summarized below.

The Gulf has a total area of approximately 600,000 square miles (1.5 million km^2), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.1.1).

Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). Gulf water temperatures range from 54º F to 84º F (12º C to 29º C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73º F through 83º F (23-28º C), including bays and bayous (Figure 3.1.1), between 1982 and 2009, according to satellite-derived measurements (NODC 2011).[12] In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

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

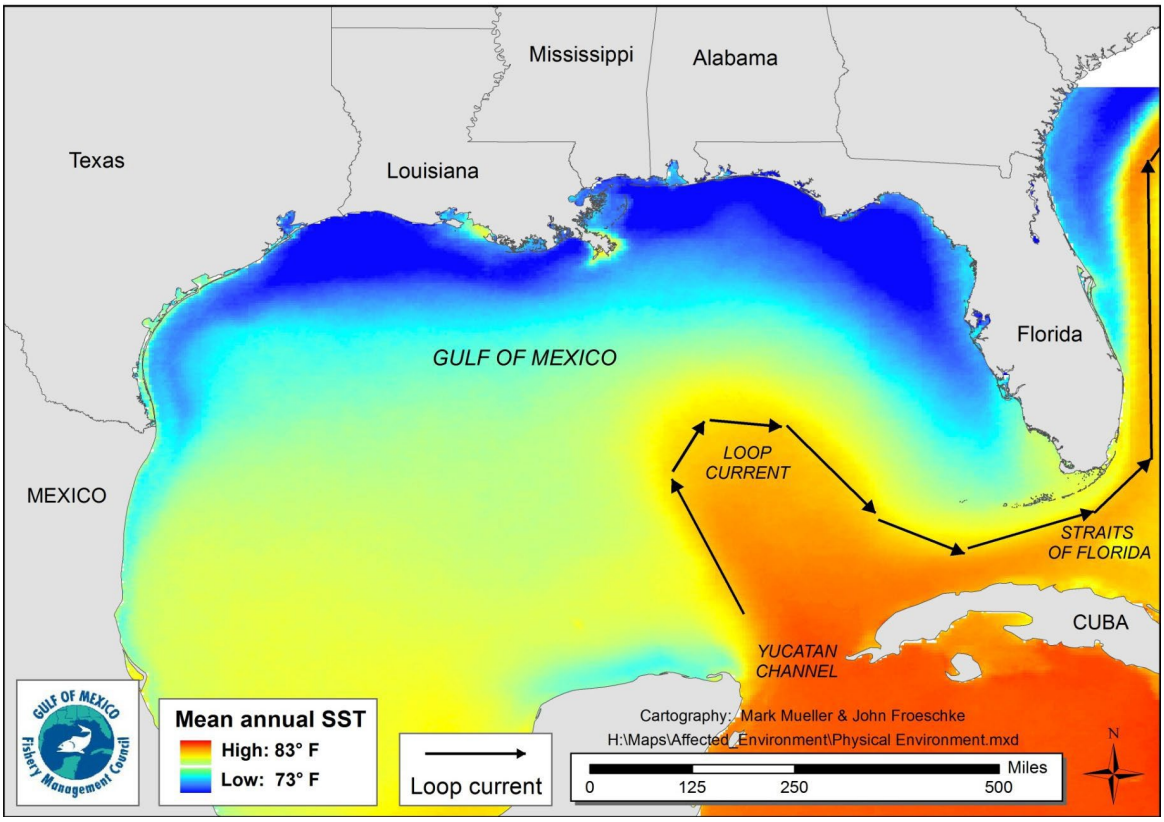

Figure 3.1.1. Mean annual sea surface temperature derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set.[13]

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. They generally have a planktonic larval stage that 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, 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.

Gag are primarily caught on the west coast of Florida from Lee County north into the Florida Panhandle, and very occasionally off Alabama (Schirripa and Goodyear 1994). Newly settled juveniles are estuarine dependent, occurring in shallow seagrass beds during late spring and summer (Koenig and Coleman 1998; Strelcheck et al. 2003). At the onset of the first winter,

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

juvenile gag begin to migrate out of inshore nursery habitats, although some juvenile gag may remain in inshore waters during winter (Heinisch and Fable 1999). After female gag reach sexual maturity (50% are sexually mature by approximately 24 inches total length (TL); SEDAR 72 2022), they may move to deeper, offshore waters to spawn. Adults can be found in and around structure from bays and nearshore waters out to offshore habitats in excess of 100 meters depth (Lindberg et al. 2006; Collins and Barbieri 2017; Grüss et al. 2017). After leaving inshore nursery habitat, adult gag demonstrates relatively strong site fidelity (Lindberg et al. 2006; Collins and Barbieri 2017). Adult males are usually only found in regions of the West Florida Shelf to the South of Apalachicola in bottom depths exceeding 60 meters (m) (including the Madison-Swanson and Steamboat Lumps marine protected areas) and may rarely be captured on the continental shelf of LA and TX. Adult males are found at an average depth of 93 m (Grüss et al. 2017).

Habitat Areas of Particular Concern (HAPC) and Environmental Sites of Special Interest

Detailed information pertaining to HAPCs is provided in Generic Amendment 3 (GMFMC 2005) and Amendment 9 to the Fishery Management Plan for the Coral and Coral Reefs of the Gulf of Mexico, U.S. Waters (GMFMC 2018). Detailed information pertaining to the Gulf area closures and marine reserves is provided in Amendment 32 to the Fishery Management Plan for the Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP; GMFMC 2011b). There are environmental sites of special interest that are discussed in the Generic EFH Amendment (GMFMC 2004a) that are relevant to Reef Fish management. These documents are hereby incorporated by reference.

Northern Gulf of Mexico Hypoxic Zone

A large hypoxic zone forms every summer in the northern Gulf. It is the result of allochthonous materials and runoff from agricultural lands resulting in increasing nutrient inputs to multiple rivers. These tributaries feed into the Mississippi River, which disperses to the Gulf, and creates a temperature and salinity dependent layering of waters. The nutrient rich fresh waters from the Mississippi create seasonal, large algal blooms at the surface that eventually die, sink to the bottom, and decompose. This creates the oxygen-poor, hypoxic, bottom water layer unless front or storm events occur, which allows for mixing of the layers (Rabalais and Turner 2019). Mapping of the hypoxic zone began in 1985. For 2021, the extent of the hypoxic area was 6,334 square miles, almost triple what it was in 2020 (2,116 square miles), but still less than the extent of the 2017 hypoxic area (8,776 square miles). The changes in hypoxic area can be attributed to changing amounts of river discharge and its associated nutrient load and storm events. The major factor for the reduced size in 2020 was the active storm season with Hurricane Hanna passing right over the zone, allowing for mixing of the waters. The 2021 hypoxia area was higher than the 5-year hypoxic area average (5,408 square miles) and much larger than the 1,930 square mile goal set by the Interagency Mississippi River and Gulf of Mexico Hypoxia Task Force to be reached by 2035.[14] The hypoxic conditions in the northern Gulf directly impact less

[14] http://gulfhypoxia.net

mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009; Breitburg et al. 2018). However, more mobile macroinvertebrates and demersal fishes, such as gag, are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Greenhouse Gases

The Intergovernmental Panel on Climate Change (IPCC) has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Perez (2017) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.1.1 with respect to total emissions and fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (2.04% and 1.67%, respectively).

Table 3.1.1. Total Gulf greenhouse gas 2014 emissions estimates (in 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*.

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

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

3.2 Description of the Biological/Ecological Environment

The biological environment of the Gulf, including for gag, is described in detail in the Generic EFH Amendment (GMFMC 2004a), Generic ACL/AM Amendment (GMFMC 2011a), and Reef Fish Amendments 30A (GMFMC 2008c) and 35 (GMFMC 2012a) which are hereby incorporated by reference and summarized below.

Gag Life History and Biology

Newly settled gag juveniles are estuarine dependent and are usually found in shallow seagrass beds during late spring and summer (Koenig and Coleman 1998; Strelcheck et al. 2003). As gag

matures, it moves to deeper, offshore waters to spawn. Gag is protogynous, transitioning from female to male at older ages. Age and size at which 50% of females undergo sexual transition is approximately 11.5 years and 43 inches TL (110 cm TL: Lowerre-Barbieri et al. 2021). Maximum age is estimated to be 33 years (SEDAR 72 2022), and 50% of females are mature by 3.7 years of age and 23 inches TL (58.5 cm TL; Fitzhugh et al. 2006). Gag forms spawning aggregations at depths ranging from 160-400 feet (Coleman et al. 1996). In the eastern Gulf, the spawning season is estimated to extend from late January to mid-April, with a peak in March (Fitzhugh et al 2006). Often, immature female gag are found with spawning aggregations (Coleman et al. 1996). Gag can reach a maximum length and weight of 54 inches (138 cm TL) and 68 lb (31 kg) (Lombardi et al 2006).

Status of the Gag Stock

See Chapter 1.1: Background, for more information. In summary, according to SEDAR 72 (2022), gag is overfished and undergoing overfishing as of 2019.

Bycatch

Details of bycatch in the gag portion of the reef fish fishery can be found in Chapter 7 (Bycatch Practicability Analysis [BPA]) of Amendment 38 (GMFMC 2012b) to the Reef Fish FMP and in Chapter 4 (BPA) to Amendment 30B to the Reef Fish FMP (GMFMC 2008a), and is hereby incorporated by reference.

Gag is part of the reef fish complex and may be captured incidentally while fishing for other species, especially other groupers and snappers which are also known to be captured while targeting gag. Several reef species are undergoing overfishing including gag, greater amberjack, cubera snapper, the jacks complex, and the mid-water snapper complex, while both gag and greater amberjack are also overfished. The overfished status of deep-water groupers is unknown (National Marine Fisheries Service [NMFS] 4th quarter 2022 Update Summary of Stock Status for non-Federal Strategic Sourcing Initiative [FSSI] stocks).[15] Minimum size limits are estimated to be the greatest source of regulatory discards for the majority of reef fish species. However, in shortening the recreational gag season duration and changing the recreational fishing season start date such that it removes the majority of overlap with the recreational red snapper season, discards due to out of season catch are likely to be a large source of regulatory discards in the future. Both fishing sectors are currently constrained to a 24-inch fork length (FL) minimum size limit for gag. The bag limit (2 gag per person as part of a 4-total grouper recreational bag limit) can also contribute to bycatch, although in a less substantial role than other sources of regulatory discards. Because gag habitat and fishing grounds overlap with many other commonly targeted reef fish species, catch (and potentially discards) of gag while targeting other species, and vice versa, may occur frequently. Interactions with other species such as sea turtles and sea birds are known to occur but are minimal (see next section).

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

This assessment considers measures that are expected to affect gag discard mortality due to potentially reducing allowable catch and shortening and moving the starting date of the gag recreational fishing season. However, there is some biological benefit to gag that outweigh any increases in discards by allowing more fish to remain in the water due to the reduced catch limit and a reduction in the open fishing season duration. Discard mortality rates for reef fish have been positively correlated with warmer water temperatures (Pulver 2017), and **Alternative 4** and **Preferred Alternative 3** (in the later portion of the projected season) in Action 4 correspond to a recreational season that is closed when water temperatures are warmest. However, even under Action 4, there may be an increase in discards during warmer water months because any gag captured while fishing for other species (especially red snapper, which experiences peak fishing pressure in June and July) would be required to be released. Ultimately, overall mortality of Gulf gag would be expected to be substantially lower under this rule due to the reduction in the duration of the recreational fishing season and the reduced catch limits.

Protected Species and Protected Species Bycatch

NMFS manages marine protected species in the Southeast region under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). A brief summary of these two laws and more information is available on NMFS Office of Protected Resources website.[16] ESA-listed species or Distinct Population Segments (DPS) of marine mammals, sea turtles, fish, and corals occur in the exclusive economic zone (EEZ) of the Gulf. There are numerous stocks of marine mammals managed within the Southeast region. All marine mammals in U.S. waters are protected under the MMPA.

The five whale species that may be present in the Gulf (blue, sperm, sei, fin, and Rice's[17]) are listed as endangered under the ESA. Rice'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.

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 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.

[16] https://www.fisheries.noaa.gov/about/office-protected-resources

[17] The Rice's whale (*Balaenoptera ricei*) was previously classified as the Gulf of Mexico Bryde's whale but was later identified as morphologically and genetically distinct from other whales under the Bryde's whale complex, warranting classification as a new species of baleen whale living in the Gulf of Mexico.

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 April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered. Two of the green sea turtle DPSs, the North Atlantic DPS and the South Atlantic DPS, occur in the Gulf and are listed as threatened. In addition, on June 29, 2016, NMFS published a final rule (81 FR 42268) listing Nassau grouper as threatened under the ESA. NMFS has reinitiated consultation on the FMP to address these listings. In a memorandum dated September 29, 2016, NMFS determined that fishing under the Reef Fish FMP during the re-initiation period is not likely to jeopardize the continued existence of the North Atlantic and South Atlantic DPSs of green sea turtles or Nassau grouper.

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 (now Rice's whale, see footnote 13 above) as endangered. In a memorandum dated June 20, 2019, NMFS revised the re-initiation request to include the Gulf Bryde's whale (Rice'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.[18]

There is no information to indicate marine mammals and birds rely on gag for food, and they are not generally caught by fishermen harvesting gag. The primary gear in the Gulf Reef Fish fishery used to harvest gag is hook-and-line, and they are occasionally captured on bottom longlines and with spearfishing gear. These gear types are classified in the 2023 Marine Mammal Protection Act List of Fisheries as a Category III fishery (88 FR 16899; March 1,

[18] The official change to the name has no effect on NMFS's conclusion that the activities associated with the Reef Fish FMP will not jeopardize the continued existence of the species during the revised reinitiation period.

2023), meaning the annual mortality and serious injury of a marine mammal resulting from the 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. Additionally, there is no evidence that the Gulf gag portion of the reef fish fishery as a whole is adversely affecting seabirds. Dolphins are the only species documented as interacting with the reef fish fishery. Bottlenose dolphin prey upon bait, catch, and/or discarded fish from the reef fish fishery.

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). The future reproductive success of 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).

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. Twenty-first century dispersant applications are thought to be less harmful than their predecessors. However, the combination of oil and dispersants has proven to be more toxic to marine fishes than either dispersants or crude oil alone. Marine fish which are more active (e.g., a pelagic species versus a demersal species) appear to be more susceptible to negative effects from interactions with weathered oil/dispersant emulsions. These effects can include mobility impairment and inhibited respiration (Swedmark et al. 1973). The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. More information about the *Deepwater Horizon* MC252 oil spill is available on the NOAA Southeast Regional Office (SERO) website.[19]

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 International Panel on Climate Change (IPCC).[20] These changes are likely to affect plankton biomass and fish

[19] https://www.fisheries.noaa.gov/news/deepwater-horizon-10-years-later-10-questions
[20] http://www.ipcc.ch/

larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The National Oceanic and Atmospheric Association (NOAA) Climate Change Web Portal[21] predicts the average sea surface temperature in the Gulf and South Atlantic will increase by 2-4ºF (1–3ºC) for 2010–2070 compared to the average over the years 1950–2010. For reef fishes and snapper-grouper species, Burton (2008) and Morley et al. (2018) 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 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 (Sokolow 2009; Hollowed et al. 2013; Maynard et al. 2015; Wells et al. 2015). Some stocks have already shown increases in abundance in the northern Gulf (Fodrie et al. 2010) and Texas estuaries (Tolan and Fisher 2009). Integrating the potential effects of climate change into the fisheries assessment process is currently difficult due to the assessment rarely projecting through a time span that would include detectable climate change effects (Hollowed et al. 2013). However, there are ecosystem models available or being developed that incorporate future, potential, climate change effects (King and McFarlane 2006; Pinsky and Mantua 2014; Grüss et al. 2017; Chagaris et al. 2019). While complex, this information may need to be incorporated into stock assessments where possible. Better planning and collaboration with managers are currently being pursued to include this type of data in the assessment process.

The Southeast Fisheries Science Center (SEFSC) has developed climate vulnerability analyses (CVA)[22] that can be used to determine the vulnerability of gag to climate change stressors. According to the SEFSC CVA, Gulf gag vulnerabilities are summarized as follows and in Table 3.2.1.

- High overall vulnerability, trait-based sensitivity (life history), and climate exposure (environmental factors) scores. This is out of four categories: Low, Moderate, High, and Very High.
- The highest sensitivity scores (nominal range from 1 to 4) were in Population Growth Rate (3.2), Spawning Cycle (2.9), Stock size/status (2.8), and Early Life History Survival and Settlement (2.6).
- The highest exposure scores were Temperature (4.0) and Ocean Acidification (4.0). These two were followed by Salinity (2.9), Sea Level Rise (2.4), and Hypoxia (2.2).

[21] https://www.esrl.noaa.gov/psd/ipcc/
[22] https://www.fisheries.noaa.gov/national/climate/climate-vulnerability-assessments

- Gag had Low Potential for Distributional Change (this is the worst out of the four rankings). When combined with the High overall climate vulnerability, it points to a difficulty in moving to offset the impacts of climate change.

Generally, the Gulf is projected by the SEFSC models used (CMIP5) to become warmer, saltier, less oxygenated, and more acidic everywhere during the current fifty years. Conditions will have similar, but amplified, patterns in the 2056–2099 period (Quinlan et al., in press).

	Mycteroperca microlepis	Attribute Mean	Data Quality	Expert Scores Plots (tallies by bin)
Sensitivity Attributes	Habitat Specificity	2.8	3	
	Prey Specificity	1.8	2.6	
	Adult Mobility	2.6	3	
	Dispersal of Early Life Stages	2.1	2.2	
	Early Life History Survival and Settlement Requirements	2.6	2	
	Complexity in Reproductive Strategy	3	3	
	Spawning Cycle	2.9	3	
	Sensitivity to Temperature	2	2.8	
	Sensitivity to Ocean Acidification	2	2	
	Population Growth Rate	3.2	3	
	Stock Size/Status	2.8	2.6	
	Other Stressors	2.3	2	
	Sensitivity Score	High		
Exposure Factors	Air Temperature	1	0	
	Hypoxia	2.2	1.6	
	Ocean Acidification	4	2	
	Precipitation	1	0	
	Primary Productivity	1.6	2	
	Salinity	2.9	3	
	Sea Level Rise	2.4	2.4	
	Sea Surface Temperature	4	3	
	Exposure Score	High		
Overall Vulnerability Rank		High		

Low
Moderate
High
Very High

Figure 3.2.1. Gag biological processes analyzed for climate change sensitivities.

3.3 Description of the Economic Environment

Detailed descriptions of the gag component of the Gulf Reef Fish FMP can be found in Amendments 38 (GMFMC 2012b) and 44 (GMFMC 2017). Additionally, this section and Section 3.4 provide information on the respective economic and social environments of the fishery.

3.3.1 Commercial Sector

Any fishing vessel that harvests and sells any of the reef fish species managed under the Reef Fish FMP from the Gulf EEZ, including gag, 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. The introduction of the IFQ program in 2010 further limited participation in harvesting gag. To harvest gag, commercial fishermen must have both the limited access permit and sufficient allocation to account for all harvested gag. As shown in Table 3.3.1.1, 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 grouper-tilefish (GT)-IFQ program was implemented in 2010, but at a slower rate. As of July 8, 2021, there were 825 valid or renewable commercial reef fish permits, 748 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 3.3.1.1. Number of valid or renewable Gulf commercial reef fish permits, 2009-2020.

Year	Number of Permits
2009	998
2010	969
2011	952
2012	917
2013	895
2014	882
2015	868
2016	852
2017	850
2018	845
2019	842
2020	837

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 3.3.1.2, as of July 8, 2021, 93 businesses owned two or more valid or renewable reef fish permits. Although these businesses represented only 14.9% of the businesses with permits; they held 36.0% 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 17.

Table 3.3.1.2. Vessels and businesses with a commercial reef fish permit end as of July 8, 2021.

No. of Vessels Owned by a Business	No. of Businesses	No. of Total Permitted Vessels	% of Businesses	% of Permitted Vessels
1	531	531	85.1%	64.4%
2	63	126	10.1%	15.3%
3	13	39	2.1%	4.7%
4	2	8	0.3%	1.0%
5-7	8	42	1.3%	5.1%
8-10	4	36	0.6%	4.4%
11-17	3	43	0.5%	5.2%
Total	**624**	**825**	**100%**	**100.0%**

Source: NMFS SERO permits and IFQ databases, July 8, 2021.

Although all permitted vessels may harvest non-IFQ reef fish species (e.g., vermilion snapper), not all permitted vessels are eligible to harvest gag grouper (GG). A permitted vessel must be linked to an active IFQ account in order to be eligible to harvest GG and other IFQ species.[23] 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.

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

Table 3.3.1.3. IFQ eligible vessels and businesses with a Gulf reef fish permit.

No. of Vessels Owned by a Business	No. of Businesses	No. of Total Permitted Vessels	% of Businesses	% of Permitted Vessels
1	445	445	83.0%	60.5%
2	61	122	11.4%	16.6%
3	13	39	2.4%	5.3%
4	2	8	0.4%	1.1%
5-7	8	42	1.5%	5.7%
8-10	4	36	0.7%	4.9%
11-17	3	43	0.6%	5.9%
Total	**536**	**735**	**100%**	**100.0%**

Source: NMFS SERO permits and IFQ databases, July 8, 2021.

Table 3.3.1.3 shows that as of July 8, 2021, only 735 permitted vessels were linked to an IFQ account, and these vessels were owned by 536 businesses. Thus, 90 permitted vessels were not eligible to harvest IFQ species and 88 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 17.0% of the businesses but hold 39.5% of the permitted vessels that can harvest IFQ species.

IFQ Accounts with GG Shares

As of July 8, 2021, there were 672 IFQ accounts with shares in one or more share categories. Of these accounts, 506 held GG shares. The total percentage of GG shares held by accounts with GG shares does not sum to 100% in Table 3.3.1.4 because a small percentage of GG shares were reclaimed under Reef Fish Amendment 36A.[24] The total percentages for other share categories also do not sum to 100% because some accounts with GG 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 506 accounts holds just under 0.2% of the GG shares. However, as discussed in Reef Fish Amendment 36A, the distribution of shares within the GG share category, and in fact all categories, is highly skewed. In other words, some accounts have a relatively high percentage of the shares in a category while others have no or a very low percentage of the shares. For accounts that hold GG shares, the largest or maximum percent of shares held by a single account in each category ranges from 2.33% for GG to 4.27 % for red

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

grouper (RG), 3.65% for RS, 4.44% for shallow water grouper (SWG), 8.23% for deep water grouper (DWG), and 9.95% for Tilefish (TF).

The account that has the highest percentages of GG shares is near the share cap of 2.349%. The account that has the highest percentage of RG shares was 98% of the total 4.331% share cap for RG. The account that has the highest percentage of TF shares was 81% of the total 12.211% share cap for TF. Thus, in percentage terms, these estimates indicate there are some relatively large shareholders in the GG, RG, and TF categories in particular. Even though the concentration of shares is relatively high for RG and TF, concentration levels across all categories, as well as combined categories 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).[25]

Table 3.3.1.4. Quota share statistics (in percent) for accounts with GG shares, July 8, 2021.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Max	8.219	4.265	2.330	4.433	9.945	3.648
Sum	72.735	90.685	99.659	93.877	68.212	66.513
Average	0.144	0.179	0.197	0.186	0.135	0.131

Source: NMFS SERO IFQ database accessed 7/8/2021.

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 507 IFQ accounts with GG shares are owned by 455 businesses. Further, although some IFQ accounts with GG 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 507 IFQ accounts with GG shares, 354 accounts were linked to one or more permitted vessels, while 152 accounts were not linked to a permitted vessel. The 354 accounts were linked to 468 permitted vessels and these accounts and vessels were owned by 307 businesses. Most businesses only own one or two accounts and permitted vessels. However, one business has 12 accounts, and 3 businesses own

[25] 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).

10 or more permitted vessels. The 152 accounts that were not linked to a vessel were owned by 148 businesses and 3 businesses held two or more accounts with GG shares.

As shown in Table 3.3.1.5, the 307 businesses that own GG shares and permitted vessels hold the vast majority of shares held by businesses that own GG shares in all share categories, ranging from a low of just over 55% of the RS shares to a high of over 77% of the GG shares. On average, these 307 businesses own between 0.16% and 0.23% of the shares in each category. The maximum percentage of shares owned by a business varies considerably, ranging from about 3.64% of the RS shares to 9.9% of the TF shares.[26]

As shown in Table 3.3.1.6, the 148 businesses that own GG 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 17% of the RG shares and slightly more than 15% of the SWG shares. These businesses own between 0.1% and 0.2% of the shares in each category on average. The maximum percentage of shares owned by one of these businesses varies somewhat, ranging from about 1.62% of the SWG shares to 4.48% of the TF shares.

In general, the information in Tables 3.3.1.5 and 3.3.1.6 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 GG shares that own permitted vessels and businesses with GG 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 GG.

Table 3.3.1.5. Quota share statistics (in percent) for businesses with GG shares and permitted vessels, July 8, 2021.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Max	8.219	3.662	2.279	4.433	9.945	3.648
Sum	61.569	67.045	77.484	77.032	55.796	54.703
Average	0.182	0.198	0.229	0.227	0.165	0.161

Source: NMFS SERO IFQ database (accessed 07/08/2021).

Table 3.3.1.6 Quota share statistics (in percent) for businesses with GG shares and no permitted vessels, July 8, 2021.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Max	2.317	3.494	2.330	1.621	4.481	2.332
Sum	8.908	17.596	19.515	15.012	11.459	11.343
Average	0.110	0.217	0.241	0.185	0.141	0.140

Source: NMFS SERO IFQ database (accessed 07/08/2021).

[26] 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.

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 2021 quotas for each share category were as follows: 6,937,838 lbs gw for RS, 3,000,000 lb gw for RG, 1,024,000 lb gw for DWG, 582,000 lb gw for TF, and 525,000 lb gw for SWG. Table 3.3.1.7 presents statistics regarding annual allocation to IFQ accounts based on the share statistics in Table 3.3.1.4 and these quotas. Based on this information, the average account holder with GG shares received 2,171 lb gw of GG allocation in 2021, while the largest account holder received almost 22,000 lb gw. Across all categories, the average account holder with GG shares received about 23,000 lb gw of allocation in 2021 (Table 3.3.1.7).

Table 3.3.1.7 Annual allocation (lb gw) statistics for accounts with GG shares, July 8, 2021.

Statistic	DWG Allocation	RG Allocation	GG Allocation	SWG Allocation	TF Allocation	RS Allocation
Max	84,164	109,868	21,879	23,275	57,880	253,078
Sum	721,680	2,538,948	909,722	483,167	391,420	4,582,151
Average	1,722	6,060	2,171	1,153	934	10,936

Source: NMFS SERO IFQ database (accessed 07/08/2021).

Table 3.3.1.8 provides statistics regarding the amount of allocation held by the 307 businesses that possess GG shares and at least one permit. Information in this table reflects that these businesses control just over 75% of the GG allocation, or around 728,000 lb gw. The largest amount of GG allocation controlled by a single business with GG shares and a permit is almost 22,000 lb gw. The average amount of GG allocation held by a business with a permit is about 2,200 lb gw.

Table 3.3.1.9 provides statistics regarding the amount of allocation held by the 87 businesses that possess shares but are not associated with a permit. Information in this table reflects that these businesses control almost 20% of the GG allocation, or around 183,250 lb gw. The largest amount of allocation controlled by a single business with GG shares but without a permit is slightly less than 22,000 lb gw. The average amount of GG allocation held by a business without a permit is almost 2,300 lb gw.

Table 3.3.1.8. Annual allocation (lb gw) statistics for businesses with GG shares and permitted vessels, July 8, 2021.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Max	84,164	109,868	21,400	23,275	57,880	253,078
Sum	630,470	2,011,354	727,570	404,419	324,731	3,795,201
Average	1,860	5,933	2,146	1,193	958	11,195

Source: NMFS SERO IFQ database (accessed 07/08/2021).

Table 3.3.1.9. Annual allocation (lb gw) statistics for businesses with GG shares and no permitted vessels, July 8, 2021.

Statistic	DWG Shares	RG Shares	GG Shares	SWG Shares	TF Shares	RS Shares
Max	23,729	104,808	21,879	8,512	26,080	161,774
Sum	91,217	527,876	183,248	78,813	66,689	786,950
Average	1,126	6,517	2,262	973	823	9,715

Source: NMFS SERO IFQ database (accessed 07/08/2021).

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 GG shares are in Table 3.3.1.10. The total value of all shares held by accounts with GG shares is just under $246 million (2021 dollars),[27] with the bulk of that value coming from ownership of RS shares, which accounts for more than 85% of the combined total value. This is also true for the average account that holds GG shares. The average value of an account that holds GG shares is about $587,000, though only about 3% of that value is based on GG shares. The account with the largest asset value of shares is worth about $11.6 million, with RS shares representing the bulk of that value (99%).

Table 3.3.1.10. Quota share value statistics for accounts with GG shares (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Max	$937,587	$703,157	$179,189	$130,804	$531,340	$11,482,169	$13,964,247
Sum	$8,039,514	$16,249,270	$7,450,622	$2,715,400	$3,593,237	$207,892,189	$245,940,231
Average	$19,187	$38,781	$17,782	$6,481	$8,576	$496,163	$586,970

Note: Share value estimates are based on average 2021 share prices per pound.
Source: NMFS SERO IFQ database (accessed 07/08/2021).

The information in Table 3.3.1.10 reflects the asset value of shares based on 2021 share prices. As illustrated in Table 3.3.1.11, average share prices have fluctuated greatly across the share categories. Specifically, RS was the only share category to have a continuous increase in the average share price. The average RS share price increased 19% in 2021 relative to 2017. GG share prices declined continuously from 2017-2021 falling by 20%. RG share prices have been relatively steady, after experiencing a decline in 2018. Compared to conditions in 2017, GG shares currently represent a far smaller percentage of a GG 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.

[27]Converted to 2021 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

Table 3.3.1.11. Average share prices by share category, 2017-2021 (2021 dollars).

Year	DWG	RG	GG	SWG	TF	RS
2017	$13.88	$5.68	$17.45	$9.55	$9.56	$38.23
2018	$11.72	$4.40	$10.49	$5.23	$11.48	$38.91
2019	$9.63	$6.00	$10.07	$5.92	$10.01	$40.37
2020	$14.54	$6.43	$9.19	$5.29	$8.83	$41.26
2021	$11.14	$6.40	$8.19	$5.62	$9.18	$45.37
Average	**$12.18**	**$5.78**	**$11.08**	**$6.32**	**$9.81**	**$40.83**

Source: SERO Catch Share Database (July 2022)

Table 3.3.1.12 provides statistics regarding the value of the shares held by the 307 businesses that possess GG shares and at least one permit. Information in this table again shows that these businesses control just over 77% of the total GG share value. The largest GG share value controlled by a single business with a permit is a little over $175,000, while the average value of GG shares held by a business with a permit is just over $17,500. GG shares only represent about 3% of the total share value held by these businesses, while RS shares represent about 85% of the total share value held by these businesses.

Table 3.3.1.12. Quota share value statistics for businesses with GG shares and permitted vessels, July 8, 2021 (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS
Max	$937,587	$703,157	$175,267	$130,804	$531,340	$11,482,169
Sum	$7,023,441	$12,872,666	$5,958,801	$2,272,836	$2,981,029	$172,188,251
Average	$20,718	$37,972	$17,578	$6,705	$8,794	$507,930

Note: Share value estimates are based on average 2021 share prices per pound from SERO Catch Share Database (July 2022)
Source: NMFS SERO IFQ database (accessed 07/08/2021).

Table 3.3.1.13 provides statistics regarding the value of the shares held by the 87 businesses that possess GG shares but are not associated with a permit. Information in this table again shows that these businesses control about 19.5% of the total GG share value. The largest GG share value controlled by a single business without a permit is about $179,000, while the average value of shares held by a business with GG shares but without a permit is just over $18,500. GG shares only represent about 3% of the total share value held by these businesses, while RS shares represent almost 84% of the total share value held by these businesses.

Table 3.3.1.13. Quota share value statistics for businesses with GG shares but no permitted vessels, July 8, 2021 (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS
Max	$264,336	$670,774	$179,189	$47,838	$239,415	$7,339,687
Sum	$1,016,156	$3,378,407	$1,500,804	$442,929	$612,208	$35,703,938
Average	$12,545	$41,709	$18,528	$5,468	$7,558	$440,789

Note: Share value estimates are based on average 2021 share prices per pound from SERO Catch Share Database (July 2022)
Source: NMFS SERO IFQ database (accessed 07/08/2021).

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). The 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 GG shares are provided in Table 3.3.1.14.

The average market value of an 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 GG shares was harvested, economic profits from those landings would be expected to be about $21.1 million, with the bulk of those profits (83%) arising from the harvest of RS, while GG would only account for about 3%. Although one account would be expected to earn about $1.19 million in short-term profits, if the account holders with GG shares retain their initial annual allocations, the average short-term profit per account would only be expected to be around $50,000.[28] Realized value in the form of actual annual revenue and profits is likely less from GG allocation and other allocation in the GT-IFQ program as quota utilization for those species is typically well below 100% in those categories (67% for GG in 2021). Thus, annual profit from the sale of GG allocation is more likely to be around $488,000 in total and $1,164 per business on average.

Table 3.3.1.14. Potential market value of annual allocation in 2022 for all accounts with GG shares (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Max	$87,531	$71,414	$17,503	$13,732	$36,465	$964,229	$1,190,874
Sum	$750,547	$1,650,316	$727,778	$285,069	$246,595	$17,457,995	$21,118,300
Average	$1,791	$3,939	$1,737	$680	$589	$41,666	$50,402

Note: Annual allocation market value estimates are based on average 2021 allocation prices from SERO Catch Share Database (July 2022).
Source: NMFS SERO IFQ database (accessed 07/08/2021).

The information in Table 3.3.1.14 reflects the potential market value of allocation based on 2021 allocation prices and commercial quotas. However, with the exception of RS allocation and RG somewhat, allocation prices for other share categories have declined over the past 5 years, as illustrated in Table 3.3.1.15. Specifically, GG allocation prices have declined by 50% during this time. The declines for DWG and TF allocation prices have been less but are still noticeable.

[28] "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.

If these trends continue, then the estimates in Table 3.3.1.14 may overestimate the market value of these allocations in 2022.[29] Conversely, RS allocation price has increased by 4%. Thus, if the upward trend in the RS allocation price continues, the estimated market value of RS allocation in Table 3.3.1.14 may underestimate actual market value in 2022. Compared to conditions in 2017, GG allocation currently represents an even smaller percentage of a GG share account holder's allocation portfolio, which was around 5% at that time. The same is true for the other GT-IFQ share categories, with RS allocation now dominating that portfolio.

Table 3.3.1.15. Average allocation prices by share category, 2017-2021 (2021 dollars).

Year	DWG	RG	GG	SWG	TF	RS
2017	$1.29	$0.46	$1.59	$0.63	$0.79	$3.65
2018	$1.06	$0.34	$1.09	$0.57	$0.77	$3.65
2019	$1.10	$0.62	$0.90	$0.62	$0.76	$3.88
2020	$1.09	$0.49	$0.76	$0.59	$0.65	$3.80
2021	$1.04	$0.65	$0.80	$0.59	$0.63	$3.81
Average	**$1.12**	**$0.51**	**$1.03**	**$0.60**	**$0.72**	**$3.76**

Source: 2021 Gulf of Mexico Grouper-Tilefish Individual Fishing Quota Report and 2021 Red Snapper Individual Fishing Quota Report

Similar to shares, annual allocation tends to be "unconcentrated" across accounts. According to NMFS (2022), RS, RG, and SWG as well as the aggregate quantity of all species groups have always been unconcentrated. However, there does exist a more consistent pattern of concentration for TF. Notably, the allocation market for TF starts out unconcentrated at the beginning of each year and becomes more concentrated during the year. These concentration patterns occur with a mixture of different suppliers in different years, and appear to be more consistent with a small number of harvesters chasing a relatively small number of fish that likely is not by itself a relevant market, rather than an attempt to exercise market power (NMFS).

Table 3.3.1.16 provides statistics regarding the value of the allocation held by the 307 businesses that possess GG shares and at least one permit. Information in this table again shows that these businesses control just about 80% of the total value of GG allocation. The largest value of GG allocation controlled by a single business with a permit is worth almost $17,200, while the average value of GG allocation held by a business with a permit is just over $1,700. Realized value in the form of actual annual revenue and profits is likely less from GG allocation as quota utilization is typically well below 100% (67% in 2021). Thus, annual profit for these businesses from the sale of GG allocation is more likely to be around $390,000 in total and $1,150 per business on average.

[29] It should be noted that gag allocation price is 1.04 in early 2022 per: https://noaa-sero.s3.amazonaws.com/drop-files/cs/Issue8.pdf. This indicates a higher rate of harvest for GG in 2022.

Table 3.3.1.16. Allocation value statistics for businesses with GG shares and permitted vessels, July 8, 2021 (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS
Max	$87,531	$71,414	$17,120	$13,732	$36,465	$964,229
Sum	$655,689	$1,307,380	$582,056	$238,607	$204,580	$14,459,714
Average	$1,934	$3,857	$1,717	$704	$603	$42,654

Table 3.3.1.17 provides statistics regarding the value of the allocation held by the 87 businesses that possess shares but are not associated with a permit. The information in this table again shows that these businesses control about 20% of the total value of GG allocation. The largest value of GG allocation controlled by a single business without a permit is worth approximately $17,500, while the average value of allocation held by a business without a permit is approximately $1,800. 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% (67% in 2021). Thus, annual profit for these businesses from the sale of GG allocation is more likely to be around $98,000 in total and $1,200 per business on average.

Table 3.3.1.17. Allocation value statistics for businesses with GG shares but no permitted vessels, July 8, 2021 (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS
Max	$24,678	$68,125	$17,503	$5,022	$16,430	$616,359
Sum	$94,866	$343,119	$146,599	$46,500	$42,014	$2,998,281
Average	$1,171	$4,236	$1,810	$574	$519	$37,016

Note: Annual allocation market value estimates are based on average 2021 allocation prices.
Source: NMFS SERO IFQ database (accessed 07/08/2021).

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 and NMFS, 2018).

Table 3.3.1.18. Potential ex-vessel value of annual allocation in 2022 for accounts with GG shares (2021 dollars).

Statistic	DWG	RG	GG	SWG	TF	RS	All
Max	$478,893	$574,611	$135,212	$137,787	$178,850	$1,353,970	$2,859,323
Sum	$4,106,358	$13,278,700	$5,622,081	$2,860,350	$1,209,488	$24,514,508	$51,591,486
Average	$9,800	$34,479	$12,354	$6,561	$5,315	$62,225	$130,735

Source: NMFS SERO IFQ database (accessed 07/08/2021).

The information in Table 3.3.1.18 reflects the potential ex-vessel value of allocations in 2022 based on 2021 ex-vessel prices and commercial quotas in 2021. Again, realized ex-vessel value

will likely be less for GG 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 3.3.1.19, ex-vessel prices at the share category level have fluctuated from 2017 through 2021. With the exception of TF, and to a more minor extent RS, ex-vessel prices have increased in 2021, relative to 2017. Ex-vessel prices for DWG, RG, GG, and SWG have increased by 9%, 12%, 7%, and 13%, respectively. Although not shown here, this increase is also seen at the individual species level within the DWG, SWG, RG, and TF categories, with the exception golden tilefish in the TF category, which declined by 3.0%. The ex-vessel price for all species in the TF category decreased by 2.0% in 2021, relative to 2017. The ex-vessel price for SWG and RG has increased by 11.5 and 13.2%, respectively. These trends are nearly the opposite of the trends for allocation prices, suggesting that it is likely becoming relatively more profitable for those with shares to harvest their allocation rather than sell it, all other things being equal[30].

Table 3.3.1.19. Average ex-vessel prices by share category, 2017-2021 (2021 dollars).

Year	DWG	RG	GG	SWG	TF	RS
2017	$5.20	$4.69	$5.77	$5.23	$3.26	$5.46
2018	$5.45	$5.10	$6.07	$5.59	$3.03	$5.47
2019	$5.91	$5.60	$6.37	$5.86	$3.04	$5.57
2020	$5.48	$5.29	$6.13	$5.76	$2.91	$5.28
2021	$5.69	$5.23	$6.18	$5.92	$3.09	$5.35
Average	**$5.55**	**$5.18**	**$6.10**	**$5.67**	**$3.07**	**$5.43**

Source: 2021 Gulf of Mexico Grouper-Tilefish Individual Fishing Quota Report and 2021 Red Snapper Individual Fishing Quota Report.

Vessels

The information in Table 3.3.1.20 describes the landings and revenue for vessels that harvested GG in each year from 2017 through 2021, 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 (93%), a significant portion came from harvesting non-IFQ species in the Gulf (6%), with a minor amount coming from harvests in the South Atlantic (1%).

Some important trends can be seen in Table 3.3.1.20. In general, vessel participation in the IFQ programs tends to be very fluid. However, the number of vessels that harvested GG in each year from 2017 through 2021 declined each year. The number of vessels that harvested GG declined

[30] GG ex-vessel price increased to $6.86 in yearly 2022 per: https://noaa-sero.s3.amazonaws.com/drop-files/cs/Issue8.pdf .

by 12% in 2021, relative to 2017. GG landings and revenue have increased from 2017 through 2021, with landings rising by 14% and revenue increasing by 24%. Revenue from other Gulf IFQ species increased by 7% in 2021 relative to 2017. Revenues from non-IFQ species in the Gulf, and South Atlantic Non-IFQ species fell by 28% respectively in 2021, relative to 2017. As a result, total revenue for these vessels increased by 5% in 2021 relative to 2017. From 2017-2021, GG represented about 6% of these vessels' total revenue on average, suggesting relatively little dependency on GG.

Table 3.3.1.20. Landings and revenue statistics for vessels harvesting GG by year, 2017-2021 (2021$)*.

Year	Number of Vessels	Statistic	GG Landings (gw)	GG Revenue	Other IFQ Revenue	Gulf Non-IFQ Revenue	South Atlantic Revenue	Total Revenue
2017	380	Max	24,341	$140,249	$2,466,119	$134,418	$139,837	$2,466,589
		Total	492,095	$2,830,650	$44,372,701	$3,832,716	$400,008	$51,436,075
		Mean	1,295	$7,449	$118,013	$10,221	$1,067	$135,358
2018	377	Max	24,776	$159,121	$2,205,352	$140,585	$113,430	$2,208,890
		Total	492,934	$2,983,416	$42,061,525	$3,469,311	$443,296	$48,957,548
		Mean	1,308	$7,914	$112,164	$9,377	$1,198	$129,861
2019	356	Max	29,339	$197,608	$2,495,692	$173,143	$79,845	$2,496,834
		Total	532,015	$3,392,046	$46,344,444	$3,117,573	$334,854	$53,188,917
		Mean	1,494	$9,528	$131,287	$8,882	$954	$149,407
2020	350	Max	18,742	$123,052	$3,244,241	$116,619	$34,676	$3,251,599
		Total	475,714	$2,928,676	$39,817,332	$2,439,928	$106,588	$45,292,523
		Mean	1,359	$8,368	$113,764	$7,113	$311	$129,407
2021	334	Max	24,701	$148,206	$3,086,989	$135,769	$109,472	$3,091,171
		Total	562,734	$3,516,205	$47,520,186	$2,757,766	$286,826	$54,080,983
		Mean	1,685	$10,528	$144,879	$8,618	$896	$161,919

Source: NMFS SERO IFQ database accessed 01/18/2023 and SEFSC Socioeconomic Panel (Jan22 Version).
*The estimates in this table have been updated and revised from the same table in the gag interim rule Environmental Assessment (EA) (GMFMC & NOAA, 2022). A programming error was found in the code used to generate the estimates in the gag interim rule EA table, which has now been corrected. Thus, the estimates in this table are correct.

These estimates 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). The GG commercial quota has remained constant for the past seven years, as have DWG, SWG, and TF. However, the RG commercial quota has changed multiple times from 2016-2020. In late 2016, based on a stock assessment, the RG quota increased from 5.72 mp to 7.78 mp gw, and remained at this level through the end of 2018. Updated projections reduced the RG quota to 3.0 mp gw in 2019. On June 1, 2022, Amendment 53 to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) set the commercial ACL at 2.53 mp gw, and

the commercial quota at 2.4 mp gw. Later in 2022, the Modification of Gulf of Mexico Red Grouper Catch Limits Framework action set the quota to 2.79 mp gw (NMFS 2022b). In addition, the RS commercial quota increased from approximately 6.097 mp gw in 2016 to 6.937 mp gw in 2019 and remained at that level through 2021.

The maximum annual gross revenue earned by a single vessel during this time was about $3.24 million (2021 dollars) in 2020, though the average gross revenue per vessel was only about $141,000 that year. Similar to the trends in total revenue for GG vessels, these values had increased to $161,000 by 2021, representing a 20% increase in total revenue per vessel. Average gag landings and revenue per vessel also increased from 1,295 lb gw and $7,449 to 1,685 lb gw and $10,568 per vessel or by about 14% and 24%, respectively (Table 3.3.1.20).

Economic Value

Changes in commercial gag landings may result in economic effects because of potential changes in ex-vessel prices due to less (or more) domestic gag being available in markets. In turn, if the ex-vessel price is expected to change, gross revenue and thus consumer surplus (CS) would also be expected to change. The potential effects on ex-vessel price, gross revenue, and CS can be estimated utilizing the work by Keithly and Tabarestani (2018). According to the results of their Habit Formation model, they estimated an own-price flexibility for "other groupers," inclusive of gag, of -0.396. The own-price flexibility is the percentage change in a product's price relative to the percentage change of a product's quantity sold, and thus estimates the responsiveness of a product's price to the quantity being sold. The own-price flexibility estimate in Keithly and Tabarestani (2018) is not compensated for income. An income compensated estimate would likely be lower, which would in turn yield smaller changes in the ex-vessel price and thus smaller changes in gross revenue and PS (producer surplus). Thus, any estimates based on their analysis should be considered maximum expected changes in ex-vessel price, gross revenue, and CS in the commercial sector.

Estimates of economic returns have not been available historically for the commercial sector of the Gulf reef fish fishery. Reports such as Overstreet et al (2017); Overstreet and Liese (2018a); and Overstreet and Liese (2018b) provided the first such estimates. Liese (pers. comm. 2022, SEFSC) recently provided average estimates of economic returns across 2014-2018 for vessels that caught gag. These estimates are the most useful for current purposes, and thus findings from that report are summarized below. Given the declines in landings and revenue for GG vessels discussed above, it is quite likely that economic returns were different by 2020 than they were in 2018, and thus the estimates below should be used with some caution. However, some of the findings for 2014-2018 seem to be consistent with the results above for 2016-2020.

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) or species group (e.g., Jacks). 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 GG.

From an economic returns perspective, two of the 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 (PS) [31] 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 3.3.1.21 illustrates the economic "margins" generated on gag trips, i.e., trip net cash flow and trip net revenue as a percentage of trip revenue. As shown in this table, 29.8%, 6.1%, and 16.5% (or 52.4% 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 35% was net cash flow back to the owner(s). The margin associated with trip net revenue was higher at 45%. Thus, trip cash flow and trip net revenue were both positive on average from 2014 through 2018, generally indicating that gag trips were profitable during this time.

Table 3.3.1.22 provides estimates of the important economic variables at the annual level for all vessels that had GG landings from 2014 through 2018. Similar to the trip level, three of the 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 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. 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. Economic return on asset value is calculated by dividing the net revenue from operations by the vessel value. Net cash flow and net revenue from operations at the annual vessel level were both positive from 2014-2018, generally indicating that GG vessels in the commercial sector were profitable, though some vessels earned much greater profits than others

[31] Producer surplus is the difference between the amount a producer is paid for a unit of a good and the minimum amount the producer would accept to supply that unit (i.e., marginal cost).

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

did. Net cash flow and net revenue from operations averaged 26% and 32%, respectively, while the economic return on asset value was approximately 46.3% during this time.

In general, PS is the difference between total annual revenue and variable costs. PS is a measure of net economic benefits to producers. Overstreet and Liese (2018b) state that "sale of IFQ allocation or shares is also not accounted for, as these transactions cannot be associated with a vessel." If revenue from the sale of allocation is not accounted for, then the cost of buying allocation should also not be considered in the calculation of PS. Therefore, a more accurate estimate of PS in percentage terms would be 50% of gross revenue based on estimates of variable costs in Table 3.3.1.22.[33]

Table 3.3.1.21. Economic characteristics of GG trips 2014-2018 (2021$).

	2014	2015	2016	2017	2018	Average
Number of Observations	667	771	992	819	676	
Response Rate (%)	80%	84%	95%	94%	93%	
Trips						
Owner-Operated	66%	58%	61%	52%	64%	60%
Fuel Used per Day at Sea (gallons/day)	44	42	37	44	43	42
Total Revenue	100%	100%	100%	100%	100%	100%
Costs (% of Revenue)						
Fuel	7.3%	5.8%	4.4%	5.7%	7.2%	6.1%
Bait	3.5%	3.9%	3.9%	4.6%	5.1%	4.2%
Ice	1.5%	1.6%	1.7%	1.8%	2.0%	1.7%
Groceries	2.9%	3.0%	3.7%	4.2%	3.7%	3.5%
Miscellaneous	2.3%	3.1%	3.5%	2.3%	3.6%	3.0%
Hired Crew	29.9%	32.0%	30.0%	30.2%	27.1%	29.8%
IFQ Purchase	14.1%	19.8%	17.2%	14.3%	17.1%	16.5%
Owner-Captain Time	6.8%	6.2%	6.7%	5.2%	9.2%	6.8%
Trip Net Cash Flow	39.0%	30.8%	35.7%	36.9%	34.2%	35.0%
Trip Net Revenue	46%	44%	46%	46%	42%	45%
Labor - Hired & Owner	37%	38.2%	36.7%	35.4%	36.3%	36.7%
Fuel & Supplies	17%	17.4%	17.1%	18.6%	21.6%	18%
Input Prices						
Fuel Price (per gallon)	$3.99	$2.88	$2.26	$2.51	$2.91	$2.91
Hire Crew Wage (per crew-day)	$332	$317	$284	$261	$240	$286
Productivity Measures						
Landings/Fuel Use (lb/gallon)	12.7	11.2	11.2	9.8	8.7	11.0
Landings/Labor Use (lb/crew-day)	198	176	159	156	144	167

[33] PS =TR%-(Labor%+Fuel&Supplies%)

Table 3.3.1.22. Economic characteristics of GG vessels 2014-2018 (2021$).

	2014	2015	2016	2017	2018	Average
Number of Observations	64	81	96	94	80	
Response Rate (%)	65%	79%	85%	80%	79%	
Vessels						
Owner-Operated	73%	63%	74%	62%	87%	68%
For-Hire Active	5%	19%	13%	19%	10%	13%
Vessel Value	$144,262	$116,207	$100,982	$120,250	$111,028	$118,546
Total Revenue	100%	100%	100%	100%	100%	100%
Costs (% of Revenue)						
Fuel	7.6%	7.1%	6.1%	6.4%	7.6%	7.0%
Other Supplies	10.4%	10.8%	10.9%	11.6%	12.8%	11.3%
Hired Crew	28.3%	29.9%	24.9%	25.5%	24.6%	26.6%
Vessel Repair & Maintenance	7.0%	8.0%	7.9%	9.9%	10.2%	8.6%
Insurance	0.6%	1.0%	0.9%	1.2%	0.8%	0.9%
Overhead	3.9%	5.7%	4.5%	5.8%	3.3%	4.6%
Loan Payment	0.4%	1.6%	1.4%	1.4%	1.3%	1.2%
IFQ Purchase	11.9%	14.3%	13.6%	11.3%	16.5%	13.5%
Owner-Captain Time	5.4%	5.0%	5.6%	4.9%	5.8%	5.3%
Net Cash Flow	30.0%	21.6%	29.9%	26.9%	22.9%	26.0%
Net Revenue for Operations	33.0%	29.2%	36.3%	31.2%	30.8%	32.0%
Depreciation	3.6%	3.4%	3.0%	3.5%	4.1%	3.5%
Fixed Costs	12.0%	14.7%	13.3%	16.9%	14.2%	14.0%
Labor - Hired & Owner	34.0%	34.8%	30.4%	30.4%	30.5%	32.0%
Fuel & Supplies	18.0%	17.9%	17.0%	18.0%	20.4%	18.0%
Economic Return (on asset value)	45.9%	43.1%	61.2%	44.0%	37.3%	46.3%

Dealers

The information in Table 3.3.1.23 illustrates the purchasing activities of dealers that bought GG landings from vessels from 2017 through 2021.[34] Like vessels, dealer participation in the GG component of the GT-IFQ program is fluid and not all dealers purchased GG in each year during this time. Similar to the number of vessels harvesting GG during this time, the number of dealers that purchased GG fluctuated over this time, but decreased by 8% in 2021 relative to 2017. The average number of dealers purchasing GG from 2017-2021 was 89.

Trends in purchases of GG landings by dealers mimic the trend in GG vessel revenues, as do the trends in purchases of other IFQ species and Gulf non-IFQ species. For example, purchases of GG landings in the Gulf by dealers increased significantly (23%) in 2021, relative to 2017. Further, purchases of other-IFQ species in the Gulf also increased by 7% during this time.

South Atlantic purchases by dealers who purchased Gulf GG landings do not mirror the trends for Gulf gag vessels South Atlantic landings. Purchases of South Atlantic non-IFQ landings by dealers who purchased Gulf GG declined overall from 2017-2021 (5%), but less so than landings of South Atlantic non-IFQ species by Gulf gag vessels (28%). GG dealers have a greater diversity in their purchasing portfolios which in turn allowed them to be more flexible and adaptive to changes in the GG component of the GT-IFQ program. In combination with the decrease in the number of GG dealers, the average value of purchases per GG dealer increased by 35% from 2017 through 2021.

On average, purchases of GG represented approximately 3% of all seafood purchases by GG dealers during this time, which suggests a low dependency on GG purchases, and a lower percentage of revenue GG represents for commercial vessels (6%). In addition, federally permitted dealers' ability to change which species they purchase is greater than commercial vessels' ability to change which species they harvest. Unlike commercial vessel permits, dealer permits do not restrict which species dealers can purchase.

Keithly and Wang (2018) estimated the mark-ups between the ex-vessel price and dealer sales price for GG and certain other grouper and tilefish species. However, those estimates are insufficient to estimate PS or profit for GG dealers, or changes to such as a result of regulatory changes, in part because costs other than the raw fish costs (which are equivalent to the ex-vessel value) are not considered. NMFS does not have estimates of those other costs for GG dealers or seafood dealers more broadly, and thus does not have estimates of net cash flow or net revenue from operations for GG dealers comparable to those in the commercial harvesting sector. Thus, while it is likely that the harvest of GG generates some PS and profit for GG dealers, NMFS does not possess the data to estimate PS and profit. Additionally, because of federal dealers' ability to switch to purchasing other species, changes to those values as a result of the

[34] 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 GG compared to the IFQ data due to waterbody code assignment issues in the Keys.

management measures considered in this amendment are likely to be relatively small. Similarly, any additional PS and profit generated from GG sales further up the distribution chain to wholesalers/distributors, grocers, and restaurants is likely minimal, given the vast number of seafood and other products they handle and their even greater ability to shift to purchasing other products.

Table 3.3.1.23. Dealer statistics for dealers that purchased GG landings by year, 2017-2021. All dollar estimates are in 2021$.

Year	Number Dealers	Statistic	GG Purchases	Other IFQ Purchases	Gulf Non-IFQ Purchases	South Atlantic Purchases	Total Purchases
2017	89	Max	$446,099	$8,509,150	$3,042,988	$4,278,206	$9,226,879
		Total	$2,825,949	$50,797,298	$35,447,356	$10,874,757	$96,803,871
		Mean	$31,752	$570,756	$398,285	$776,768	$1,087,684
2018	93	Max	$599,503	$8,388,953	$6,586,587	$4,642,310	$9,046,163
		Total	$2,982,685	$49,184,609	$46,672,970	$16,883,677	$112,217,160
		Mean	$32,072	$528,867	$501,860	$993,157	$1,206,636
2019	92	Max	$790,426	$10,310,210	$2,730,464	$3,957,741	$10,957,197
		Total	$3,398,657	$51,596,311	$33,108,434	$9,674,529	$93,960,527
		Mean	$36,942	$560,829	$376,232	$744,195	$1,021,310
2020	88	Max	$395,751	$9,321,697	$3,101,034	$4,388,604	$9,821,705
		Total	$2,944,594	$48,788,162	$27,939,525	$10,129,230	$86,311,382
		Mean	$33,461	$554,411	$324,878	$723,516	$980,811
2021	82	Max	$468,438	$9,413,980	$3,982,918	$4,800,599	$9,976,041
		Total	$3,521,103	$53,720,409	$34,085,450	$9,189,172	$96,524,277
		Mean	$42,940	$655,127	$431,461	$706,859	$1,177,125

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

Imports

Imports of foreign seafood products compete in the domestic seafood market and have in fact dominated many segments of the domestic 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 can have downstream effects on the local fish market. At the harvest level, imports can affect the returns to fishermen through the ex-vessel prices they receive for their landings. As substitutes to domestic production, 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 that directly compete with domestic harvest of snapper grouper species including the species in this amendment.

Snappers

According to NMFS' foreign trade data, snapper are not exported from the U.S. to other countries. Thus, the following describes the imports of fresh and frozen snapper products, which directly compete with domestic harvest of snapper species. All monetary estimates are in 2021 dollars. As shown in Table 3.3.1.24, imports of fresh snapper products were 31.2 million lb product weight (pw) in 2017. They peaked at 36.0 million lb pw in 2021, an increase of 15% relative to 2017. Total revenue from snapper imports increased from $99.0 million (2021 dollars) in 2017 to a five-year high of $148.6 million in 2021. The average price per pound for fresh snapper products was $3.54 from 2017-2021 and has been steadily increasing reaching the highest price per pound in 2021. Imports of fresh snapper products primarily originated in Mexico or Central America and primarily entered the U.S. through the port of Miami.

Table 3.3.1.24. Annual pounds and value of fresh snapper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of fresh snapper imports (product weight, million pounds)	31.2	30.5	32.8	32.4	36.0
Value of fresh snapper imports (millions $, 2021$)	99.0	103.5	115.3	113.4	148.6
Average price per lb (2021$)	$3.17	$3.39	$3.52	$3.50	$4.13
Share of Imports by Country					
Mexico	35.8	32.5	34.9	40.4	32.8
Nicaragua	15.4	17.0	14.6	15.1	13.3
Panama	14.8	16.6	13.9	11.0	14.0
All others	33.9	33.9	36.6	33.5	39.9

Source: NOAA Foreign Trade Query Tool, accessed 11/16/22

As shown in Table 3.3.1.25, imports of frozen snapper products were 12.8 million lb pw in 2017. They peaked at 18.2 million lb pw in 2021, an increase of 42% relative to 2017. Total revenue from frozen snapper imports increased from $38.2 million (2021 dollars) in 2017 to a five-year high of $66.6 million in 2021. The average price per pound for frozen snapper products was $3.20 from 2017-2021 but has been increasing in recent years. Imports of frozen snapper products primarily originated in Brazil or South America and primarily entered the U.S. through the port of Miami.

Table 3.3.1.25. Annual pounds and value of frozen snapper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of frozen snapper imports (product weight, million pounds)	12.8	12.2	11.4	15.9	18.2
Value of frozen snapper imports (millions $, 2021$)	38.2	37.6	36.7	48.4	66.6
Average price per lb (2021$)	$2.98	$3.08	$3.22	$3.05	$3.65
Share of Imports by Country					
Brazil	61.0	63.8	54.6	55.4	58.6
Indonesia	11.0	11.3	6.8	5.4	3.9
Suriname	7.9	6.9	13.5	10.3	10.5
All others	20.1	17.9	25.0	28.9	27.0

Source: NOAA Foreign Trade Query Tool, accessed 11/16/22

Groupers

According to NMFS' foreign trade data,[35] grouper are not exported from the U.S. to other countries. Thus, the following describes the imports of fresh and frozen grouper products, which directly compete with domestic harvest of reef fish species. As shown in Table 3.3.1.26, imports of fresh grouper products were 12.3 million lb pw in 2017. They peaked at 12.4 million lb pw in 2018, but declined to 10.4 million lb pw by 2020. Total revenue from fresh grouper imports decreased from 2018 to 2020, but in 2021 remained the same as in 2016 at 55.7 million dollars. The average price per pound for fresh grouper products was $4.49 from 2017-2021, with a large decrease coming in 2020. Imports of fresh grouper products primarily originated in Mexico, Panama, and Brazil.

Table 3.3.1.26. Annual pounds and value of fresh grouper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of fresh Grouper imports (product weight, million pounds)	12.3	12.4	11.3	10.4	12.2
Value of fresh Grouper imports (millions $, 2021$)	55.7	57.2	53.0	40.6	57.7
Average price per lb (2021$)	$4.54	$4.61	$4.68	$3.89	$4.73
Share of Imports by Country					
Mexico	58.8	58.0	57.9	67.6	53.8
Panama	12.2	9.0	8.1	8.0	12.0
Brazil	10.1	15.9	16.9	12.3	17.7
All others	19.0	17.1	17.0	12.2	16.5

Source: NOAA Foreign Trade Query Tool, accessed 01/25/23

[35] https://www.fisheries.noaa.gov/foss/

As shown in Table 3.3.1.27, imports of frozen grouper products were 1.4 million lb pw in 2017. They peaked at 4.6 million lb pw in 2018, but declined to 2.2 million lb. pw by 2021. Total revenue from frozen grouper increased from $2.0 million (2021 dollars) in 2017 to $6.2 million in 2018, but subsequently declined to $5.1 million in 2021. The average price per pound for frozen grouper products was $1.67 from 2017-2021, and increased by 60% in 2021 relative to 2017. Imports of frozen grouper products primarily originated in Mexico, India, and Indonesia.

Table 3.3.1.27. Annual pounds and value of frozen grouper imports and share of imports by country, 2017-2021.

	2017	2018	2019	2020	2021
Pounds of frozen Grouper imports (product weight, million pounds)	1.4	4.6	3.5	0.8	2.2
Value of frozen Grouper imports (millions $, 2021$)	2.0	6.2	4.8	1.5	5.1
Average price per lb (2021$)	$1.46	$1.34	$1.37	$1.85	$2.33
Share of Imports by Country					
Mexico	47.2	79.2	79.2	33.7	54.3
India	29.3	11.2	11.2	25.9	18.1
Indonesia	16.3	4.0	3.0	1.1	10.9
All others	7.2	5.5	6.5	39.3	16.7

Source: NOAA Foreign Trade Query Tool, accessed 05/14/22

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.

Estimates of the U.S. average annual business activity associated with the commercial harvest of gag in the Gulf were derived using the model[36] developed for and applied in NMFS (2022) and are provided in Table 3.3.1.28. Specifically, these impact estimates reflect the expected impacts from average annual gross revenues generated by landings of Gulf red grouper from 2016 through 2020. This business activity is characterized as jobs (full- and part-time), income impacts (wages, salaries, and self-employed income), value-added impacts (the difference between the value of goods and the cost of materials or supplies), and output impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting.

The results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species; specifically reef fish in this case. Separate models for individual species such as gag are not available. Between 2016 and 2020, landings of Gulf gag resulted in approximately $3.45 million (2021 dollars) in gross revenue on average. In turn, this revenue generated employment, income, value-added, and output impacts of 413 jobs, $12.6 million, $17.8 million, and $34.3 million per year, respectively, on average.

[36] A detailed description of the input/output model is provided in NMFS (2011). "A Users Guide to the National and Coastal State I/O Model." www.st.nmfs.noaa.gov/documents/commercial_seafood_impacts_2007-2009.pdf.

Table 3.3.1.28. Average annual economic impacts of gag in the commercial sector of the Gulf reef fish fishery. All monetary estimates are in thousands of 2021 dollars and employment is measured in full-time equivalent jobs.

Harvesters	Direct	Indirect	Induced	Total
Employment impacts	72	11	15	98
Income impacts	1,865	346	837	3,049
Total value-added impacts	1,988	1,247	1,433	4,667
Output Impacts	3,454	2,810	2,781	9,046
Primary dealers/processors				
Employment impacts	15	6	10	31
Income impacts	609	561	530	1,700
Total value-added impacts	649	716	999	2,363
Output impacts	1,959	1,475	1,952	5,386
Secondary wholesalers/distributors				
Employment impacts	7	2	7	15
Income impacts	363	108	381	852
Total value-added impacts	386	181	651	1,219
Output impacts	971	354	1,267	2,592
Grocers				
Employment impacts	30	3	7	40
Income impacts	746	248	374	1,368
Total value-added impacts	795	399	634	1,828
Output impacts	1,274	648	1,244	3,167
Restaurants				
Employment impacts	186	12	30	229
Income impacts	2,991	907	1,713	5,612
Total value-added impacts	3,189	1,622	2,887	7,697
Output impacts	5,831	2,538	5,697	14,065
Harvesters and seafood industry				
Employment impacts	310	34	69	413
Income impacts	6,573	2,170	3,837	12,580
Total value-added impacts	7,007	4,164	6,603	17,774
Output impacts	13,489	7,826	12,941	34,255

3.3.2 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

Recreational landings presented in this section are derived from multiple sources. Landings from private vessels are come from Florida Fish and Wildlife Commissions' State Reef Fish Survey (SRFS). Landings from charter and shore modes are derived from MRIP Survey Data. Finally, headboat landings are derived from the SRHS. Private vessels accounted for the majority of gag grouper landings on average (2017 through 2021), followed by charter vessels, then headboats, and with some recorded landings from shore (Table 3.3.2.1). Although not shown in the table, approximately 99.4% of gag landings on average were recorded in the state of Florida. 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.

Table 3.3.2.1. Recreational landings (lb gw) and percent distribution of gag across all states by mode for 2017-2021.

	Landings (pounds gw)					Percent Distribution			
	Charter vessel	**Headboat (SRHS)**	**Private**	**Shore**	**Total**	**Charter vessel**	**Headboat (SRHS)**	**Private**	**Shore**
2017	213,183	24,703	764,068	0	1,001,954	21%	2%	76%	0%
2018	186,724	27,644	716,961	32,700	964,029	19%	3%	74%	3%
2019	239,667	21,908	841,751	17,820	1,121,147	21%	2%	75%	2%
2020	320,879	24,255	1,213,729	12,904	1,571,767	20%	2%	77%	1%
2021	475,262	31,659	1,135,040	25,138	1,667,099	29%	2%	68%	2%
AVG	**287,143**	**26,034**	**934,310**	**17,712**	**1,265,199**	**22%**	**2%**	**74%**	**1%**

Source: SEFSC MRIP FES and SHRS Recreational ACL Data (accessed October 25, 2022) and FWC SRFS Data (accessed January 2023).

Angler Effort

Recreational effort presented in this section is derived from MRIP Survey Data, Texas Parks and Wildlife Department's Marine Sport-Harvest Monitoring Program, and the Louisiana Department of Wildlife and Fisheries' Recreational Creel Survey. Although SRFS is the data source for private recreational vessel landings of gag in this amendment, SRFS data cannot be

used to estimate private recreational vessel effort because the SRFS does not directly estimate the number of trips targeting or number of trips catching specific species, nor does it distinguish black grouper and gag grouper on its survey instrument. Therefore, the effort estimates presented in this section for the charter, private and shore modes are based on MRIP-FES data.

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 gag grouper occurred in Florida from 2017 through 2021 (Table 3.3.2.2 and Table 3.3.2.3). The majority of estimated target and catch effort came from the private angling mode, followed by charter vessels. A small number of gag target and catch trips were recorded for the shore mode. The trends in total target effort were more variable from 2017-2021 than landings. Target effort increased by 68% in 2019, but declined by 27% in 2020 relative to 2017. However, target effort in the shore mode increased dramatically in 2019 and declined in 2020 and 2021. Catch effort also decreased in total and by mode from 2017 through 2021, but increased in the charter mode in 2018-2020. Thus, the reduction in catch effort (22%) was relatively less than the reduction in target effort from 2017 through 2021, though catch effort in the charter mode rose by 62%. Estimates of gag target or catch effort for additional years, and other measures of directed effort, are available on the NOAA website.[37]

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

Table 3.3.2.2. Number of gag recreational target trips, by mode and state, 2017-2021.*

Mode	Year	Florida	Alabama	Louisiana	Total
Shore	2017	147,837	0	0	147,837
	2018	172,821	0	0	172,821
	2019	665,579	0	0	665,579
	2020	349,279	0	0	349,279
	2021	137,519	0	0	137,519
	Average	294,607	0	0	294,607
Charter	2017	23,806	0	62	23,868
	2018	20,580	0	0	20,580
	2019	24,818	0	0	24,818
	2020	29,190	0	0	29,190
	2021	48,186	0	0	48,186
	Average	29,316	0	12	29,328
Private/Rental	2017	576,300	0	201	576,501
	2018	611,440	0	0	611,440
	2019	659,232	0	0	659,232
	2020	603,857	2,491	0	606,348
	2021	578,616	2,183	0	580,799
	Average	605,889	935	40	606,864
All	2017	747,943	0	263	748,206
	2018	804,841	0	0	804,841
	2019	1,349,629	0	0	1,349,629
	2020	982,326	2,491	0	984,817
	2021	764,321	2,183	0	766,504
	Average	929,812	935	53	930,799

Sources: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey. Target effort estimates for most reef fish species in Texas are unavailable.
*No target effort occurred in Texas or Mississippi.

Table 3.3.2.3. Number of gag recreational catch trips, by mode and state, 2017-2021.*

Mode	Year	Florida	Alabama/Mississippi	Louisiana	Texas	Total
Shore	2017	207,541	0	0	0	207,541
	2018	192,167	0	0	0	192,167
	2019	376,527	0	0	0	376,527
	2020	341,205	0	0	0	341,205
	2021	271,620	0	0	0	271,620
	Average	277,812	0	0	0	277,812
Charter	2017	74,695	945	61	0	75,701
	2018	76,276	433	84	0	76,793
	2019	76,918	1,498	776	0	79,192
	2020	153,209	670	40	82	154,001
	2021	121,909	347	163	0	122,419
	Average	100,601	779	225	16	101,621
Private/Rental	2017	1,131,723	6,051	318	86	1,138,178
	2018	978,690	1,802	1,020	182	981,694
	2019	746,334	5,523	1,410	76	753,343
	2020	1,015,776	3,984	590	0	1,020,350
	2021	718,557	0	2,981	23	721,561
	Average	918,216	3,472	1,264	73	923,025
All	2017	1,413,959	6,996	379	86	1,421,420
	2018	1,247,133	2,235	1,104	182	1,250,654
	2019	1,199,779	7,021	2,186	76	1,209,062
	2020	1,510,190	4,654	630	82	1,515,556
	2021	1,112,086	347	3,144	23	1,115,600
	Average	1,296,629	4,251	1,489	90	1,302,458

Sources: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads. Catch effort estimates for Texas are from the Texas Parks and Wildlife Department's Marine Sport-Harvest Monitoring Program and assumed equivalent to MRIP-FES estimates. Louisiana recreational catch effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey.

As shown in tables 3.3.2.4 and 3.3.2.5, across all modes, target and catch effort was the highest in wave 3 (May-June) and wave 6 (Nov-Dec). Target effort is the lowest in wave 1 (Jan-Feb) 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 6 and lowest in wave 1. For the charter mode, target effort was highest in wave 3 and lowest in wave 1.

Table 3.3.2.4. Number of gag target trips by wave and mode, 2017 – 2021.*

	1 (Jan-Feb)	2 (Mar-Apr)	3 (May-Jun)	4 (Jul-Aug)	5 (Sep-Oct)	6 (Nov-Dec)	Total
	Shore						
2017	2,080	0	62,306	23,197	10,505	49,749	147,837
2018	0	8,434	23,153	55,429	4,027	81,777	172,820
2019	0	15,543	270,766	68,574	123,507	187,189	665,579
2020	23,477	8,254	17,130	118,217	114,371	67,830	349,279
2021	10,562	0	58,293	11,318	48,295	9,052	137,520
Average	7,224	6,446	86,330	55,347	60,141	79,119	294,607
	Charter						
2017	0	0	6,437	1,017	1,338	15,075	23,867
2018	0	186	11,776	90	480	8,047	20,579
2019	0	423	5,956	3,462	3,496	11,481	24,818
2020	0	217	18,376	4,281	3,213	3,104	29,191
2021	660	951	10,570	14,586	7,784	13,635	48,186
Average	132	355	10,623	4,687	3,262	10,268	29,328
	Private/Rental						
2017	31,044	34,829	104,600	53,528	69,255	283,245	576,501
2018	2,479	27,577	116,860	182,120	108,835	173,567	611,438
2019	14,242	1,158	204,431	163,052	86,504	189,845	659,232
2020	0	37,953	130,089	111,866	96,393	230,048	606,349
2021	11,546	12,199	85,538	135,785	59,714	276,017	580,799
Average	11,862	22,743	128,304	129,270	84,140	230,544	606,864
	All						
2017	33,124	34,829	173,343	77,742	81,098	348,069	748,205
2018	2,479	36,197	151,789	237,639	113,342	263,391	804,837
2019	14,242	17,124	481,153	235,088	213,507	388,515	1,349,629
2020	23,477	46,424	165,595	234,364	213,977	300,982	984,819
2021	22,768	13,150	154,401	161,689	115,793	298,704	766,505
Average	19,218	29,545	225,256	189,304	147,543	319,932	930,799

Sources: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads. Target effort estimates for most reef fish species in Texas are unavailable. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey

Table 3.3.2.5. Number of gag catch trips by wave and mode, 2017 – 2021.

	1 (Jan-Feb)	2 (Mar-Apr)	3 (May-Jun)	4 (Jul-Aug)	5 (Sep-Oct)	6 (Nov-Dec)	Total
	Shore						
2017	58,763	28,848	21,972	29,963	15,246	52,749	207,541
2018	5,237	101,349	59,987	3,596	-	21,998	192,167
2019	27,879	4,202	21,383	129,013	102,216	91,835	376,528
2020	22,199	3,793	18,574	27,141	242,776	26,722	341,205
2021	23,356	181,055	35,331	13,207	14,951	3,720	271,620
Average	27,487	63,849	31,449	40,584	75,038	39,405	277,812
	Charter						
2017	11,539	8,099	17,387	5,240	8,904	24,533	75,702
2018	15,741	4,641	30,000	10,346	2,584	13,482	76,794
2019	7,830	2,564	25,516	14,297	7,281	21,704	79,192
2020	28,924	3,366	53,136	45,577	9,492	13,505	154,000
2021	7,403	19,617	40,826	19,310	17,901	17,361	122,418
Average	14,287	7,657	33,373	18,954	9,232	18,117	101,621
	Private/Rental						
2017	102,082	104,272	322,571	144,839	129,625	334,790	1,138,179
2018	84,656	150,466	322,509	215,708	109,792	98,563	981,694
2019	27,235	35,730	252,973	171,185	86,813	179,406	753,342
2020	111,037	96,258	187,558	136,675	263,073	225,748	1,020,349
2021	111,332	65,169	182,116	126,882	41,046	195,016	721,561
Average	87,268	90,379	253,545	159,058	126,070	206,705	923,025
	All						
2017	172,384	141,219	361,930	180,042	153,775	412,072	1,421,422
2018	105,634	256,456	412,496	229,650	112,376	134,043	1,250,655
2019	62,944	42,496	299,872	314,495	196,310	292,945	1,209,062
2020	162,160	103,417	259,268	209,393	515,341	265,975	1,515,554
2021	142,091	265,841	258,273	159,399	73,898	216,097	1,115,599
Average	129,043	161,886	318,368	218,596	210,340	264,226	1,302,458

Sources: MRIP Survey Data available at https://www.fisheries.noaa.gov/recreational-fishing-data/recreationalfishing-data-downloads. Effort estimates for Texas are from the Texas Parks and Wildlife Department's Marine Sport-Harvest Monitoring Program and assumed equivalent to MRIP-FES estimates. Louisiana recreational effort estimates came from the Louisiana Department of Wildlife and Fisheries Recreational Creel Survey.

Permits

There are no specific federal permitting requirements for recreational anglers to fish for or harvest reef fish, including gag. Instead, private anglers are required to either possess 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 from a for-hire vessel 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 3.3.2.6. 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 July 8, 2021, there were 1,286 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,[38] 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.

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.

[38] In 2020, of the 1,289 vessels with valid for-hire permits, 87 were primarily used for commercial fishing, 79 were primarily used as headboats, and 1,122 were primarily used as charter vessels.

Table 3.3.2.6. Number of valid or renewable for-hire Gulf reef fish permits, 2009-2020.

Year	Number of Permits
2009	1417
2010	1385
2011	1353
2012	1336
2013	1323
2014	1310
2015	1294
2016	1282
2017	1280
2018	1279
2019	1277
2020	1289

The number of federally permitted Gulf headboats in the SRHS has been slightly variable from 2016-2020. In 2016, there were 69 federally permitted Gulf headboats in the SRHS. In 2017, the number of federally permitted Gulf headboats increased to 73, but subsequently declined to 69 in 2020. 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.[39] 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. Similar analysis of recreational effort is not possible for the headboat mode in the Gulf 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 snapper grouper trips by intent.

Headboat angler days declined overall across the Gulf States from 2018 through 2020, but increased by about 9% in 2021, relative to 2018 (Table 3.3.2.7). Texas, however, saw little decline in headboat angler days from 2018-2020, and had a significant increase in 2021. On average (2018 through 2021), Florida accounted for the majority of headboat angler days

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

reported, followed by Texas and Alabama; whereas, Mississippi and Louisiana combined, accounted for only a small percentage (Table 3.3.2.8). Headboat effort in terms of angler days for the entire Gulf was concentrated most heavily during the summer months of June through August on average (2018 through 2021; Table 3.3.2.8).

Table 3.3.2.7. Gulf headboat angler days and percent distribution by state (2017 through 2021).

	Angler Days				Percent Distribution			
	FL	**AL**	**MS-LA***	**TX**	**FL**	**AL**	**MS-LA***	**TX**
2017	178,814	17,839	3,186	51,570	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%
2019	161,564	18,607	2,632	52,456	68.7%	7.9%	1.1%	22.3%
2020	126,794	13,091	1,728	51,498	65.7%	6.8%	0.9%	26.7%
2021	181,632	13,844	3,197	71,344	67.3%	5.1%	1.2%	26.4%
Average	160,497	16,348	2,698	56,865	67.8%	7.0%	1.1%	24.1%

Source: NMFS Southeast Regional Headboat Survey (SRHS) (February 2022).
*Headboat data from Mississippi and Louisiana are combined for confidentiality purposes.

Table 3.3.2.8. Gulf headboat angler days and percent distribution by month (2018 – 2021).

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	Headboat Angler Days											
2017	8,998	14,007	21,032	19,383	19,186	47,673	54,028	22,984	10,289	11,054	11,299	11,488
2018	5,524	13,694	20,762	17,584	16,876	54,251	53,304	24,819	13,235	10,633	8,183	8,377
2019	2,330	12,819	21,796	16,299	18,271	46,046	47,594	24,212	11,369	13,687	10,389	10,447
2020	8,147	10,906	11,426	385	11,130	43,930	42,021	20,647	12,190	14,497	8,710	9,122
2021	6,871	8,584	21,301	17,746	22,019	51,773	55,201	24,978	15,768	20,446	12,117	13,213
Avg	5,718	11,501	18,821	13,004	17,074	49,000	49,530	23,664	13,141	14,816	9,850	10,290
	Percent Distribution											
2017	3.6%	5.6%	8.4%	7.7%	7.6%	19.0%	21.5%	9.1%	4.1%	4.4%	4.5%	4.6%
2018	2.2%	5.5%	8.4%	7.1%	6.8%	21.9%	21.6%	10.0%	5.4%	4.3%	3.3%	3.4%
2019	1.0%	5.4%	9.3%	6.9%	7.8%	19.6%	20.2%	10.3%	4.8%	5.8%	4.4%	4.4%
2020	4.2%	5.6%	5.9%	0.2%	5.8%	22.7%	21.8%	10.7%	6.3%	7.5%	4.5%	4.7%
2021	2.5%	3.2%	7.9%	6.6%	8.2%	19.2%	20.4%	9.3%	5.8%	7.6%	4.5%	4.9%
Avg	2.4%	4.9%	8.0%	5.5%	7.2%	20.7%	21.0%	10.0%	5.6%	6.3%	4.2%	4.4%

Source: NMFS SRHS (Feb 2022).

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 CS. The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept (bag limit). These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips. The two most recent publications with estimates of angler willingness-to-pay for gag bag limits used data from a survey of Gulf anglers in 2013. Table 2 in Carter et al. (2020) shows that anglers fishing from a private boat were willing to pay $92.80 (2021$) on average to keep 2 gag instead of zero (closed season). Similarly, Table 3 in Carter et al. (2022) reports that anglers fishing from a charter boat were willing to pay $72.90 (2021$) on average to keep 2 gag instead of zero. There is no estimate available for anglers fishing from the shore mode. In general, the estimate for private boat anglers can be used for aggregate analyses over all anglers (D. Carter, SEFSC, personal comm. 2022).

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 $286,500, while the average annual gross revenue for a Gulf charter vessel is $94,552 (2021 dollars). More recent estimates of average annual gross revenue for Gulf headboats are provided in Abbott and Willard (2017) and D. Carter (SEFSC, pers. comm., 2018). Abbott and Willard (2017) suggest that Savolainen et al.'s (2012) 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 $505,972 (2021 dollars). Further, their data suggests average annual gross revenue per vessel had increased to about $611,383 (2021$) 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 (2012) 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 (2017) estimates would overestimate average annual gross revenue for Gulf headboats. D. Carter (SEFSC, pers. comm., 2018) estimated that average annual gross revenue for Gulf headboats was approximately $450,737 (2021 dollars) in 2017, while the maximum gross revenue for a single headboat was about $1.45 million. 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 2021$, Savolainen et al. (2012) estimated the annual PS for Gulf headboats and charter vessels was approximately

$200,456 and $62,181, respectively.[40] Their best estimates of economic profit were $83,632 and $27,948 (2021$), respectively. Estimates of PS and economic profit for headboats is not available from Abbott and Willard (2017) or D. Carter (SEFSC, pers. comm., 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 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 3.3.2.9, 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 $824 and $1,912 (2021$), respectively. Given the respective average number of anglers per trip for each fleet, PS per trip is estimated to be $150 for charter vessels and $68 for headboats.

Table 3.3.2.9. Trip economics for offshore trips by Gulf charter vessels and Southeast headboats in 2017 (2021$).

	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	$824	$1,912
Average # of Anglers per Trip	5.5	28.2
Trip Net Cash Flow per Angler Trip	$150	$68

Source: Souza and Liese (2019)

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

[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.

the region where recreational fishing occurs. It should be clearly noted that, in the absence of the opportunity to fish, the income would presumably be spent on other goods and services and these expenditures would similarly generate economic activity in the region where the expenditure occurs. As such, the analysis below represents a distributional analysis only.

Estimates of the business activity (economic impacts) associated with recreational angling for Gulf gag were calculated using average trip-level impact coefficients derived from the 2019 Fisheries Economics of the U.S. report (NMFS 2022a)[42] and underlying data provided by the NOAA Office of Science and Technology. Economic impact estimates in 2018 dollars were adjusted to 2021 dollars using the annual, not seasonally adjusted gross domestic product (GDP) implicit price deflator provided by the U.S. Bureau of Economic Analysis.

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 gag target effort by mode and state (2017 through 2021) and the associated business activity are provided in Table 3.3.2.10.

[42] A detailed description of the input/output model is provided in Lovell, S. S. Steinback, and J. Hilger (2013).

Table 3.3.2.10. Estimated economic impacts from average annual Gulf gag recreational target trips by state and mode (2017-2021), using state-level multipliers. All monetary estimates are in thousands of 2021$ and employment is in full-time equivalent jobs.*

	FL	AL	LA
Charter Mode			
Target Trips	$29,316	$0	$12
Value Added Impacts	$10,257	$0	$6
Sales Impacts	$17,224	$0	$11
Income Impacts	$5,994	$0	$3
Employment (Jobs)	$158	$0	$0
Private/Rental Mode			
Target Trips	$605,889	$0	$40
Value Added Impacts	$21,843	$0	$6
Sales Impacts	$33,855	$0	$10
Income Impacts	$11,462	$0	$3
Employment (Jobs)	$310	$0	$0
Shore			
Target Trips	$294,607	$935	$0
Value Added Impacts	$10,792	$66	$0
Sales Impacts	$16,866	$114	$0
Income Impacts	$5,685	$34	$0
Employment (Jobs)	$155	$1	$0
All Modes			
Target Trips	$929,812	$935	$52
Value Added Impacts	$42,892	$66	$12
Sales Impacts	$67,944	$114	$21
Income Impacts	$23,140	$34	$7
Employment (Jobs)	$623	$1	$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 3.3.2.10 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 2017 and 2021, and using national-level multipliers, gag target effort generated employment, income, value-added, and output (sales) impacts of 193 jobs, $9.2 million, $16.3 million, and $28.8 million per year, respectively, on average.

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.

3.4 Description of the Social Environment

This amendment primarily affects commercial and recreational management of gag in the Gulf and therefore the following section focuses on gag. However, commercial red grouper is impacted to a lesser extent because of IFQ multi-use rules, and the social description of the Red Grouper Framework (NMFS 2022b) is incorporated by reference herein. The following description includes permits related to the commercial and recreational reef fish fishing by state in order to provide a geographic distribution of fishing involvement. Top communities based on the number of permits are presented. Commercial and recreational landings by state are included to provide information on the geographic distribution of fishing involvement. Descriptions of GG-IFQ accounts with shares, GG-IFQ accounts with allocation but without shares, and GG-IFQ dealers are included at the state and community level. The top communities in the Gulf by commercial landings are identified, commercial engagement and reliance are described, and the local quotient for these communities are included. Descriptions of the top communities based on recreational engagement are also included. Community level data are presented in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented to assess the potential for environmental justice concerns.

Additional detailed information about communities in the following analysis can be found on NMFS' Southeast Regional Office (SERO) Community Snapshots website.[43]

[43] https://www.fisheries.noaa.gov/southeast/socioeconomics/snapshots-human-communities-and-fisheries-gulf-mexico-and-south-atlantic

3.4.1 Commercial Sector

Permits

Gulf commercial permits for reef fish are issued to individuals in Florida (81.4% of Gulf reef fish vessels), Texas (7.8%), Alabama (4.5%), Louisiana (3.8%), and Mississippi (0.9%) (SERO permit office, July 8, 2021). Residents of other states (Arkansas, Georgia, Illinois, Maryland, Missouri, North Carolina, New York, Oklahoma, and South Carolina) also hold commercial reef fish permits, but these states represent a smaller percentage of the total number of issued permits.

Gulf reef fish permits are held by individuals with mailing addresses in 232 communities (SERO permit office, July 8, 2021). Communities with the most commercial reef fish permits are located in Florida and Texas (Table 3.4.1.1). The communities with the most reef fish permits are Panama City, Florida (9.1% of reef fish permits), Key West, Florida (4.8%), and St. Petersburg, Florida (3.3%).

Table 3.4.1.1. Top communities by number of Gulf reef fish permits.

State	Community	Reef Fish Permits (RR)
FL	Panama City	82
FL	Key West	43
FL	St. Petersburg	30
FL	Largo	26
TX	Galveston	22
FL	Destin	22
FL	Cortez	21
FL	Pensacola	21
FL	Seminole	20
FL	Clearwater	16
FL	Tampa	16
FL	Lynn Haven	13
FL	Naples	13
FL	Steinhatchee	13
FL	Apalachicola	11
FL	Tarpon Springs	11

Source: SERO permit office, July 8, 2021.

Landings

Nearly all the commercial gag catch is landed along the west coast of Florida (average of 99.2% from 2017-2021), followed by Louisiana (0.5%), Texas (0.2%), and Alabama and Mississippi (0.2%, NMFS SERO IFQ database accessed 2/16/23).

IFQ Accounts

Also called shareholder accounts, an IFQ account is required to hold shares and allocation. To land IFQ-managed species, such as gag, fishermen need a permitted vessel and sufficient IFQ allocation in the vessel's account to land the fish. Some accounts are held in the name of an individual, or more than one individual, while others form business entities and open accounts in the name of the business. This makes it more difficult to talk about the social environment, because the number of participants behind such an account and their relationships to other accounts is not always clear; additionally, an IFQ account with more than one owner may not all reside in the same area. In the following analysis, accounts are described at the state and community level based on the mailing address of the individual, business, or primary entity which represents the primary individual listed on the account, if the account is held by more than one individual. The number of IFQ accounts is used here as a proxy to represent the number of participants.

Shareholders

As of July 8, 2021, a total of 506 IFQ accounts held shares of gag (IFQ database; includes active and suspended accounts). The majority of accounts with gag shares have a mailing address in Florida (81.4% of accounts with gag shares, Table 3.4.1.2), followed by Texas (6.1%), Alabama (4.5%), and Louisiana (3.8%). Accounts with mailing addresses in Mississippi and in other states (Arkansas, Georgia, Michigan, North Carolina, New York, South Carolina, Tennessee, Utah, and Wyoming) also hold gag shares, but these states represent a smaller percentage of the total number of accounts with shares.

The greatest proportion of gag shares are held in accounts with mailing addresses in Florida, followed by Texas (Table 3.4.1.2). Accounts in Alabama, Louisiana, Mississippi, and other states also hold gag shares, but these states represent a smaller percentage of shares.

Table 3.4.1.2. Number of IFQ accounts with gag shares by state, including the percentage of shares by state by share category.

State	Accounts	GG Shares (%)
AL	23	1.632
FL	412	88.602
LA	19	1.047
MS	5	0.181
TX	31	4.380
Other	16	3.817
Total	**506**	**99.659**

Source: NMFS SERO IFQ database accessed 7/8/21.
Note: Includes active and suspended accounts.

Accounts with gag shares are held by people with mailing addresses in a total of 180 communities (IFQ database accessed 7/8/21). Communities with the most accounts with gag shares are located in Florida and Texas (Table 3.4.1.3). The community with the most accounts with gag shares is Panama City, Florida (8.3% of accounts with shares), followed by Key West, Florida (4.7%), Largo, Florida (3.4%), and St. Petersburg, Florida (3%).

Table 3.4.1.3. Top communities by number of IFQ accounts with gag shares, including the percentage of shares by community by share category.

State	Community	Accounts	GG Shares (%)
FL	Panama City	42	18.343
FL	Key West	24	0.372
FL	Largo	17	5.778
FL	St. Petersburg	15	2.597
FL	Destin	14	1.084
FL	Cortez	13	1.714
FL	Pensacola	12	0.577
FL	Steinhatchee	10	2.796
FL	Tampa	10	1.004
FL	Clearwater	9	4.353
FL	Seminole	9	1.761
FL	Tarpon Springs	9	2.644
FL	Apalachicola	8	6.347
FL	Tallahassee	8	1.227
TX	Galveston	8	0.795

Source: NMFS SERO IFQ database accessed 7/8/21.

The largest or maximum percent of gag shares held in a community is 18.343% in Panama City, Florida (IFQ database accessed 7/8/21). The percentage of shares by community varies widely and a large number of accounts with shares may not necessarily correlate to a large percentage of shares in a particular category (Table 3.4.1.3). Some communities with a relatively smaller number of accounts may have a larger percentage of shares in a particular share category or categories.

Allocation Holders without Shares

In 2021, a total of 221 IFQ accounts held gag allocation without gag shares (IFQ database accessed 2/25/22). However, these accounts may be related to accounts with gag shares. The majority of accounts with gag allocation, but without gag shares have mailing addresses in Florida (86.9% of accounts with gag allocation, but without gag shares, Table 3.4.1.4), followed by Texas (5.9%), Louisiana (2.7%), and Alabama (1.8%). Account holders with gag allocation, but without gag shares also have mailing addresses in other states (Georgia, Illinois,

Massachusetts, North Carolina, New York, Ohio, and South Carolina), but these states represent a smaller percentage of the total number of accounts with gag allocation, but without gag shares.

Table 3.4.1.4. Number of IFQ accounts with gag allocation, but without gag shares by state, 2021.

State	Accounts
AL	4
FL	192
LA	6
MS	0
TX	13
Other	6
Total	**221**

Source: NMFS SERO IFQ database accessed 2/25/22.

IFQ accounts with gag allocation, but without gag shares have mailing addresses in a total of 98 communities (IFQ database accessed 2/25/22). Communities with the most accounts with allocation, but without shares are located in Florida and Texas (Table 3.4.1.5). The community with the most accounts with allocation, but without shares is Panama City, Florida (8.1% of accounts with allocation, but without shares, Table 3.4.1.5), followed by Largo, Florida and St. Petersburg, Florida (each with 5.4%).

Table 3.4.1.5. Top communities by number of IFQ accounts with gag allocation, but without gag shares, 2021.

State	Community	Accounts
FL	Panama City	18
FL	Largo	12
FL	St. Petersburg	12
FL	Seminole	8
FL	Madeira Beach	7
TX	Galveston	7
FL	Cortez	5
FL	Key West	5

Source: NMFS SERO IFQ database accessed 2/25/22.

Dealers

The majority of dealer facilities with gag landings are located in Florida (average of 87.9% of IFQ dealer facilities reporting landings of gag for 2017-2021, Table 3.4.1.6), followed by Louisiana and Texas (7.6%), and Alabama and Mississippi (4.5%).

Table 3.4.1.6. Number of Gulf gag IFQ dealer facilities by state for 2017-2021.

Year	AL/MS	FL	LA/TX
2017	7	100	8
2018	5	103	11
2019	6	94	9
2020	4	96	8
2021	4	119	8

Source: NMFS SERO IFQ database accessed 2/16/23.

Gulf gag dealers are located in a total of 84 communities (IFQ database accessed 2/16/23, includes Gulf dealers with gag landings 2017-2021). Communities with the most Gulf gag dealer facilities are located in Florida and Louisiana (Table 3.4.1.7). The community with the most Gulf gag dealer facilities is Key West, Florida (5.3% of Gulf gag dealer facilities, Table 3.4.1.7), followed by Madeira Beach, Florida (4.7%).

Table 3.4.1.7. Top communities by number of Gulf gag IFQ dealer facilities with gag landings during 2017-2021.

State	Community	*Dealer Facilities
FL	Key West	9
FL	Madeira Beach	8
FL	Destin	6
FL	Panama City	6
FL	St. Petersburg	6
FL	Bokeelia	5
FL	Panacea	5
FL	Steinhatchee	5
LA	Golden Meadow	5

Source: NMFS SERO IFQ database accessed 2/16/23.
*Multiple dealers can use the same facility and a dealer can operate at multiple facilities.

Regional Quotient

Regional Quotient (RQ) is the proportion of gag landed within a community out of the total amount of gag landed within the Southeast region. It is an indicator of the percent contribution in pounds or value of gag landed within that community relative to the regional fishery. The RQ is reported individually only for the top 10 communities by total landings for the years of 2017 through 2021. All other communities that landed gag are grouped as "Other." Figure 3.4.1.1 shows the RQ in percentage of pounds from 2017 to 2021. The dominant communities for gag pounds landed included the communities of Madeira Beach, Florida; Apalachicola, Florida; and Panama City, Florida (Figure 3.4.1.1). Several of the top 10 communities are located in Pinellas County (Madeira Beach, Indian Shores, Tarpon Springs, and Redington Shores) and are within close proximity to each other, indicating a strong localized relationship to the gag resource, although the participants and fishing infrastructure are not centralized in one part of the county.

Indian Shores and Redington Shores border each other, but are administrated as distinct towns and therefore, are identified herein as separate communities.

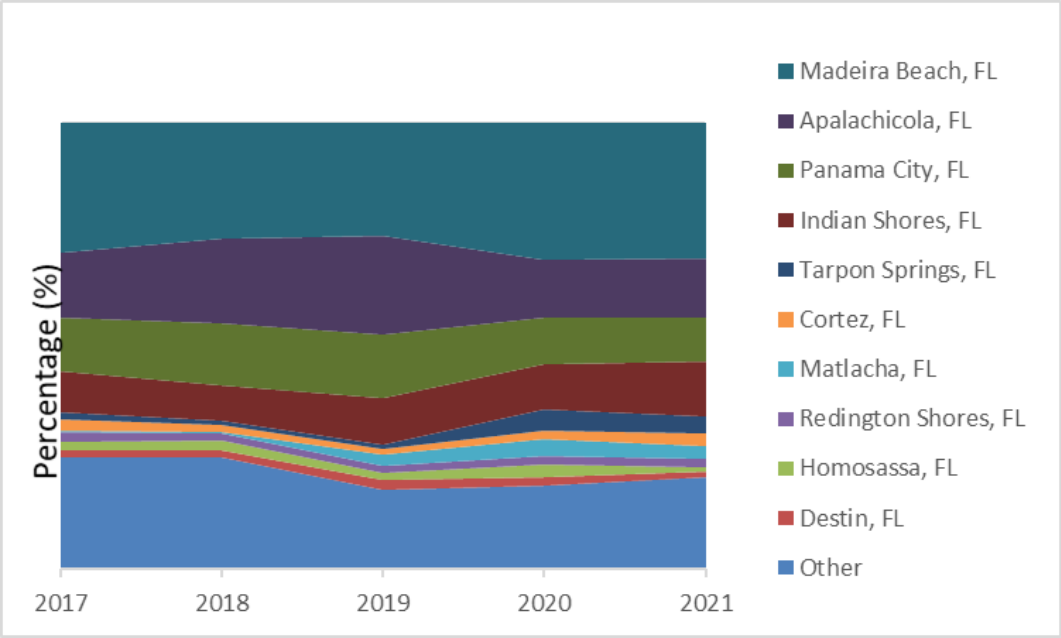

Figure 3.4.1.1. Regional Quotient (pounds) for top communities by landings of gag in the Gulf from 2017 through 2021.
Source: IFQ database accessed 2/16/23.

Local Quotient

The community Local Quotient (LQ) is the proportion of Gulf gag landings out of the total landings for all species for the community and that year and is a relative measure. It is an indicator of the contribution in pounds or value of gag to the overall landings in a community. The LQ is reported individually only for communities with the greatest commercial landings of gag as depicted in Figure 3.4.1.1. Although Indian Shores, Florida ranked among the top 10 communities for the RQ, it is not included because dealer data for non-IFQ species are not available. Figure 3.4.1.2 shows the LQ in both pounds and value for 2021. The community of Redington Shores, Florida ranks first for LQ pounds and includes the greatest proportion of gag landings out of the total landings for that community. Apalachicola, Florida ranks second for LQ pounds, but first for LQ value of gag. This suggests that although a greater proportion of the total pounds landed in Apalachicola is made up by other species, gag is important to Apalachicola in terms of total value. Gag ranks third for proportion of total value for Apalachicola, behind red snapper and red grouper (SERO Community ALS 2021).

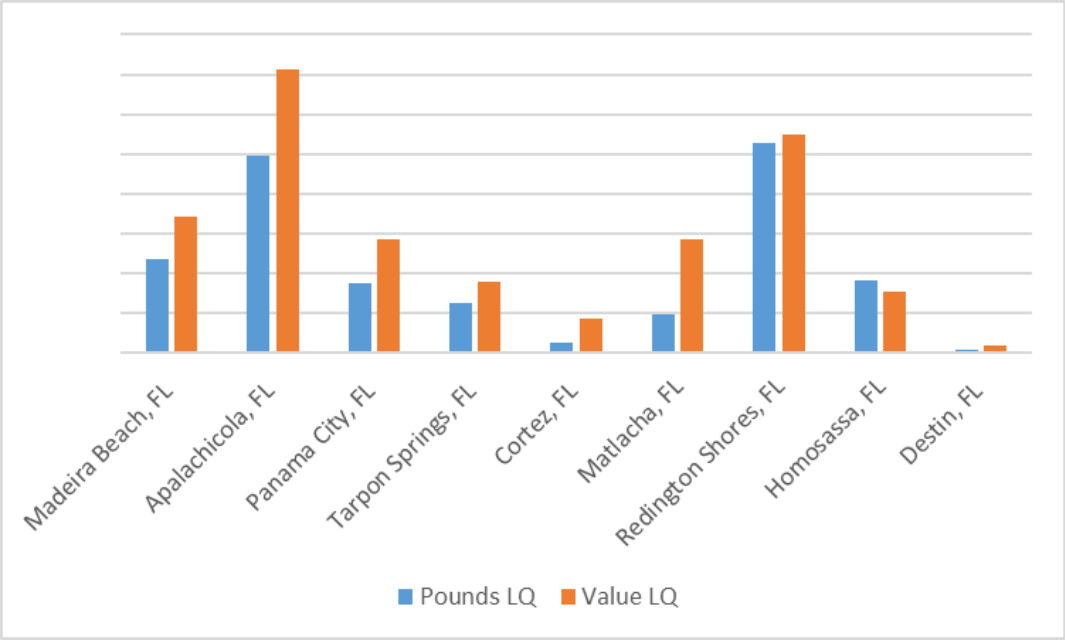

Figure 3.4.1.2. Local Quotient for top communities by landings of gag in the Gulf.
Source: SERO, Community ALS 2021.

Engagement and Reliance

In addition to examining the RQs and LQs to understand how Gulf communities are engaged and reliant on fishing, indices were created using secondary data from permit and landings information for the commercial sector (Jepson and Colburn 2013, Jacob et al. 2013). Fishing engagement is primarily based on the absolute numbers of permits, landings, and value. The analysis used the number of vessels designated commercial by homeport and owner address, value of landings, and total number of commercial permits for each community. Fishing reliance includes the same variables as fishing engagement divided by population to give an indication of the per capita influence of this activity.

Taking the communities with the highest RQs, factor scores of both engagement and reliance for commercial fishing were plotted. Two thresholds of one and one-half standard deviation above the mean are plotted onto the graphs to help determine a threshold for significance. The factor scores are standardized; therefore, a score above one is also above one standard deviation. A score above one-half standard deviation is considered engaged or reliant, with anything above one standard deviation to be very engaged or reliant.

Figure 3.4.1.3 is an overall measure of a community's commercial fishing engagement and reliance and includes the communities with the strongest relationship to the commercial sector for gag as depicted in Figure 3.4.1.1. Several communities in Figure 3.4.1.3 would be considered to be highly engaged in commercial fishing, as several are at or above one standard deviation of the mean factor score. Indian Shores, Florida shows the least amount of engagement in commercial fishing overall; however, this may be because the addresses reported in the data utilized for the indicators might differ from those reported in the IFQ database. Apalachicola and Matlacha, Florida demonstrated a moderate level of commercial reliance.

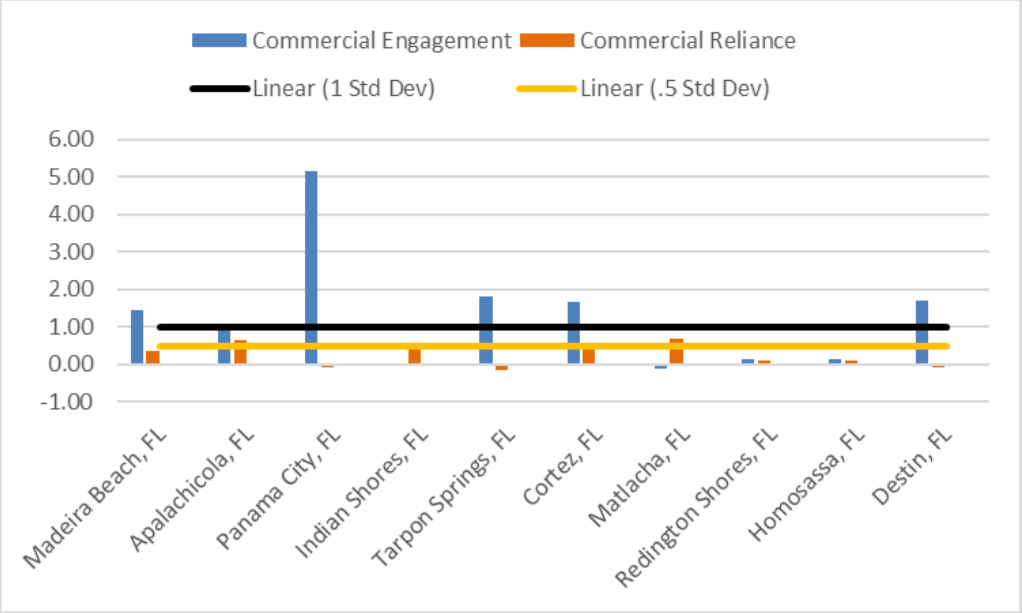

Figure 3.4.1.3. Commercial fishing engagement and reliance for top gag communities.
Source: SERO Community Social Vulnerability Indicators Database 2019.

3.4.2 Recreational Sector

Permits

A federal permit is required to take paying passengers fishing for federally managed species in the Gulf. Charter/headboat permits for reef fish are issued to individuals in Florida (60% of charter/headboat for reef fish vessels), Texas (15.7%), Alabama (10.6%), Louisiana (7.4%), and Mississippi (2.6%, SERO permit office, July 8, 2021). Residents of other states (Arkansas, Arizona, California, Colorado, Georgia, Illinois, Michigan, Missouri, Montana, North Carolina, New Jersey, New York, Ohio, Oklahoma, Tennessee, Virginia, and Wisconsin) also hold charter/headboat permits, but these states represent a smaller percentage of the total number of issued permits.

Charter/headboat permits for reef fish are held by individuals with mailing addresses in 355 communities (SERO permit office, July 8, 2021). Communities with the most charter/headboat for reef fish permits are located in Florida, Alabama, and Texas (Table 3.4.2.1). The communities with the most charter/headboat permits are Panama City, Florida (4.6% of charter/headboat permits), Destin, Florida (4.4%), and Orange Beach, Alabama (4.1%).

Table 3.4.2.1. Top communities by number of Gulf charter/headboat for reef fish permits.

State	Community	Charter/Headboat for Reef Fish Permits (RCG)
FL	Panama City	65
FL	Destin	62
AL	Orange Beach	57
FL	Naples	45
FL	Key West	43
FL	Pensacola	30
FL	Sarasota	27
FL	St. Petersburg	23
TX	Galveston	21
FL	Panama City Beach	19
TX	Corpus Christi	19
FL	Cape Coral	18
FL	Clearwater	18
FL	Fort Myers	18
FL	Crystal River	16
FL	Tampa	16
FL	Gulf Breeze	14

Source: SERO permit office, July 8, 2021.

Landings

Nearly all recreational gag landings are from the waters adjacent to the west coast of Florida (average of 98.8% from 2017-2021), followed by Alabama (0.8%), Louisiana (0.3%), and Texas (0.1%, SEFSC MRIP-FES Recreational ACL Dataset, LA Creel, and FWC SRFS).

Engagement and Reliance

Landings for the recreational sector are not available by species at the community level, making it difficult to identify communities as dependent on recreational fishing for gag. Because limited data are available concerning how communities are engaged and reliant on specific species in the recreational sector, indices were created using secondary data from permit and infrastructure information for the southeast recreational fishing sector at the community level (Jepson and Colburn 2013, Jacob et al. 2013). Recreational fishing engagement is represented by the number of recreational permits and vessels designated as "recreational" by homeport and owner's address. Fishing reliance includes the same variables as fishing engagement, divided by population. Factor scores of both engagement and reliance were plotted by community.

Figure 3.4.2.1 identifies the Gulf communities located in Florida as the top communities by engagement upon recreational fishing in general. Two thresholds of one and one-half standard deviation above the mean were plotted to help determine a threshold for significance. Communities are presented in ranked order by fishing engagement and all included communities demonstrate high levels of recreational engagement, although this is not specific to fishing for gag. Because the analysis used discrete geo-political boundaries, Panama City and Panama City Beach had separate values for the associated variables. Calculated independently, each still ranked high enough to appear in the top list, suggesting a greater importance for recreational fishing in that area. The communities of Tavernier and Islamorada, Florida demonstrate the highest reliance on recreational fishing. The communities of Marathon, Crystal River, Destin, Crystal River, and Port Saint Joe, Florida demonstrate a moderate to high reliance.

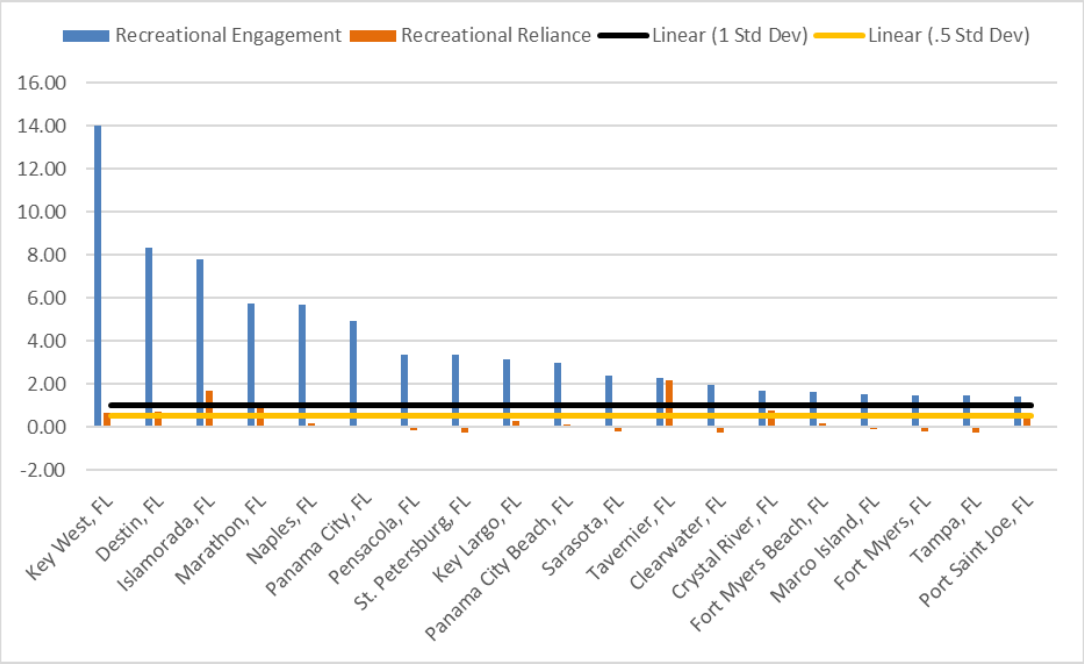

Figure 3.4.2.1. Recreational fishing engagement and reliance for top Florida communities.
Source: SERO, Community Social Vulnerability Indicators Database 2019.

The description of fishing activities presented here highlights those communities that may be most involved in Gulf gag fishing. It is expected that the impacts from the regulatory actions in this amendment, whether positive or negative, would most likely affect those communities identified above. However, some of the same engaged and reliant communities are identified for both the commercial and recreational sectors. Because this amendment would reallocate between the sectors, both positive and negative effects may occur within the same communities but there is no information to identify whether the effects would be positive or negative as a whole.

3.4.3 Environmental Justice, Equity, and Underserved Communities

Federal agencies are required to consider the impacts and/or address the inequalities of their policies on minority populations, low-income populations, disadvantaged communities, and/or

underserved communities. These requirements are outlined in the following Executive Orders (E.O.).

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

E.O. 13985 requires federal agencies to recognize and work to redress inequalities in their policies and programs that serve as barriers to equal opportunity, including pursuing a comprehensive approach to advancing equity for all, including people of color and others who have been historically underserved, marginalized, and adversely affected by persistent poverty and inequality. Federal agencies must assess how programs and policies perpetuate systemic barriers to opportunities and benefits to people of color and other underserved groups in order to equip agencies to develop policies and programs that deliver resources and benefits equitably to all.

E.O. 13985 provides definitions for equity and underserved communities, which expand the definition of a community from being geographically situated, or place-based, as defined through the Magnuson-Stevens Act, to also include communities that share a particular characteristic (e.g., crew of commercial gag grouper fishing vessels). Equity means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality. The term ''underserved communities'' refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the preceding definition of ''equity.'' According to NOAA Fisheries Equity and Environmental Justice Strategy,[44] "specific to the fisheries context, underserved groups within fishing communities may include, for example, subsistence fishery participants and their dependents, fishing vessel crews, and fish processor and distribution workers.

[44] https://media.fisheries.noaa.gov/2022-05/2022-05-NOAAFisheries-EEJ_508.pdf

E.O. 14008 calls on agencies to make achieving EJ part of their missions "by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts." Census data are available to examine the status of communities with regard to minorities and low-income populations. These data describe geographically based communities (e.g., Panama City, Florida) and are descriptive of the total population, not limited to the fishing components of the community. Information is not available at this time to examine the status of underserved populations engaged in Gulf fisheries. To help assess whether EJ concerns may be present within regional place-based communities, a suite of indices were created using census data to examine the social vulnerability of coastal communities within the region. The three indices are poverty, population composition, and personal disruption. 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. Poverty includes poverty rates for different groups; population composition includes more single female-headed households, households with children under the age of five, minority populations, and those that speak English less than well; and personal disruption includes disruptions such as higher separation rates, higher crime rates, and unemployment. Increased rates in the indicators 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.

Figures 3.4.3.1 and 3.4.3.2 provide social vulnerability rankings for place-based communities identified in Section 3.4 as important to commercial and recreational fishing for gag specifically or fishing for reef fish in general. Several communities exceed the threshold of one standard deviation above the mean for at least one of the indices (Bokeelia, Florida; Crystal River, Florida; and Panacea, Florida). These communities would be the most likely to exhibit vulnerabilities to social or economic disruption resulting from regulatory change.

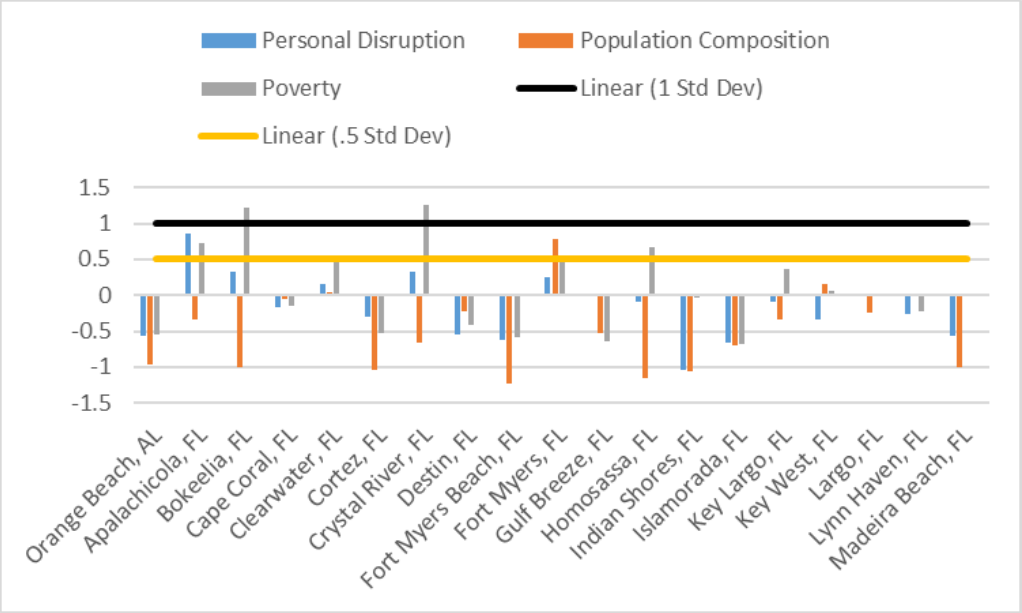

Figure 3.4.3.1. Social vulnerability indices for top commercial and recreational reef fish and gag communities.
Source: SERO, Community Social Vulnerability Indicators Database 2020.

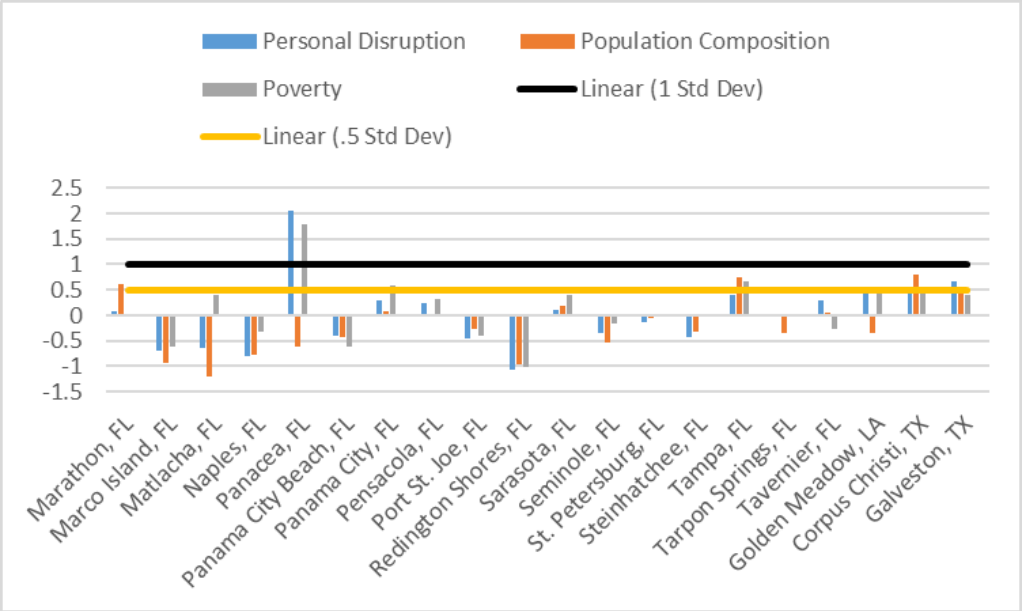

Figure 3.4.3.2. Social vulnerability indices for top commercial and recreational reef fish and gag communities continued.
Source: SERO, Community Social Vulnerability Indicators Database 2020.

People in these communities may be affected by fishing regulations in two ways: participation and employment. Although the place-based communities identified in Figures 3.4.3.1 and 3.4.3.2 may have the greatest potential for EJ concerns, complete data are not available on the race and income status for those involved in the local fishing industry (employment), or for their dependence on gag specifically (participation). The potential effects of the actions on place-

based communities and non-place-based communities, such as commercial fishermen and recreational stakeholders are discussed in Sections 4.1.4 and 4.2.4. There are no known populations that rely on the consumption of gag for subsistence. Although no EJ issues have been identified, the absence of potential EJ concerns cannot be assumed.

3.5 Description of the Administrative Environment

3.5.1 Federal Fishery Management

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

Responsibility for federal fishery management decision-making is divided between the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in the Other Applicable Law Appendix. 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 200 nautical miles offshore from the seaward boundaries of Alabama, Florida, Louisiana, Mississippi, and Texas, as those boundaries have been defined by law. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline extending 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

The Council consists of 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.

3.5.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five states exercises legislative and regulatory authority over their states' natural resources through discrete

administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided on their respective web pages (Table 3.6.1.1).

Table 3.5.2.1. State marine resource agencies and web pages.

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

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1: Modification of Gulf of Mexico (Gulf) Gag Status Determination Criteria (SDC)

4.1.1 Direct and Indirect Effects on the Physical Environment

The alternative to the status quo in this action establishes a new proxy for maximum sustainable yield (MSY) for gag, and by association, redefines the maximum fishing mortality threshold (MFMT), the minimum stock size threshold (MSST), and optimum yield (OY). This action would haves no direct impact on the physical environment. However, when there is a stock assessment, the F_{MSY} proxy is used to establish the overfishing limit (OFL), acceptable biological catch (ABC), annual catch limits (ACLs), and annual catch targets (ACTs). F_{MSY} proxies that allow larger catch levels may result in greater fishing activity, which would increase potential effects.

The commercial sector of the reef fish fishery is conducted using vertical line (i.e., electric reel, bandit rig, hook-and-line, and trolling) and longline gear. The recreational sector (headboat, charter, private vessels, and shore modes) primarily uses vertical line gear (hook-and-line). Reef fish are also harvested by spearfishing in both the commercial and recreational sectors. In the Gulf, a majority of the landings reported indicated that hook-and-line fishing was the predominant gear used.

Commercial harvesting for reef fish using longline gear occurs over hard bottom habitats using weights to keep the gear in direct contact with the bottom. The potential for this gear to adversely impact the bottom depends on the type of habitat it is set on, the presence or absence of currents and the behavior of fish after being hooked. In addition, this gear, upon retrieval, can abrade, snag, and dislodge smaller rocks, corals, and sessile invertebrates (Hamilton 2000; Barnette 2001). Direct underwater observations of longline gear in the Pacific halibut fishery by High (1998) noted that the gear could sweep across the bottom. A study that directly observed deployed longline gear (Atlantic tilefish portion of the snapper-grouper fishery) found no evidence that the gear shifted significantly, even when set in currents (Grimes et al. 1982). Lack of gear shifting even in strong currents was attributed to setting anchors at either end of the longline to prevent movement, which is the standard in the longline component of the commercial sector of the reef fish fishery. Based on 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 effects to habitat (Barnette 2001).

The abundance of many managed reef fish species, including gag, are higher on hard bottom areas than on sand or mud bottoms; thus, fishing with vertical line gear generally occurs over hard bottom areas. Vertical line gear includes multi-hook lines known as bandit gear, handlines,

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

Anchor damage is also associated with vertical line fishing vessels, particularly by the recreational sector, where fishermen may repeatedly visit well marked or known fishing locations. Hamilton (2000) pointed out that "favorite" fishing areas such as reefs are targeted and revisited multiple times, particularly with the advent of GPS technology. The cumulative effects of repeated anchoring could damage the hard bottom areas where reef fish fishing occurs, as well as repeated drops of weighted fishing rigs onto the reef. Recreational and commercial vessels that use vertical line gear are typically known to anchor more frequently over reef sites.

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

Alternative 1 (No Action) would retain the current F_{MSY} proxy for gag, which is currently defined as the fishing mortality rate (F) corresponding to the maximum yield per recruit (F_{MAX}). By default, this F proxy defines the MFMT, and the MSST is summarily defined as 50% of the biomass at F_{MAX} (B_{MAX}). OY is defined as 75% of the yield at F_{MAX}. The Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) determined that the use of F_{MAX} as a proxy for gag was inappropriate (see Section 2.1). As such, **Alternative 1** is not a viable alternative. **Preferred Alternative 2** would revise the SDC for gag based on the results of the SEDAR 72 updated 2022 stock assessment, as reviewed by the SSC in July 2022. The MSY proxy would be defined as the yield when fishing at the $F_{40\%SPR}$ where SPR is the spawning potential ratio. The $F_{40\%SPR}$ F_{MSY} proxy also defines the MFMT. The MSST is defined as 50% of the biomass at $F_{40\%SPR}$. The OY would be conditional on stock status, which is a departure from how OY has been previously defined for gag (**Alternative 1**).

Under **Alternative 1**, there would be no change to the fishing effort or direct effects on the physical environment. **Preferred Alternative 2** would define the F_{MSY} proxy for gag as $F_{40\%SPR}$. Because of the multispecies nature of the reef fish fishery for the commercial and recreational sectors, and because fishing effort may shift to other species and away from gag specifically, modifying the SDC for gag in **Preferred Alternative 2** is not expected to result in measurable effects to the physical environment compared to **Alternative 1**.

The National Marine Fisheries Service (NMFS) has developed, at the Council's request, interim measures to reduce the catch limits for gag based on a previous stock assessment model run of SEDAR 72 (2021). This model run used recreational landings data informed by the Marine Recreational Information Program's (MRIP) Fishing Effort Survey (FES), and produced yield

projections using an F_{MSY} proxy of $F_{30\%SPR}$. This model run was reviewed by the SSC in September 2021, and projections were finalized with the SSC in November 2021, with the SSC considering those results as consistent with the best scientific information available (at the time). These interim measures rely on the F_{MSY} proxy ($F_{30\%SPR}$) and catch limit recommendations from this previous model, were implemented on May 3, 2023, and can remain in effect for up to 366 days. The purpose of these interim measures is to reduce overfishing of gag while this amendment (Amendment 56) is being developed.

4.1.2 Direct and Indirect Effects on the Biological and Ecological Environment

Direct and indirect effects from fishery management actions as they relate to gag have been discussed in detail in past Fishery Management Plan for the Reef Fish Fishery of the Gulf of Mexico (Reef Fish FMP) amendments (e.g., GMFMC 2008a, 2008b, 2011a, 2011b, 2012a, 2012b, 2016, 2017a, 2017b) and are incorporated here by reference. Management actions that affect the biological and ecological environments primarily 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 a population through fishing reduces the overall population size. Fishing gear types have different selectivity patterns, which refer to a fishing method's ability to target and capture a species by size (length) and age. Selectivity patterns also include discards, which are mostly comprised of sublegal sized fish or fish caught during seasonal closures, and the mortality associated with releasing these fish. Potential impacts of the 2010 *Deepwater Horizon* MC252 oil spill on the biological/ecological environment are discussed in Section 3.2 and in the *Deepwater Horizon* Programmatic Damage Assessment and Restoration Plan (DWH Trustees 2016) and are also incorporated here by reference. These impacts include recruitment failure and reduced fish health.

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 suggested this change was due to fishing. Grouper reproduction may also have been impacted by fishing. Fitzhugh et al. (2006,) reported the size at which 50% of females are sexually mature, and the size at which 50% of females transition to males, was smaller in their studies compared to earlier years. In addition, for hermaphroditic species (like gag), fishing pressure has been suggested as influential to changes in sex ratios. The proportion of male gag in the population has decreased from historical levels of 17% (Hood and Schlieder 1992) to 2-10% in the 1990s (Coleman et al. 1996), to approximately 2% in 2020 (SEDAR 72 2022). This decrease in the fraction of males has led to concerns by the Council's SSC of a negative effect on the gag stock's reproductive potential. It has been previously suggested that the resulting reduction in the number of males is a consequence of males being more aggressive feeders than females. Thus, hook-and-line fishing on gag spawning aggregations tends to selectively remove males before females (Gilmore and Jones 1992; Koenig et al. 1996). A decline in the ratio of male to female gag in the Gulf has been an ongoing source of concern. Furthermore, for species that aggregate, such as gag, the species is particularly vulnerable to fishing because they are concentrated at specific locations. This problem is magnified because of the depth at which gag spawn (from 27-66 fathoms, but concentrated

around 44 fathoms; Koenig et al. 1996). At these depths, gag is vulnerable to mortality from barotrauma when hooked at depth and then reeled to the surface.

Bycatch does occur within the reef fish fishery. If fish are released due to catch limits, seasons, or other regulatory measures, these fish are considered bycatch. Bycatch practicability analyses have previously been completed for gag (GMFMC 2008a, 2011b, 2012a). In general, these analyses have found that reducing bycatch provides biological benefits to managed species as well as benefits to the reef fish fishery through less waste, higher yields, and, thus, less forgone yield. In some cases, actions are approved that can increase bycatch through regulatory discards such as increased minimum sizes and closed seasons. Under these circumstances, biological benefit to the managed species outweighs any increases in discards from the action.

The reef fish fishery can also affect species outside the reef fish complex. Specifically, sea turtles have been observed to be directly affected by the longline component of the Gulf reef fish fishery. These effects occur when sea turtles interact with fishing gear and result in incidental capture injury or mortality and are summarized in GMFMC (2010). However, the most recent biological opinion (NMFS 2011a) for the Reef Fish FMP and re-initiation memos concluded that the operation of the fishery is not likely to jeopardize the continued existence of sea turtles, nor other species listed under the Endangered Species Act (ESA). This fishery is also not expected to adversely affect marine mammals; the primary gear types used by the commercial sector (longline and hook-and-line) were classified in the 2023 List of Fisheries (88 FR 16899) as a Category III fishery with regard to marine mammal species, indicating the gear has little effect on these populations.

Action 1 revises the F_{MSY} proxy for gag. **Alternative 1** (No Action) would retain the current F_{MSY} proxy (F_{MAX}), which the SSC found to not be consistent with the best scientific information available. **Preferred Alternative 2** would redefine the F_{MSY} proxy for gag as $F_{40\%SPR}$, in keeping with the justifications provided by the SSC in July 2022 (see Chapter 1, and section 4.1.1 above). Yield-per-recruit based proxies, like F_{MAX}, correspond to higher MSYs than $F_{40\%SPR}$ and may allow for higher levels of fishing effort, producing potentially greater adverse effects of the biological/ecological environment. Neither alternative is expected to have significant impacts on the biological environment. The multi-species nature of the reef fish fishery is expected to be maintained, and therefore the manner in which the fishery is prosecuted is not expected to change. For gag, F_{MAX} (**Alternative 1**) could have the greatest adverse impacts, with fewer adverse impacts for $F_{40\%SPR}$ (**Preferred Alternative 2**). Under **Preferred Alternative 2**, establishing an F_{MSY} proxy of $F_{40\%SPR}$ for gag would be consistent with the guidance provided by Harford et al. (2019), and that of the SSC (see Sections 1.1 and 2.1). Therefore, **Preferred Alternative 2** would be expected to result in positive direct effects to the biological environment for gag compared to **Alternative 1**, which would be expected to maintain the negative biological effects currently being observed for the stock.

4.1.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain current SDC definitions. Therefore, **Alternative 1** would not be expected to result in economic effects. However, **Alternative 1** is not a viable alternative because current SDC definitions, which are based on F_{MAX}, are no longer deemed

sustainable by the SSC and are therefore not consistent with the best scientific information available.

Preferred Alternative 2 would redefine SDC based on the best scientific information available as indicated by the SSC following its review of the latest gag stock assessment (SEDAR 72). Therefore, under **Preferred Alternative 2,** future determinations of the status of the gag stock would be expected to be more accurate. Although the magnitude of the economic effects cannot be quantified at this time, **Preferred Alternative 2** would be expected to result in indirect economic benefits in the long run because management measures based on the best scientific information available are designed to achieve OY on a continuing basis, and thus would be expected to be more appropriate and effective.

4.1.4 Direct and Indirect Effects on the Social Environment

Modifying the SDC values does not directly affect fishing behavior. Catch levels are derived from the SDC, meaning that modifying the SDC values, including the point at which a stock is considered to be overfished (MSST) and undergoing overfishing (MFMT), may result in indirect effects. In general, more biologically conservative SDC values would be expected to result in the setting of lower catch limits. Lower catch limits would result in fewer fishing opportunities in the short term, which would be expected to result in indirect negative effects. At the same time, more biologically conservative SDC values would also be expected to reduce the risk of overharvest and therefore would be expected to result in indirect positive effects in the long term.

Although additional effects are not usually expected from retaining **Alternative 1** (No Action), the current stock SDC are not consistent with the best scientific information available. **Preferred Alternative 2** would revise the MSY, MFMT, MSST, and OY for gag based on the recent stock assessment update (SEDAR 72 2022). The SDC under **Preferred Alternative 2** are more biologically conservative than under **Alternative 1** and would be expected to result in indirect negative effects in the short-term. These negative effects would be expected to be mitigated over the long term as the revised SDC are more appropriate for the gag stock to rebuild, resulting in indirect positive effects.

4.1.5 Direct and Indirect Effects on the Administrative Environment

Because the alternatives in this action would not result in added regulations, there would not be any immediate effect on the administrative environment from rulemaking.

Alternative 1 would result in retaining the current F_{MSY} proxy for gag; however, because F_{MAX} is not considered by the Council's SSC or NMFS to be consistent with the best scientific information available, **Alternative 1** is not a viable alternative. **Preferred Alternative 2** would redefine the F_{MSY} proxy for gag as $F_{40\%SPR}$. When compared to **Alternative 1**, **Preferred Alternative 2** would be more positive to the administrative environment because it results in harvest levels that are set to reduce the likelihood that overfishing or stock depletion would occur, even indirectly accounting for episodic mortality from events like red tide blooms. A spawning potential ratio (SPR) proxy (like $F_{40\%SPR}$ in **Preferred Alternative 2**) that allows for a

higher SPR target would be expected to have more positive effects on the administrative environment as described because they would allow a lower, and predictably more sustainable, rate of harvest, reducing the likelihood that overfishing or a stock depletion could occur.

Actions to control harvest by the Council and NMFS are mostly routine and conducted through the Council process as established by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Additionally, through the use of ACLs and accountability measures (AM), the Council and NMFS can determine if overfishing is occurring annually and take measures to reduce the likelihood of the gag stock becoming overfished. This minimizes the risk that the gag stock would be depleted, triggering further management action.

4.2 Action 2: Modification of Gulf Gag Catch Limits, Sector Allocation, and Rebuilding Timeline

4.2.1 Direct and Indirect Effects on the Physical Environment

General effects on the physical environment from fishing are described in Section 4.1.1.

Establishing a rebuilding time and modifying the sector allocation and catch limits are not expected to result in significant effects on the physical environment as both sectors are not expected to change current practices they respectively use in the multi-species reef fish fishery. The catch limits proposed in **Alternative 2** and **Preferred Alternative 3** would result in a substantial reduction in gag harvest, and presumably fewer available days to fish recreationally for them. Gag is targeted by both sectors and fishing occurs for other reef fish species when recreational fishing for gag is closed, or when a commercial vessel does not have sufficient gag IFQ allocation available to retain and land gag. Thus, the effects on the physical environment of **Alternative 2** and **Preferred Alternative 3** are not expected to be measurably different from **Alternative 1** as fishing would continue to occur regardless if gag is open for harvest. However, there could be a slight positive effect on the physical environment due to the reduced number of direct target trips when recreational gag harvest is closed, or vessels have used all their IFQ allocation. This may be negated though by the co-occurrence of gag with other popular reef fish species, like other snappers and groupers, and the regulatory requirement for fishermen to discard gag when they cannot be retained. Any impacts to the physical environment are expected to be minor because modifications to the sector allocation and catch limits would not change the fishing methods used or alter the execution of the reef fish fishery as a whole. It is assumed reef fish fishermen would continue to take trips and harvest other species when the harvest of gag is not allowed. Therefore, the effects to the physical environment under the options in **Alternative 2** and **Preferred Alternative 3** are expected to be similar to **Alternative 1**.

4.2.2 Direct and Indirect Effects on the Biological and Ecological Environment

Direct and indirect effects from fishery management actions as they relate to gag have been discussed in detail Section 4.1.2.

Decreasing the catch limits reduces the number of fish that can be harvested. In the case of gag, a decrease in the catch limits is necessary to end overfishing and rebuild the stock from its current overfished condition. Decreasing the catch limits for gag may also cause an increase in regulatory discards if some gag are caught while targeting other reef fish species. The 2022 SEDAR 72 stock assessment characterized the nature of commercial and recreational discards of gag. Commercial discards make up a considerably smaller fraction of the total discards compared to recreational discards, such that despite the higher estimated discard mortality by the commercial fleets (25%, versus 12% for recreational fleets; SEDAR 72 2022), the effect of discard mortality by the recreational fleets is greater. This is because the number of recreational discards in any given historical fishing year is one to two orders of magnitude greater than the

commercial discards. As discussed in 4.1.2, the commercial and recreational reef fish fisheries in the Gulf target multiple species throughout the year; thus, regulatory discards of gag may increase for some fleets with the implementation of lower catch limits. Further, male gag are almost exclusively found in waters greater than 40 meters (131 feet) in depth (SEDAR 72 2022, and references therein). Regulatory discards of gag from these deeper depths would be expected to be subject to greater barotrauma-related mortality. However, the magnitude of commercial discards of gag under decreased catch limits may be reduced, because commercial vessels lacking sufficient IFQ allocation to land gag may actively avoid the species altogether (public testimony from commercial fishermen at Council meetings; see also information on discards in NMFS 2022b). Recreational discards by for-hire fishermen are expected to remain the same due to the expectation that their current fishing practices would continue, which include generally avoiding species that cannot be retained (public testimony from commercial fishermen at Council meetings). Recreational discards by the private vessel and shore modes may increase to the extent to which those fishermen do not modify where or how they fish to avoid catching and discarding gag when the fishing season is closed. Even so, recreational fishing is classically a multispecies activity, and directed fishing effort on a species closed to harvest may be redirected to another species which may be harvested.

Any modification to the sector allocation is not expected to significantly affect the biological environment. Any effect of moving allocation from one sector to another, as it relates to depth fished and any resultant mortality, would be highly uncertain. Further, both sectors primarily use the same gear types and practices (hook and line, natural bait), have the same minimum size limits (24 inches total length), and are constrained with AMs. The minimum size limit corresponds to the length at which 50% of females are estimated to be sexually mature. Further, the reductions in the catch limits associated with **Alternative 2** and **Preferred Alternative 3** are projected to provide the greatest positive effect on the stock and allow rebuilding consistent with whichever rebuilding timeline is selected under either alternative. Catch limits under **Alternative 1** would not allow the stock to rebuild, resulting in a negative biological effect. Under **Alternative 2** and **Preferred Alternative 3**, all of the OFLs and ABCs are based on projections from the 2022 SEDAR 72 stock assessment update, and the recommendations from the Council's SSC for an OFL with an F_{MSY} proxy of $F_{40\%SPR}$, when fishing at $F_{Rebuild}$ (the fishing mortality rate that will rebuild the stock under $F_{40\%SPR}$, relative to the specified rebuilding timeline). Thus, each of the options under **Alternative 2** and **Preferred Alternative 3** are projected to result in the same stock size at the end of the specified rebuilding timeline. The difference in total landings among **Alternative 2** and **Preferred Alternative 3** and the associated options results from differences in the magnitude of discards and associated discard mortality rates, and the length composition landed by each sector. Because **Alternative 3** would allocate a greater percentage of the total ACL to the recreational sector compared to **Alternative 2**, a modest reduction of total allowable annual harvest is reflected in **Preferred Alternative 3**. However, the overall mortality of gag is expected to be the same between **Alternative 2** and **Preferred Alternative 3**. The difference in effects between the reduced total ACLs under **Alternative 2** and **Preferred Alternative 3** is negligible within the projection period of 2024 – 2028. Therefore, the effects under **Alternative 2** and **Preferred Alternative 3** on the biological environment are not expected to be measurably different from each other, but are more positive to the gag stock when compared to **Alternative 1**.

For the commercial sector, the IFQ program constrains commercial landings to the quota. For the recreational sector, the buffer between the ACL and ACT (Action 3) reduces the likelihood that the recreational ACL would be exceeded. If the recreational ACL is exceeded, the requirement to pay back the overage is expected to mitigate the negative impacts of that overage on the stock. The catch limits under **Alternative 1** are based on the Marine Recreational Information Program (MRIP) Coastal Household Telephone Survey (CHTS) and SEDAR 33 (2014). MRIP-CHTS and SEDAR 33 are no longer considered consistent with the best scientific information available, would maintain catch limits that continue allowing overfishing to occur, and would not rebuild the stock's SSB to a level commensurate with SSB at MSY. Therefore, **Alternative 1** is expected to result in negative effects to the gag stock.

Alternative 2 and **Preferred Alternative 3** are expected to have direct positive effects on the biological environment for the gag stock compared to **Alternative 1**, since they are expected to end overfishing and rebuild the stock. By reducing fishing mortality, the number of older, larger fish in the population is expected to increase and help the stock meet whichever rebuilding timeline is selected (i.e., **Options a – c** of **Alternative 2** and **Preferred Alternative 3**). Positive biological effects are expected under **Alternative 2** and **Preferred Alternative 3** due to rebuilding the gag stock. **Option 2a** and **Option 3a** would rebuild the gag stock to $SSB_{40\%SPR}$ in 11 years, assuming no direct fishing mortality; **Option 2b** and **Preferred Option 3b** would rebuild the stock in 18 years, while fishing at 75% of $F_{40\%SPR}$; **Option 2c** and **Option 3c** would rebuild the stock in 22 years, or twice the minimum time to rebuild under no direct fishing mortality (T_{Min}). It is important to note that **Option 2a** and **Option 3a** cannot account for effects on the gag stock relative to regulatory dead discards from a gag closure, because these options assume zero fishing mortality of gag, regardless of the species being targeted. Due to the multi-species nature of the reef fish fishery, regulatory discards of gag would occur. However, the magnitude of dead discards under **Options 2a** and **3a** would be expected to be highest out of the options in **Alternative 2** and **Preferred Alternative 3**. **Option 2b** and **Preferred Option 3b** and **Option 2c** and **Option 3c** would all rebuild the gag stock to the same biomass size at $SSB_{40\%SPR}$, albeit at different time durations (18 years versus 22 years). The longer the rebuilding period is for gag, the greater the likelihood that the rebuilding stock would be subject to both direct fishing pressure and episodic mortality from red tide as discussed in Sections 1.1 and 2.2. However, by rebuilding the gag stock to $SSB_{40\%SPR}$, the SSC expects that the stock would be more resilient to both sources of mortality over the long-term.

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 gag abundance. However, the relationships between gag and non-target species caught on trips where gag are directly targeted are not fully understood. Overall, any effects to the ecological environment of the Gulf by reducing gag catch limits are not expected to be significant because the overall prosecution of the reef fish fishery is not expected to change. In most cases, multiple species are targeted on reef fish trips. For this same reason, no additional impacts to ESA-listed species or introduction of invasive species are anticipated as a result of this action.

4.2.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain the current OFL, ABC, and the recreational and commercial ACLs for gag. Therefore, **Alternative 1** would not be expected to change fishing practices or recreational and commercial gag harvests and would not be expected to result in economic effects. However, **Alternative 1** is not a viable alternative because it is not consistent with the best scientific information available and would not end overfishing. **Alternative 2** and **Preferred Alternative 3** would revise the catch limits and establish a rebuilding time for the gag stock. **Alternative 2** would maintain the existing allocation between the recreational and commercial sectors (61% recreational, 39% commercial). **Preferred Alternative 3** would allocate 65% and 35% to the recreational and commercial sectors, respectively. With given buffers between the recreational ACLs and ACTs and between the commercial ACLs and ACTs, recreational and commercial ACL modifications considered in **Alternative 2** and **Preferred Alternative 3** would result in changes to the recreational and commercial ACTs and commercial quotas.

For the commercial sector, because gag is currently managed under an IFQ program, short term economic effects expected to result from changes to the commercial gag quota can be measured by changes in the value of annual IFQ allocation. Between 2017 and 2021, annual allocation transfer prices per pound (lb) gutted weight (gw) averaged $1.03 ($2021) (Table 3.3.1.15). For each alternative and option, estimated changes in commercial gag quotas and annual allocation values relative to **Alternative 1** are provided in Table 4.2.3.1.

Table 4.2.3.1. Annual and total changes in commercial gag quota in pounds gutted weight (lb gw) and in annual allocation value ($2021) by alternative and option.

Option 2A			Option 3A		
Year	Difference relative to **Alternative 1**		Year	Difference relative to **Alternative 1**	
	Quota (lb gw)	Annual Allocation ($2021)		Quota (lb gw)	Annual Allocation ($2021)
2024	-939,000	-$967,170	2024	-939,000	-$967,170
2025	-939,000	-$967,170	2025	-939,000	-$967,170
2026	-939,000	-$967,170	2026	-939,000	-$967,170
2027	-939,000	-$967,170	2027	-939,000	-$967,170
2028	-939,000	-$967,170	2028	-939,000	-$967,170
Total	-4,695,000	-$4,835,850	**Total**	-4,695,000	-$4,835,850
Option 2B			**Preferred Option 3B**		
2024	-803,204	-$827,300	2024	-819,407	-$843,989
2025	-750,737	-$773,259	2025	-773,113	-$796,306
2026	-703,671	-$724,781	2026	-731,448	-$753,391
2027	-650,433	-$669,946	2027	-684,382	-$704,914
2028	-584,850	-$602,395	2028	-627,286	-$646,105
Total	-3,492,895	-$3,597,682	**Total**	-3,635,635	-$3,744,704
Option 2C			**Option 3C**		
2024	-774,656	-$797,895	2024	-793,945	-$817,763
2025	-713,702	-$735,113	2025	-740,707	-$762,928
2026	-660,463	-$680,277	2026	-692,869	-$713,655
2027	-600,281	-$618,289	2027	-639,631	-$658,820
2028	-526,982	-$542,791	2028	-574,819	-$592,064
Total	-3,276,084	-$3,374,366	**Total**	-3,441,971	-$3,545,230

Between 2024 and 2028, **Alternatives 2** and **3** would decrease the commercial gag quota by at least 3.28 million pounds (mp) gw (**Option 2c**) and at most 4.70 mp (gw) (**Options 2a and 3a**). Associated losses in annual allocation value are estimated to range from $3.37 million ($2021) (**Option 2c**) to $4.84 million ($2021) (**Options 2a and 3a**). Between 2024 and 2028, **Preferred Alternative 3 - Preferred Option 3b** would decrease the commercial gag quota by 3.66 mp (gw). Associated losses in annual allocation value expected to result from **Preferred Alternative - Preferred Option 3b** between 2024 and 2028 are estimated at $3.75 million ($2021). Gag IFQ annual allocation prices are also expected to increase due to the reduced supply of annual allocation that would result from the decreases in quota proposed in this action.

In addition to decreases in IFQ annual allocation values, **Alternative 2** and **Preferred Alternative 3** would modify the percentages of multi-use shares distributed to IFQ shareholders. **Alternatives 2** and **Preferred Alternative 3** would set the red grouper multi-use allocation equal to zero, and are therefore expected to lessen the catch-quota flexibility of IFQ shareholders.

Expected reductions in commercial gag landings, which would result from decreases in gag commercial quotas considered in **Alternative 2** and **Preferred Alternative 3,** would lead to decreased gag availability in the markets. The diminished availability of commercially caught gag to consumers, which would be associated with an increase in market prices, is expected to result in consumer surplus (CS) losses relative to **Alternative 1** (No Action). Expected landings reductions are estimated by subtracting 2017-2021 average commercial gag landings from the commercial quotas proposed in **Alternative 2** and **Preferred Alternative 3**. Average commercial gag landings between 2017 and 2021 are estimated at 511,121 lb gw (Table 1.1.1.). Expected price increases were derived based on a price flexibility estimate provided by Keithly and Tabarestani (2018) and an average ex-vessel price for gag. Keithly and Tabarestani (2018) estimated an own price flexibility of -0.396 for groupers, including gag. Between 2017 and 2021, ex-vessel prices for gag averaged $6.10 per lb gw ($2021) (Table 3.3.1.19). Estimated changes in commercial gag landings in average ex-vessel prices and associated changes in CS are provided in Table 4.2.3.2.

Table 4.2.3.2. Annual and total changes in commercial gag landings and consumer surplus and annual changes in average ex-vessel prices by alternative and option. Dollar values are in $2021.

Option 2a			
Year	Changes relative to **Alternative 1**		
	Landings	Price	Consumer Surplus
2024	-511,121	$2.20	-$561,211
2025	-511,121	$2.20	-$561,211
2026	-511,121	$2.20	-$561,211
2027	-511,121	$2.20	-$561,211
2028	-511,121	$2.20	-$561,211
Total	-2,555,607		-$2,806,056
Option 2b			
2024	-375,325	$1.61	-$521,597
2025	-322,858	$1.39	-$485,072
2026	-275,793	$1.18	-$442,244
2027	-222,554	$0.96	-$382,327
2028	-156,971	$0.67	-$291,777
Total	-1,353,502		-$2,123,017
Option 2c			
2024	-346,777	$1.49	-$503,190
2025	-285,823	$1.23	-$452,169
2026	-232,585	$1.00	-$394,547
2027	-172,402	$0.74	-$314,745
2028	-99,103	$0.43	-$196,532
Total	-1,136,691		-$1,861,184

Option 3a			
Year	Changes relative to **Alternative 1**		
	Landings	Price	Consumer Surplus
2024	-511,121	$2.20	-$561,211
2025	-511,121	$2.20	-$561,211
2026	-511,121	$2.20	-$561,211
2027	-511,121	$2.20	-$561,211
2028	-511,121	$2.20	-$561,211
Total	-2,555,607		-$2,806,056
Preferred Option 3b			
2024	-391,528	$1.68	-$530,486
2025	-345,234	$1.48	-$502,095
2026	-303,569	$1.30	-$468,671
2027	-256,503	$1.10	-$421,942
2028	-199,407	$0.86	-$352,478
Total	-1,496,242		-$2,275,672
Option 3c			
2024	-366,066	$1.57	-$516,011
2025	-312,828	$1.34	-$476,743
2026	-264,991	$1.14	-$431,072
2027	-211,752	$0.91	-$368,684
2028	-146,941	$0.63	-$276,298
Total	-1,302,578		-$2,068,808

Relative to **Alternative 1**, cumulative reductions in CS ($2021) expected to result from the decreased availability of gag to consumers are estimated to range from $497,585 (**Alternative 2-Option 2c**) to $2.81 million (**Alternative 2-Option 2a** and **Alternative 3-Option 3a**) during the 2024-2028 interval. Between 2024 and 2028, cumulative reductions in consumer surplus expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at $2.28 million ($2021).

Estimated average price changes expected to result from decreases in commercial gag landings and a 2017-2021 average ex-vessel price of $6.10 per lb gw ($2021) (Table 3.3.1.19) are used to estimate expected changes in commercial revenues. As discussed in Section 3.3.1., changes in producer surplus (PS) were estimated at 50% of the revenues. Changes in commercial gag landings, revenue, and associated changes in PS are provided in Table 4.2.3.3.

Table 4.2.3.3. Annual and total changes in commercial gag landings, revenue, and producer surplus by alternative and option. Dollar values are in $2021.

Options 2a			
Year	Changes relative to **Alternative 1**		
	Landings	Revenue	Producer Surplus
2024	-511,121	-$3,117,841	-$1,558,920
2025	-511,121	-$3,117,841	-$1,558,920
2026	-511,121	-$3,117,841	-$1,558,920
2027	-511,121	-$3,117,841	-$1,558,920
2028	-511,121	-$3,117,841	-$1,558,920
Total	-2,555,607	-$15,589,203	-$7,794,601
Option 2b			
2024	-375,325	-$2,070,504	-$1,035,252
2025	-322,858	-$1,708,289	-$854,145
2026	-275,793	-$1,403,489	-$701,744
2027	-222,554	-$1,081,657	-$540,828
2028	-156,971	-$718,679	-$359,339
Total	-1,353,502	-$6,982,618	-$3,491,309
Option 2c			
2024	-346,777	-$1,870,483	-$935,241
2025	-285,823	-$1,466,850	-$733,425
2026	-232,585	-$1,140,430	-$570,215
2027	-172,402	-$800,760	-$400,380
2028	-99,103	-$429,097	-$214,548
Total	-1,136,691	-$5,707,620	-$2,853,810

Option 3a			
Year	Changes relative to **Alternative 1**		
	Landings	Revenue	Producer Surplus
2024	-511,121	-$3,117,841	-$1,558,920
2025	-511,121	-$3,117,841	-$1,558,920
2026	-511,121	-$3,117,841	-$1,558,920
2027	-511,121	-$3,117,841	-$1,558,920
2028	-511,121	-$3,117,841	-$1,558,920
Total	-2,555,607	-$15,589,203	-$7,794,601
Preferred Option 3b			
2024	-391,528	-$2,187,145	-$1,093,572
2025	-345,234	-$1,859,870	-$929,935
2026	-303,569	-$1,581,069	-$790,535
2027	-256,503	-$1,284,069	-$642,035
2028	-199,407	-$949,327	-$474,663
Total	-1,496,242	-$7,861,481	-$3,930,740
Option 3c			
2024	-366,066	-$2,004,865	-$1,002,432
2025	-312,828	-$1,641,736	-$820,868
2026	-264,991	-$1,336,220	-$668,110
2027	-211,752	-$1,019,330	-$509,665
2028	-146,941	-$666,423	-$333,211
Total	-1,302,578	-$6,668,574	-$3,334,287

Between 2024 and 2028, expected cumulative decreases in commercial revenues relative to **Alternative 1** are estimated to range from $5.71 million (**Alternative 2-Option 2c**) to $15.59 million (**Alternative 2-Option 2a** and **Alternative 3-Option 3a**). Between 2024 and 2028, expected cumulative decreases in PS relative to **Alternative 1** are estimated to range from $2.85 million (**Alternative 2-Option 2c**) to $7.80 million (**Alternative 2-Option 2a** and **Alternative 3-Option 3a**). Between 2024 and 2028, cumulative decreases in commercial gag revenues and in PS expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at $7.87 million ($2021) and $3.93 million ($2021), respectively.

The sizeable decreases in the commercial gag landings expected from **Alternative 2** and **Alternative 3** would be expected to result in the reduction of gag available for purchase by dealers. Commercial gag landings would be eliminated under **Alternative 2-Option 2a** and **Alternative 3-Option 3a**. However, gag purchases represent a relatively small proportion of total dealer purchases. Between 2016 and 2020, gag purchases accounted for 3.74% of total dealer purchases. Therefore, adverse economic effects to dealers due to the reduced availability of gag for purchase are expected to be limited.

For the commercial sector, aggregate changes in economic value expected to result from this action are estimated by the summing changes in PS to commercial fishermen and in CS to consumers purchasing gag. For each alternative, commercial surplus measures and total economic value are provided in Table 4.2.3.4.

Table 4.2.3.4. Annual and total changes in commercial consumer and producer surpluses, and in economic value. Dollar values in $2021.

	Consumer Surplus	Producer Surplus	Economic Value
Option 2a or 3a			
2024	-$561,211	-$1,558,920	-$2,120,131
2025	-$561,211	-$1,558,920	-$2,120,131
2026	-$561,211	-$1,558,920	-$2,120,131
2027	-$561,211	-$1,558,920	-$2,120,131
2028	-$561,211	-$1,558,920	-$2,120,131
Total	-$2,806,056	-$7,794,601	-$10,600,657
Option 2b			
2024	-$521,597	-$1,035,252	-$1,556,849
2025	-$485,072	-$854,145	-$1,339,217
2026	-$442,244	-$701,744	-$1,143,988
2027	-$382,327	-$540,828	-$923,155
2028	-$291,777	-$359,339	-$651,116
Total	-$2,123,017	-$3,491,309	-$5,614,326
Option 2c			
2024	-$503,190	-$935,241	-$1,438,431
2025	-$452,169	-$733,425	-$1,185,594
2026	-$394,547	-$570,215	-$964,762
2027	-$314,745	-$400,380	-$715,125
2028	-$196,532	-$214,548	-$411,080
Total	-$1,861,184	-$2,853,810	-$4,714,994
Preferred Option 3b			
2024	-$530,486	-$1,093,572	-$1,624,058
2025	-$502,095	-$929,935	-$1,432,030
2026	-$468,671	-$790,535	-$1,259,206
2027	-$421,942	-$642,035	-$1,063,977
2028	-$352,478	-$474,663	-$827,141
Total	-$2,275,672	-$3,930,740	-$6,206,412
Option 3c			
2024	-$516,011	-$1,002,432	-$1,518,443
2025	-$476,743	-$820,868	-$1,297,611
2026	-$431,072	-$668,110	-$1,099,182
2027	-$368,684	-$509,665	-$878,349
2028	-$276,298	-$333,211	-$609,509
Total	-$2,068,808	-$3,334,287	-$5,403,095

Between 2024 and 2028, cumulative decreases in commercial economic value, i.e., consumer and producer surplus combined, relative to **Alternative 1** are estimated to range from $4.71 million (**Alternative 2-Option 2c**) to $10.60 million (**Alternative 2-Option 2a** and **Alternative 3-Option 3a**). Between 2024 and 2028, cumulative decreases in commercial economic value expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at $6.21 million ($2021).

For the recreational sector, the economic effects expected to result from **Alternatives 2** and **3** were measured in changes in economic value, i.e., changes in CS for anglers and changes in PS to for-hire operators. Changes in CS are evaluated based on differences between ACTs considered in **Alternatives 2** and **3** and 2017-2021 average recreational gag landings. Changes in PS are evaluated based on expected changes in the number of for-hire trips targeting gag.

CS per additional fish kept during a trip is defined as the amount of money an angler would be willing to pay for a fish in excess of the cost to harvest the fish. Changes in CS expected to result from ACT decreases considered in **Alternatives 2** and **3** were based on an estimated CS per gag and on the expected decreases in recreational gag landings relative to the status quo alternative (**Alternative 1**). For actions affecting the recreational sector catch limits or targets (Actions 2 and 3.1), expected changes in recreational gag landings are evaluated based on ACT changes to allow the computation of cumulative economic effects expected to result from the suite of preferred alternatives selected in this document. These required cumulative economic effects are included in the Regulatory Impact Review (Section 6). Expected decreases in recreational gag landings were determined by subtracting 2017-2021 average recreational gag landings from recreational ACTs proposed in **Alternatives 2** and **3.** As provided in Table 1.1., recreational gag landings averaged 1,265,199 lb gw between 2017 and 2021. Expected changes in recreational gag landings were converted into numbers of fish based on a 2017-2021 average weight of 8.88 lb gw per gag (M. Larkin, pers. comm., 2022, SEFSC). Based on information provided in Section 3.3.2, a CS of $92.80 ($2021) per two gag is used. For **Alternatives 2** and **3**, expected changes in recreational gag landings expressed in lb gw and in number of fish, and associated expected changes in economic value are provided in Table 4.2.3.5.

Table 4.2.3.5. Annual and total changes in gag recreational landings, number of fish, and in economic value (CS) ($2021) by alternative and option.

Option 2a					**Option 3a**			
	Difference relative to **Alternative 1**					Difference relative to **Alternative 1**		
Year	Landings	Fish	Consumer Surplus		Year	Landings	Fish	Consumer Surplus
2024	-1,265,199	-143,773	-$6,613,541		2024	-1,265,199	-143,773	-$6,613,541
2025	-1,265,199	-143,773	-$6,613,541		2025	-1,265,199	-143,773	-$6,613,541
2026	-1,265,199	-143,773	-$6,613,541		2026	-1,265,199	-143,773	-$6,613,541
2027	-1,265,199	-143,773	-$6,613,541		2027	-1,265,199	-143,773	-$6,613,541
2028	-1,265,199	-143,773	-$6,613,541		2028	-1,265,199	-143,773	-$6,613,541
Total	-6,325,996	-718,863	-$33,067,706		**Total**	-6,325,996	-718,863	-$33,067,706
Option 2b					**Preferred Option 3b**			
2024	-1,017,481	-115,623	-$5,318,650		2024	-1,006,710	-114,399	-$5,262,350
2025	-922,343	-104,812	-$4,821,337		2025	-907,085	-103,078	-$4,741,579
2026	-837,077	-95,122	-$4,375,631		2026	-817,332	-92,879	-$4,272,415
2027	-739,246	-84,005	-$3,864,243		2027	-715,013	-81,251	-$3,737,569
2028	-620,773	-70,542	-$3,244,947		2028	-591,154	-67,177	-$3,090,123
Total	-4,136,920	-470,105	-$21,624,808		**Total**	-4,037,294	-458,783	-$21,104,037
Option 2c					Option **3c**			
2024	-966,322	-109,809	-$5,051,227		2024	-951,961	-108,177	-$4,976,161
2025	-855,925	-97,264	-$4,474,156		2025	-836,180	-95,020	-$4,370,940
2026	-758,992	-86,249	-$3,967,459		2026	-733,861	-83,393	-$3,836,093
2027	-648,596	-73,704	-$3,390,388		2027	-618,977	-70,338	-$3,235,564
2028	-514,864	-58,507	-$2,691,334		2028	-478,963	-54,428	-$2,503,669
Total	-3,744,699	-425,534	-$19,574,563		**Total**	-3,619,942	-411,357	-$18,922,426

Between 2024 and 2028, cumulative decreases in recreational gag landings are estimated to range from 3.62 million lb gw (**Alternative 3-Option 3c**) to 6.33 million lb gw (**Alternative 2-Option 2a and Alternative 3-Option 3a)**. Associated decreases in CS are estimated to range from $18.92 million (**Alternative 3-Option 3c**) to $33.07 million (**Alternative 2-Option 2a and Alternative 3-Option 3a)**. Between 2024 and 2028, cumulative decreases in recreational gag landings and in CS expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at 4.04 million lb gw and $21.1 million ($2021), respectively.

In addition to CS changes, decreases in the gag recreational ACL (and ACT) considered in this action are expected to result in decreases in PS to charter for-hire operators due to shortened gag recreational fishing seasons.

PS per angler trip is defined as the amount of money that a vessel owner earns in excess of the cost of providing the trip. As indicated in Section 3.3.2, PS per angler trip is estimated at $150 ($2021). Expected changes in charter trips targeting gag were derived from projected closure dates for **Alternative 2** and **Preferred Alternative 3** provided in Table 2.4.1. and from the average distribution of gag target trips by wave and mode between 2017 and 2021 provided in Table 3.3.2.4. For each alternative, estimated changes in number of trips and in economic value (PS) relative to **Alternative 1** are provided in Table 4.2.3.6. Due to the uncertainty in the

estimated season lengths, the projected closure dates and associated changes in target trips could change when NMFS reviews more recent data in the future.

Table 4.2.3.6. Changes in for-hire gag target trips and in producer surplus ($2021) by alternative and option.

Option 2a			Option 3a		
Year	Change relative to **Alternative 1**		Year	Change relative to **Alternative 1**	
	Trips	Producer Surplus		Trips	Producer Surplus
2024	-29,328	-$4,399,200	2024	-29,328	-$4,399,200
2025	-29,328	-$4,399,200	2025	-29,328	-$4,399,200
2026	-29,328	-$4,399,200	2026	-29,328	-$4,399,200
2027	-29,328	-$4,399,200	2027	-29,328	-$4,399,200
2028	-29,328	-$4,399,200	2028	-29,328	-$4,399,200
Total	-146,640	-$21,996,000	**Total**	-146,640	-$21,996,000
Option 2b			**Preferred Option 3b**		
2024	-24,626	-$3,693,902	2024	-24,452	-$3,667,780
2025	-23,121	-$3,468,122	2025	-22,894	-$3,434,104
2026	-21,911	-$3,286,690	2026	-21,533	-$3,229,993
2027	-19,417	-$2,912,486	2027	-18,989	-$2,848,316
2028	-17,385	-$2,607,676	2028	-17,010	-$2,551,527
Total	-106,459	-$15,968,877	**Total**	-104,878	-$15,731,719
Option 2c			**Option 3c**		
2024	-23,801	-$3,570,178	2024	-23,574	-$3,536,159
2025	-22,138	-$3,320,709	2025	-21,911	-$3,286,690
2026	-19,946	-$2,991,863	2026	-19,310	-$2,896,443
2027	-17,759	-$2,663,825	2027	-19,417	-$2,912,486
2028	-15,986	-$2,397,937	2028	-15,145	-$2,271,691
Total	-99,630	-$14,944,512	**Total**	-99,356	-$14,903,470

Between 2024 and 2028, cumulative decreases in charter for-hire trips targeting gag are estimated to range from 99,356 (**Alternative 3-Option 3c**) to 146,640 trips (**Alternative 2-Option 2a and Alternative 3-Option 3a)**. Associated decreases in PS are estimated to range from $14.90 million ($2021) (**Alternative 3-Option 3c**) to $22.00 million ($2021) (**Alternative 2-Option 2a and Alternative 3-Option 3a)**. Between 2024 and 2028, cumulative decreases in charter for-hire trips targeting gag and in PS expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at 104,878 trips and $15.73 million ($2021), respectively.

For the recreational sector, aggregate changes in economic value expected to result from this action are estimated by the summing changes in CS to recreational anglers and in PS to for-hire

operators. For each alternative, commercial surplus measures and total economic value are provided in Table 4.2.3.7.

Table 4.2.3.7. Annual and total changes in recreational consumer and producer surpluses, and in economic value. Dollar values in $2021.

Option 2a or 3a			
Year	Consumer Surplus	Producer Surplus	Total
2024	-$6,613,541	-$4,399,200	-$11,012,741
2025	-$6,613,541	-$4,399,200	-$11,012,741
2026	-$6,613,541	-$4,399,200	-$11,012,741
2027	-$6,613,541	-$4,399,200	-$11,012,741
2028	-$6,613,541	-$4,399,200	-$11,012,741
Total	-$33,067,706	-$21,996,000	-$55,063,706
Option 2b			
2024	-$5,318,650	-$3,693,902	-$9,012,552
2025	-$4,821,337	-$3,468,122	-$8,289,459
2026	-$4,375,631	-$3,286,690	-$7,662,321
2027	-$3,864,243	-$2,912,486	-$6,776,729
2028	-$3,244,947	-$2,607,676	-$5,852,623
Total	-$21,624,808	-$15,968,877	-$37,593,685
Option 2c			
2024	-$5,051,227	-$3,570,178	-$8,621,405
2025	-$4,474,156	-$3,320,709	-$7,794,865
2026	-$3,967,459	-$2,991,863	-$6,959,322
2027	-$3,390,388	-$2,663,825	-$6,054,213
2028	-$2,691,334	-$2,397,937	-$5,089,271
Total	-$19,574,563	-$14,944,512	-$34,519,075
Preferred Option 3b			
2024	-$5,262,350	-$3,667,780	-$8,930,130
2025	-$4,741,579	-$3,434,104	-$8,175,683
2026	-$4,272,415	-$3,229,993	-$7,502,408
2027	-$3,737,569	-$2,848,316	-$6,585,885
2028	-$3,090,123	-$2,551,527	-$5,641,650
Total	-$21,104,037	-$15,731,719	-$36,835,756
Option 3c			
2024	-$4,976,161	-$3,536,159	-$8,512,320
2025	-$4,370,940	-$3,286,690	-$7,657,630
2026	-$3,836,093	-$2,896,443	-$6,732,536
2027	-$3,235,564	-$2,912,486	-$6,148,050
2028	-$2,503,669	-$2,271,691	-$4,775,360
Total	-$18,922,426	-$14,903,470	-$33,825,896

Between 2024 and 2028, cumulative decreases in recreational economic value, i.e., CS and PS combined, relative to **Alternative 1** are estimated to range from $34.52 million (**Alternative 2-Option 2c**) to $55.06 million ($2021) (**Alternative 2-Option 2a** and **Alternative 3-Option 3a**). Between 2024 and 2028, cumulative decreases in recreational economic value expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at $36.84 million ($2021).

Overall, total changes in economic value expected to result from this action are estimated by combining changes in economic value to the commercial and recreational sectors. For each alternative, sector-specific and aggregate changes in economic value are provided in Table 4.2.3.8.

Table 4.2.3.8. Annual and total commercial, recreational, and aggregate changes in economic value. Dollar values in $2021.

Year	Commercial Economic Value	Recreational Economic Value	Total
Option 2a or 3a			
2024	-$2,120,131	-$11,012,741	-$13,132,872
2025	-$2,120,131	-$11,012,741	-$13,132,872
2026	-$2,120,131	-$11,012,741	-$13,132,872
2027	-$2,120,131	-$11,012,741	-$13,132,872
2028	-$2,120,131	-$11,012,741	-$13,132,872
Total	-$10,600,657	-$55,063,706	-$65,664,363
Option 2b			
2024	-$1,556,849	-$9,012,552	-$10,569,401
2025	-$1,339,217	-$8,289,459	-$9,628,676
2026	-$1,143,988	-$7,662,321	-$8,806,309
2027	-$923,155	-$6,776,729	-$7,699,884
2028	-$651,116	-$5,852,623	-$6,503,739
Total	-$5,614,326	-$37,593,685	-$43,208,011
Option 2c			
2024	-$1,438,431	-$8,621,405	-$10,059,836
2025	-$1,185,594	-$7,794,865	-$8,980,459
2026	-$964,762	-$6,959,322	-$7,924,084
2027	-$715,125	-$6,054,213	-$6,769,338
2028	-$411,080	-$5,089,271	-$5,500,351
Total	-$4,714,994	-$34,519,075	-$39,234,069
Preferred Option 3b			
2024	-$1,624,058	-$8,930,130	-$10,554,188
2025	-$1,432,030	-$8,175,683	-$9,607,713
2026	-$1,259,206	-$7,502,408	-$8,761,614
2027	-$1,063,977	-$6,585,885	-$7,649,862
2028	-$827,141	-$5,641,650	-$6,468,791
Total	-$6,206,412	-$36,835,756	-$43,042,168
Option 3c			
2024	-$1,518,443	-$8,512,320	-$10,030,763
2025	-$1,297,611	-$7,657,630	-$8,955,241
2026	-$1,099,182	-$6,732,536	-$7,831,718
2027	-$878,349	-$6,148,050	-$7,026,399
2028	-$609,509	-$4,775,360	-$5,384,869
Total	-$5,403,095	-$33,825,896	-$39,228,991

Between 2024 and 2028, cumulative decreases in aggregate economic value, i.e., recreational and commercial economic values combined, relative to **Alternative 1** are estimated to range from $39.23 million (**Alternative 2-Option 2c**) to $65.66 million ($2021) (**Alternative 2-Option 2a** and **Alternative 3-Option 3a**). Between 2024 and 2028, cumulative decreases in

aggregate economic value expected to result from **Preferred Alternative 3 – Preferred Option 3b** are estimated at $43.04 million ($2021).

4.2.4 Direct and Indirect Effects on the Social Environment

This action would reduce the sector ACLs for gag based on the results of the recent stock assessment and subsequent recommendations by the SSC, adopt new units for the recreational sector's portion of the ACL, and revise the allocation between the commercial and recreational sectors; the stock is overfished and is undergoing overfishing as of 2019. In general, lower catch limits would be associated with direct negative effects in the short term as they allow for less fish to be landed. These negative effects would be expected to be mitigated over the long term as reduced harvest levels allow the stock to rebuild, leading to higher catch limits in the future. Related to the catch limit reduction, the most recent stock assessment used new data units for the recreational sector and the SSC determined that the State Reef Fish Survey (SRFS) dataset represented the best scientific information available. Updating the units for monitoring recreational landings and calibrating historical landings affects the allocation between the sectors when SRFS data are applied to the same time series used for the current allocation (**Preferred Alternative 3**). Thus, this action updates the MRIP-CHTS data with SRFS and MRIP- Fishing Effort Survey (FES) data, which impacts the sector allocations, either directly, if an alternative that revises the allocation percentages (**Preferred Alternative 3**) is selected as preferred, or indirectly, if the alternative that retains the allocation percentages (**Alternative 2**) is selected as preferred, because SRFS and MRIP-FES estimate greater recreational landings than MRIP-CHTS.

Usually, additional effects would not be expected under **Alternative 1** as the catch limits for both sectors would remain at current levels, including the recreational portion of the catch levels set in MRIP-CHTS, and fishing practices would not be affected. However, this alternative is not based on the best scientific information available and is inconsistent with the need to end overfishing and rebuild the overfished stock.

Alternative 2 and **Preferred Alternative 3** would reduce the catch levels substantially compared to **Alternative 1**, resulting in negative effects for both the recreational and commercial sectors as less fish is available to be landed. The magnitude of these effects in the short term would be relative to the size of each sector's reduction from **Alternative 1**. Currently, the recreational sector's season closes when the ACL is estimated to be met, although this may be modified through Action 4.

For the commercial sector, however, the quota represents the number of fish distributed as annual allocation to IFQ shareholders and is currently set at 77% of the commercial ACL; the commercial quota and ACT may be modified through Action 3.2. Table 4.2.3.1 quantifies the change in commercial gag quota and value of annual allocation. Here, the overall catch limit reductions for each sector are compared in Table 4.2.4.1 (recreational sector) and Table 4.2.4.2 (commercial sector) using the proposed sector ACLs under **Alternative 2** and **Preferred Alternative 3**, which total the stock ACL. For the recreational sector, the average landings for the most recent 5 years using SRFS data (2017-2021) were calculated from Table 1.1.1 for the purpose of comparing the catch limit reductions in the same units. The difference between the 5-

year average (totaling 1,115,050 lb gw) and the proposed recreational ACLs under **Alternative 2** and **Preferred Alternative 3** is compared alongside the percent change for each proposed recreational ACL from the average recreational landings; the resulting recreational sector allocation is also provided. For **Options 2a** and **3a**, a value for the sector allocation is specified for each alternative in the respective table, yet there is no applicable sector allocation for an ACL with a zero value. To compare alongside the changes to the recreational sector ACL, Table 4.2.4.2 also uses the proposed commercial ACLs compared with the current commercial ACL of 1,217,000 lb gw.

Table 4.2.4.1. Comparison of the recreational ACLs under **Alternative 2** and **Preferred Alternative 3**, the difference from each proposed ACL and the average recreational landings (2017-2021), the percent change to the recreational ACL from the average recreational landings, and the resulting recreational sector allocation.

Alternative	Year	Rec ACL (lb gw)	Difference from Avg Landings (lb gw)	Change (%) from 5-yr Avg Landings	Rec Allocation (%)
2a, 3a	2024	0	-1,115,050	-100%	NA
	2025	0	-1,115,050	-100%	NA
	2026	0	-1,115,050	-100%	NA
	2027	0	-1,115,050	-100%	NA
	2028	0	-1,115,050	-100%	NA
2b	2024	276,000	-839,050	-75%	61%
	2025	382,000	-733,050	-66%	61%
	2026	477,000	-638,050	-57%	61%
	2027	586,000	-529,050	-47%	61%
	2028	718,000	-397,050	-36%	61%
2c	2024	333,000	-782,050	-70%	65%
	2025	456,000	-659,050	-59%	65%
	2026	564,000	-551,050	-49%	65%
	2027	687,000	-428,050	-38%	65%
	2028	836,000	-279,050	-25%	65%
Preferred 3b	2024	288,000	-827,050	-74%	61%
	2025	399,000	-716,050	-64%	61%
	2026	499,000	-616,050	-55%	61%
	2027	613,000	-502,050	-45%	61%
	2028	751,000	-364,050	-33%	61%
3c	2024	349,000	-766,050	-69%	65%
	2025	478,000	-637,050	-57%	65%
	2026	592,000	-523,050	-47%	65%
	2027	720,000	-395,050	-35%	65%
	2028	876,000	-239,050	-21%	65%

Note: The 5-year average landings were calculated for 2107-2021, based on the SRFS values in Table 1.1.1.

Table 4.2.4.2. Comparison of the commercial ACLs under Alternative 2 and **Alternative 3**, the difference from each proposed ACL and the current commercial ACL, the percent change between the commercial ACLs, and the resulting commercial sector allocation.

Alternative	Year	Com ACL (lb gw)	Difference from Current Com ACL (lb gw)	Change (%) from Current ACL	Com Allocation (%)
2a, 3a	2024	0	-1,217,000	-100%	NA
	2025	0	-1,217,000	-100%	NA
	2026	0	-1,217,000	-100%	NA
	2027	0	-1,217,000	-100%	NA
	2028	0	-1,217,000	-100%	NA
2b	2024	176,000	-1,041,000	-86%	39%
	2025	244,000	-973,000	-80%	39%
	2026	305,000	-912,000	-75%	39%
	2027	374,000	-843,000	-69%	39%
	2028	459,000	-758,000	-62%	39%
2c	2024	213,000	-1,004,000	-82%	35%
	2025	292,000	-925,000	-76%	35%
	2026	361,000	-856,000	-70%	35%
	2027	439,000	-778,000	-64%	35%
	2028	534,000	-683,000	-56%	35%
Preferred 3b	2024	155,000	-1,062,000	-87%	39%
	2025	215,000	-1,002,000	-82%	39%
	2026	269,000	-948,000	-78%	39%
	2027	330,000	-887,000	-73%	39%
	2028	404,000	-813,000	-67%	39%
3c	2024	188,000	-1,029,000	-85%	35%
	2025	257,000	-960,000	-79%	35%
	2026	319,000	-898,000	-74%	35%
	2027	388,000	-829,000	-68%	35%
	2028	472,000	-745,000	-61%	35%

At the same time the catch levels are reduced, **Alternative 2** and **Preferred Alternative 3** propose ACLs that use SRFS and MRIP-FES units for the recreational sector's portion of the stock ACL, indirectly affecting the allocation between the recreational and commercial sectors. In theory, there should be no effects under **Alternatives 2** and **Preferred Alternative 3** from converting the recreational sector's ACL from MRIP-CHTS units to MRIP-FES and SRFS units, as the change from MRIP-CHTS units is intended to be a conversion. However, applying the new units for the recreational sector produces somewhat greater estimates of historical landings than MRIP-CHTS, indirectly affecting the sector allocation.

As compared below, effects from this action would result from 1) the reduction to the ACL due to the results of the stock assessment, which affects both sectors negatively depending on the size of the reduction from current catch levels, and 2) reallocating the stock ACL between the commercial and recreational sectors as a result of the application of new data units for the recreational sector, which affects the sectors inversely.

With the increasing yield stream recommended by the SSC, the ACLs for each sector represent the greatest reduction from **Alternative 1** in 2024, then increase each year thereafter through 2028 allowing more fish to be caught. This should reduce the negative effects of lost harvest opportunities compared with the previous year of the yield stream. For both sectors, the greatest negative effects would be expected under **Option 2a** and **Option 3a**, which would prohibit all harvest of gag and set each sector's ACL at zero. Following these options for the recreational sector, the next greatest negative effects would be expected in order under **Option 2b**, **Preferred Option 3b**, **Option 2c,** and finally **Option 3c** with the least negative effects. For the commercial sector, the order from greatest to least negative effects would be expected from **Preferred Option 3b, Option 2b, Option 3c** and **Option 2c**. Thus, options representing a shorter rebuilding timeline (**Option 2b** and **Preferred Option 3b**) would result in greater negative effects for both sectors compared to the longer rebuilding timeline (**Option 2c** and **Option 3c**). However, for each alternative's options, the effects for each sector are inversely related. The stock is expected to rebuild faster under the shorter rebuilding timeline (**Option 2b** and **Preferred Option 3b**) compared to **Option 2c** and **Option 3c**, mitigating the short-term negative effects through a return to greater catch limits if warranted.

An allocation is a policy designation of the rights to access the resource that also carries socio-cultural significance. The current 61% recreational to 39% commercial sector allocation reflects the greater historical engagement with the gag stock by the recreational sector compared to the commercial sector, with the percentages representing each sector's piece of the pie (i.e., the stock ACL). Tables 4.1.4.1 and Table 4.1.4.2 provide each sector's respective percentage of the ACL under **Alternative 2** and **Preferred Alternative 3**. **Alternative 2** would retain the existing sector allocation (61% recreational; 39% commercial) while adopting SRFS and MRIP-FES units for the recreational sector's portion of the stock ACL. By retaining the same policy designation of the rights to access the resource, additional effects would not be expected from **Alternative 2** compared to **Alternative 1**, as the sector allocation remains the same. However, as discussed in the section above on revising the catch limits, the amount of fish represented by the sector ACLs for the status quo sector allocation proposed for **Alternative 2** actually reflects 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. This would be expected to result in indirect negative effects for the recreational sector from retaining the current sector allocation related to the lower amount of fish available to the sector. Compared to **Alternative 1** and **Alternative 2**, **Preferred Alternative 3** would result in a 4% shift of the sector allocation from the commercial sector to the recreational sector. Although the amount of fish designated to each sector under **Preferred Alternative 3** would reflect the application of each sector's landings to the time series on which the allocation is based, in terms of the policy designation of the rights to access the resource that has been in place since 2008, some negative effects would be expected for the commercial sector while some positive effects would be expected for the recreational sector.

4.2.5 Direct and Indirect Effects on the Administrative Environment

Modifying the catch limits, sector allocation, and establishing a rebuilding timeline does not typically result in significant effects on the administrative environment. Aside from the fact that it is not viable because of its use of F_{MAX}, **Alternative 1** maintains the current sector allocation and catch limits, but it would have a greater administrative burden due to the need to convert landings back to MRIP-CHTS for management, and because it would allow overfishing of gag to continue in violation of the Magnuson-Stevens Act. Because **Alternative 1** would not be a legal alternative, it would be expected to result in a significant and negative effect on the administrative environment. **Alternative 2** and **Preferred Alternative 3** would result in a short-term increased burden on the administrative environment due to the establishment of a revised sector allocation and its associated catch limits, corresponding to the rebuilding timeline selected in **Options a – c**, through rulemaking. However, engaging in rulemaking to implement this change in management is a routine function for NMFS and considered minimal, and is expected to be possible whenever revised recommendations come from the SSC following an interim analysis or stock assessment. These analyses may be used to revise certain aspects of the rebuilding plan, such as the time to rebuild, catch limits, and other measurables. **Alternative 2** and **Preferred Alternative 3** would no longer require NMFS to convert landings from MRIP-FES to MRIP-CHTS. This conversion is model-derived and becomes less precise with time as the amount of time between when both surveys ran concurrently and present-day increases. **Alternative 2** and **Preferred Alternative 3** would also result in a decrease in the sector ACLs, which may increase the likelihood of needing to implement in-season closures for the recreational sector; the commercial sector is managed under the Grouper-Tilefish IFQ program. However, in-season closures are routinely completed for reef fish species. There is also no additional administrative burden for law enforcement, as law enforcement officers do not monitor catch limits, but would only continue to monitor compliance with any established recreational closed seasons. Some administrative burden is anticipated under **Alternative 2** and **Preferred Alternative 3** with respect to outreach as it relates to notifying stakeholders of the changes to the sector allocation and ACLs. None of the anticipated effects are expected to be significant.

4.3 Action 3: Modify the Gulf Gag Sector ACTs Based on the Catch Limits and Sector Allocation Selected in Action 2

Sub-Action 3.1: Modify the Recreational ACT
Sub-Action 3.2: Modify the Commercial ACT

4.3.1 Direct and Indirect Effects on the Physical Environment

General effects on the physical environment from fishing are described in Section 4.1.1, and general effects from modifying catch limits are described in Section 4.2.1. Modifications to the sector ACTs are expected to result in neutral effects on the physical environment as neither sector is expected to change the current practices they respectively use in the multi-species reef fish fishery. The ACTs proposed in **Alternative 2** and **Preferred Alternative 3** in Sub-Action 3.1, and **Alternative 2** and **Preferred Alternative 3** in Sub-Action 3.2, result in further reductions in gag that can be harvested compared to the ACLs proposed in Action 2. Effects from these three alternatives would be dependent on the alternative selected in Action 2 and mirror those effects. Gag is targeted by both sectors, and fishing occurs for other reef fish species when recreational fishing for gag is closed, or when a commercial vessel does not have sufficient gag IFQ allocation available to retain and land gag. Thus, the effects on the physical environment of **Alternative 2** and **Preferred Alternative 3** in Sub-Action 3.1 and **Alternative 2** and **Preferred Alternative 3** in Sub-Action 3.2 are expected to be neutral compared to **Alternative 1** of both Sub-Actions.

4.3.2 Direct and Indirect Effects on the Biological and Ecological Environment

Direct and indirect effects on the biological and ecological environments from fishery management actions, and as they relate to modifying gag catch limits, have been discussed in detail in Sections 4.1.2 and 4.2.2. Decreasing the catch limits reduces the number of fish that can be harvested. The buffers between the sector ACLs and ACTs in Action 3 reduce the likelihood that a sector's ACL would be exceeded. If the ACL is exceeded, the requirement to pay back the overage is expected to mitigate the negative impacts of that overage on the stock. The ACTs under **Alternative 1** in both Sub-Actions are based on MRIP-CHTS and SEDAR 33 (2014), using an F_{MSY} proxy of F_{MAX}. None of these are considered to be consistent with the best scientific information available by NMFS or the Council's SSC. Thus, **Alternative 1** in both Sub-Actions are not viable alternatives.

The action alternatives (i.e., **Alternative 2** and **Preferred Alternative 3** in Sub-Action 3.1 and **Alternative 2** and **Preferred Alternative 3** in Sub-Action 3.2) are expected to have direct positive effects on the biological and ecological environment, and in particular on the gag stock. Each of the action alternatives are expected to increase the likelihood that the gag stock would successfully rebuild in the chosen time frame, which would have positive impacts on the biological and ecological environments by increasing the gag population size to levels robust to

environmental and anthropogenic forces, and reducing negative biological effects that a diminished gag stock would have on the biological and ecological environment.

Relative to **Alternative 1** in both Sub-Actions, the action alternatives would all result in positive biological effects by reducing the sector ACT relative to the sector ACL relative to the F_{MSY} proxy established in Action 1, consistent with the best scientific information available. In Sub-Action 3.1, both **Alternative 2** and **Preferred Alternative 3** would result in positive biological effects compared to **Alternative 1**, with the greatest positive biological effects expected from **Preferred Alternative 3**, which corresponds to the lowest fishing mortality under Sub-Action 3.1. In Sub-Action 3.2, **Alternative 2** would result in more positive biological effects compared to **Preferred Alternative 3** by further reducing harvest compared to the commercial ACL (14% reduction compared to 5%, respectively. However, so long as the sector ACLs selected as preferred in Action 2 are not exceeded, negative biological effects are expected to be negligible.

For the same reasons as stated in Section 4.2.2, no additional impacts to Endangered Species Act (ESA)-listed species or introduction of invasive species are anticipated as a result of this action.

4.3.3 Direct and Indirect Effects on the Economic Environment

Sub-Action 3.1: Modify the Recreational ACT

Alternative 1 (No Action) would maintain the current buffer between the recreational ACL and ACT. The existing buffer between the ACL and ACT is approximately equal to 10.25%. **Alternative 1** would therefore not be expected to result in economic effects.

Alternative 2 would use the Council's ACL/ACT Control Rule to set a 10% buffer between the recreational ACL and recreational ACT for gag. Relative to **Alternative 1**, **Alternative 2** would result in a small increase in the gag ACT. **Preferred Alternative 3** would set a 20% buffer between the recreational ACL and ACT. Relative to **Alternative 1**, **Preferred Alternative 3** would decrease the gag ACT.

Economic effects expected to result from the adjustments to the buffer between the preferred gag ACL (**Action 2- Preferred Alternative 3- Preferred Option 3b**) and ACTs proposed in this action are measured in CS to anglers and changes in PS to for-hire operators. Because **Alternative 2** is estimated to result in minute annual changes relative to **Alternative 1**, **Alternative 2** would be expected to result in limited changes in season length in any given year. Therefore, estimated changes in PS to for-hire operators expected to result from **Alternative 2** are assumed to be negligible. Estimated changes in ACT are measured by subtracting the proposed ACT in each alternative to the preferred gag ACL (**Action 2- Preferred Alternative 3- Preferred Option 3b**). Table 4.3.1.3.1 provides changes in the recreational gag ACT in lbs (gw) and number of fish and estimated changes in consumer surplus ($2021) for **Alternative 2** and **Preferred Alternative 3**.

Table 4.3.1.3.1. Estimated annual and total changes in gag ACTs measured in lb gw, number of fish, and consumer surplus ($2021) by alternative.

Year	Changes relative to **Alternative 1**					
	Alternative 2			**Preferred Alternative 3**		
	Pounds (gw)	Number of fish	Consumer Surplus	Pounds (gw)	Number of fish	Consumer Surplus
2024	711	80	$3,717	-28,089	-3,163	-$146,770
2025	985	111	$5,149	-38,915	-4,382	-$203,337
2026	1,232	139	$6,440	-48,668	-5,481	-$254,299
2027	1,514	170	$7,911	-59,786	-6,733	-$312,395
2028	1,855	209	$9,692	-73,245	-8,248	-$382,723
Total	6,298	709	$32,908	-248,702	-28,007	-$1,299,524

Between 2024 and 2028, **Preferred Alternative 3** is expected to cumulatively reduce the gag ACT by approximately 250,000 lb gw or 28,000 fish. The resulting decrease in consumer surplus to anglers is estimated at $1.3 million ($2021).

The widening of the buffer between the preferred gag ACL (**Action 2- Preferred Alternative 3- Preferred Option 3b**) and the ACT considered in **Preferred Alternative 3** would also expected to adversely affect recreational gag season lengths, thereby resulting in losses in PS to for-hire operators. Expected changes in charter for-hire trips targeting gag and associated changes in PS were derived based on the 2017-2021 average distribution of gag target trips provided in Table 3.3.2.4 and on season length projections in Table 2.4.1. As discussed in Section 3.3.2, PS to for-hire operator is estimated at $150 per target trip. Table 4.3.1.3.2 provides estimated changes in season length in days, changes in trips targeting gag, and associated changes in PS ($2021) for **Preferred Alternative 3**.

Table 4.3.1.3.2. Estimated annual and total changes in season length, in trips targeting gag, and in producer surplus ($2021) for **Preferred Alternative 3**.

Year	Changes relative to **Alternative 1**		
	Days	Target Trips	Producer Surplus
2024	-2	-348	-$52,244
2025	-7	-1,219	-$182,855
2026	-8	-1,393	-$208,977
2027	-20	-3,483	-$522,443
2028	-24	-4,180	-$626,931
Total	-61	-10,623	-$1,593,450

Between 2024 and 2028, **Preferred Alternative 3** is expected to cumulatively reduce the number of recreational gag fishing days by 61 days. Associated reductions in PS to for-hire operators are estimated at $1.6 million ($2021).

Sub-Action 3.2: Modify the Commercial Quota

Alternative 1 (No Action) would retain the current buffer between the commercial gag ACL and ACT and maintain the commercial quota equal to approximately 77% of the commercial ACL. Therefore, **Alternative 1** would not be expected to result in economic effects.

Alternative 2 would set a 14% buffer between the commercial ACL and ACT and set the commercial gag quota equal to the commercial gag ACT. Resulting commercial gag ACTs and quotas would equal 86% of the corresponding commercial gag ACLs. **Preferred Alternative 3** would set a 5% buffer between the commercial ACL and ACT and set the commercial gag quota equal to the commercial gag ACT. Resulting commercial gag ACTs and quotas would equal 95% of the corresponding commercial gag ACLs. Because, **Alternative 2** and **Preferred Alternative 3** would both narrow the buffer between the commercial quota and the ACL relative to **Alternative 1**, both alternatives are expected to result in increases in the commercial gag quota and in associated positive economic effects. As discussed in Action 2 (Section 4.3.2), economic effects expected to result from commercial quota changes are measured in this section by changes in annual allocation values, in commercial fishermen's revenues and PS, and in consumer surplus to consumers purchasing gag. These effects are estimated based on the preferred commercial ACL selected in Action 2 **(Preferred Alternative 3- Preferred Option 3b)** following procedures detailed in Action 2 (Section 4.3.2.). For **Alternative 2** and **Preferred Alternative 3**, Table 4.3.3.2.1 provides estimated changes in commercial gag quotas and associated changes in in annual allocation values, in revenues and PS, and in consumer surplus.

Table 4.3.3.2.1. Estimated changes in commercial gag quota, annual allocation value, revenue, producer surplus, and consumer surplus relative to **Alternative 1**.

Alternative 2					
Year	Quota lb gw	Annual Allocation $2021	Revenue $2021	Producer Surplus $2021	Consumer Surplus $2021
2024	13,407	$13,809	$67,151	$33,576	$33,898
2025	18,113	$18,656	$90,247	$45,123	$46,955
2026	23,448	$24,151	$117,622	$58,811	$58,854
2027	28,382	$29,234	$142,001	$71,000	$72,148
2028	35,286	$36,345	$177,074	$88,537	$88,399
Total	118,635	$122,194	$594,095	$297,047	$300,254
Preferred Alternative 3					
2024	27,407	$28,229	$151,011	$75,506	$73,180
2025	38,113	$39,256	$210,047	$105,023	$101,534
2026	47,448	$48,871	$261,382	$130,691	$126,971
2027	58,382	$60,134	$321,701	$160,850	$155,811
2028	71,286	$73,425	$392,714	$196,357	$190,699
Total	242,635	$249,914	$1,336,855	$668,427	$648,195

Between 2024 and 2028, **Alternative 2** is expected to result in a cumulative increase in the commercial gag quota estimated at 118,635 lb gw. Corresponding increases in annual allocation value, commercial revenue and PS, and in CS to consumers purchasing gag are estimated at $122,194, $594,095, $297,047, and $300,254, respectively. Between 2024 and 2028, **Preferred Alternative 3** is expected to result in a cumulative increase in the commercial gag quota estimated at 242,635 lb gw. Corresponding increases in annual allocation value, commercial revenue and PS, and in CS to consumers purchasing gag are estimated at $249,914, $1,336,855, $668,427, and $648,195, respectively.

4.3.4 Direct and Indirect Effects on the Social Environment

Sub-Action 3.1 – Effects on the Social Environment – Recreational ACT

Given the need to end overfishing, the ACT is a tool that can be used to slow the rate of harvest, reducing the likelihood of exceeding the ACL. This action would modify how the recreational ACT is set (**Alternatives 2 and 3**) and potentially increase the buffer between the ACL and ACT (**Alternative 3**), which could result in indirect effects. These indirect effects would relate to the extent that the ACT is met sooner (see Action 4), thereby affecting fishing behavior directly based on the attending accountability measures, including an overage adjustment.

Although additional effects would not be expected from retaining the recreational ACT (**Alternative 1**), the recreational ACT is set and triggered based on outdated methods and is no longer considered the best scientific information available. **Alternative 2** would set the recreational ACT using the Council's ACL/ACT Control Rule based on the 2018-2021 recreational fishing years, resulting in a 10% buffer between the ACL and ACT. This buffer approximates the buffer under **Alternative 1**, and any indirect effects would be similar. **Alternative 3** would increase the size of the buffer to 20% between the ACL and ACT, which would result in the ACT being met sooner. Compared to **Alternatives 1** and **2**, **Alternative 3** would further reduce the likelihood of exceeding the ACL, and in turn, triggering any attending AMs. Currently (Alternative 1 in Action 4), the ACT is used to limit harvest in a year following one in which the ACL is exceeded; Action 4 considers modifying this provision such that further harvest of gag is prohibited when the ACT is projected or estimated to have been met. If an alternative other than **Alternative 1** is selected in Action 4, the wider buffer under **Alternative 3** would result in a shorter fishing season duration in the short-term (see Table 2.4.1), while reducing the likelihood and size of a potential ACL overage, which would be deducted from the following year's ACL.

Sub-Action 3.2 – Effects on the Social Environment – Commercial ACT

The commercial sector's harvest of gag is managed through an IFQ program, such that commercial landings of gag are limited by the amount of gag allocation (i.e., the quota) that is distributed at the beginning of each year, removing the likelihood of exceeding the commercial ACL. Although additional effects would not be expected from retaining the current methods for calculating the commercial ACT and quota, **Alternative 1** relies on outdated methods and is no longer considered to be based on the best scientific information available.

Both **Alternative 2** and **Preferred Alternative 3** would set the commercial quota for gag equal to the commercial ACT. The commercial quota under **Alternative 1** was used as a buffer to account for discards from commercial vessels without gag allocation. A smaller buffer between the ACL and ACT would allow for more fish to be harvested as more allocation is distributed, resulting in positive effects. These effects would help mitigate the negative effects from the reduction to the commercial ACL under Action 2, while continuing to ensure that commercial landings remain below the ACL through the IFQ program. Thus, adopting a smaller buffer (5%) between the ACT and ACL under **Preferred Alternative 3** would be associated with greater benefits than retaining the larger buffer (14%) under **Alternative 2,** as more gag allocation would be distributed to IFQ shareholders and is ultimately landed by vessels.

4.3.5 Direct and Indirect Effects on the Administrative Environment

This action would affect the administrative environment mostly through in-season closures for the recreational sector that are more likely to be triggered than under current management under Sub-Action 3.1, **Alternative 1**. The commercial sector will not have a seasonal closure due to the use of the Grouper-Tilefish IFQ program for gag, and because no commercial seasonal closure is considered in this document. A closure of the recreational sector for gag would only have minor effects on the administrative environment as closures already occur for many reef fish species, and are expected to occur for gag for the foreseeable future regardless of the alternative chosen in this action. **Alternative 1** in both Sub-Actions are not viable because they are based on the use of an F_{MSY} proxy that is no longer considered consistent with the best scientific information available. **Alternative 2** in Sub-Action 3.1 would be projected to result in in-season closures for the recreational sector due to a reduced ACT, so additional effects are not expected beyond the reduction in selection of an ACL chosen in Action 2. There is no effect on the administrative burden for law enforcement as law enforcement officers do not monitor catch limits, but would only continue to monitor compliance with any established closed season. Some administrative burden is anticipated with respect to outreach as it relates to notifying stakeholders of the changes to the ACT, and any in-season recreational closures that occur. None of the expected effects are expected to be significant.

4.4 Action 4: Modification of Gulf Gag Recreational Fishing Season Start Date and Accountability Measures (AM)

4.4.1 Direct and Indirect Effects on the Physical Environment

General effects on the physical environment from fishing are described in Section 4.1.1. Modification of the recreational fishing season start date is not expected to result in significant effects on the physical environment as the recreational sector is not expected to change the current practices they use in the multi-species recreational reef fish fishery. Fishing occurs for other reef fish species when recreational fishing for gag is closed. Thus, the effects on the physical environment of **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** are not expected to be measurably different from **Alternative 1** as fishing activity would continue to occur, regardless if gag is open for recreational harvest.

4.4.2 Direct and Indirect Effects on the Biological and Ecological Environment

Direct and indirect effects on the biological and ecological environments from fishery management actions have been discussed in detail in Sections 4.1.2, 4.2.2, and 4.3.2. Modifying the recreational fishing season start date may affect the selectivity at length, sex, and age of gag harvested and discarded by the recreational sector. As noted in Section 2.4, several other reef fish species are open to recreational harvest in federal waters in the Gulf during June, and gag may be caught during fishing activity directed at these and other species. Thus, having a recreational fishing season for gag co-occurring during this peak in recreational reef fish fishing (i.e., **Alternative 1** and **Alternative 2**) may result in lower regulatory dead discards of gag while co-occurring recreational fishing seasons are open (see Chagaris et al. 2019). Regulatory discards under **Alternative 1** and **Alternative 2** would be expected to be higher in months after closure of the recreational gag season due to a projection of reaching the ACL or ACT, depending on the alternative. The recreational fishing season under **Alternative 2**, which has the shortest initial fishing season durations of the alternatives in Action 4, is only projected to be open for 24 – 29 days during 2024 (**Option 2b** and **2c**, respectively), and gradually increasing up to 111 – 139 days by 2028. It is projected that as the season duration increases over the rebuilding period, that the gag season will overlap more of the red snapper and red grouper recreational seasons (the 2022 red snapper federal for-hire season closed August 19 and the 2022 red grouper recreational season closed August 30). This could reduce gag discards later in the year, since the seasons for these co-occurring species would likely also be closed and take fishing pressure off of gag. However, it is also known that regulatory discards into warmer surface waters during the summer months have been correlated with increased discard mortality rates in some reef fish species (e.g., Campbell et al. 2014; Bohaboy et al. 2019). This suggests the possibility of increased surface temperature-related discard mortality due to stress in the summer compared to the fall months. Fishermen giving public testimony at Council meetings have stated that gag feed more aggressively when water temperatures are cooler. Thus, fishing for gag during summer months (i.e., **Alternative 1** and **Alternative 2**) required fishermen to fish for gag in deeper water (e.g., greater than 30 meters depth) where barotrauma becomes an increasingly influential factor on discard mortality (Lazarre et al. 2021). Gag caught in these

deeper waters have been observed to generally be larger and older than those from shallower waters (SEDAR 72 2022). Therefore, **Alternative 1** and **Alternative 2** may result in an increased mortality rate for regulatory discards compared to regulatory discards during comparatively cooler fall and/or winter months (i.e., **Alternative 4**), especially on larger and older fish. Specific to male gag, males are not found in waters shallower than 30 meters (references herein, and fishermen during Council public testimony). The probability of discarding a male gag is never zero across all recreational fishing effort. However, that probability is expected to be greater during fishing in summer months compared to late fall and winter months by function of the average depths being fished most by the recreational fleets.

Conversely, a recreational fishing season beginning September 1 (**Preferred Alternative 3**) or October 1 (**Alternative 4**) would be expected to shift fishing effort to those months. However, the recreational reef fish fishery is a multi-species fishery, and fishing does not cease on all species just because the harvest of one species is prohibited. Thus, regulatory discards of gag would still be expected outside the open recreational fishing season for either **Preferred Alternative 3** or **Alternative 4**. If these discards originate from deeper waters, then barotrauma and its effect on discard mortality would be expected to exacerbate closed season discard mortality as a function of depth fished and whether measures such as release with a descending device is employed. However, during the open season, fishing effort would be expected to shift to shallower (less than 30 meters depth) and cooler waters as surface temperatures cool in the late fall, which would be expected to shift fishing effort to younger, smaller, and predominantly female gag. Because of the confounding effects of switching the season opening date with unknown factors like changes in fishing effort and discard mortality, there is great uncertainty associated with the effects of this action on gag overall, and particularly male mortality.

In summary, the number of regulatory discards may be lower under **Alternative 1** and **Alternative 2** by function of retention during concurrent open fishing seasons for reef fish species; however, those discards may be subject to increased discard mortality due to barotrauma and releases into warmer surface waters (stress). Further, the combination of fishing and discard mortality (those fish harvested, and those fish dying after being discarded), and the probability of discarding a male gag, is expected to be higher under **Alternative 1**, **Alternative 2**, and **Preferred Alternative 3**. The number of regulatory discards may increase in the summer months under **Preferred Alternative 3** or **Alternative 4** to the degree to which gag are being caught in other summer recreational fishing seasons with co-occurring species. However, the associated in-season discard mortality with fall season discards would be expected to be lower, as those gag are more likely to have been harvested in cooler, shallower waters. Also, since fishing effort under **Alternative 4** is expected to be in shallow waters where males are not found, discards under **Alternative 4** are expected to be almost wholly female, thereby reducing discard mortality on the male fraction of the SSB. Thus, tradeoffs in possible effects exist between these alternatives. **Alternative 1** and **Alternative 2** may result in greater negative effects to the biological environment for gag due to increased discard mortality as a result of barotrauma and stress. However, overlap with the other recreational fishing seasons (e.g., red snapper) would allow for gag that were captured incidentally to be harvested, which may result in more targeted mortality when the gag season is open, but could help mitigate overall mortality by reducing discards when fishing effort is highest. Given that a gag season starting June 1 is projected to be very short (at least initially), there would still be a large portion of the recreational fishing season

for co-occurring species that would require regulatory discarding of any gag captured. Large gag caught in these deeper waters in summer months would be expected to be retained, thereby removing them from the spawning stock biomass (SSB); further, larger gag have a greater probability of being male (SEDAR 72 2022). If a summer fishing season were implemented, it would likely reduce discards later in the year, since many of the main targets for recreational fishing (e.g., gag, red snapper, red grouper) have in the recent past closed by early fall (See Section 3.2), and thus the overall effort in the fishery, especially in areas where these species predominate, may be reduced. If the change in season does not result in an appreciable increase in dead discards during the summer months, then **Preferred Alternative 3** and **Alternative 4** would be expected to result in more positive biological effects on gag despite increased regulatory discards in summer months (some fraction of these fish would be expected to survive release), with much lower discard mortality expected during directed fishing in fall months. Under each of the alternatives, season durations are expected to increase, which is expected to result in more fishing days, greater harvest, and fewer regulatory discards in future years than the initial years of this rebuilding plan.

For the same reasons as stated in Section 4.2.2, no additional impacts to ESA-listed species or introduction of invasive species are anticipated as a result of this action.

4.4.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain the current June 1 recreational fishing season opening for gag and continue to require NMFS prohibit gag harvest when the recreational ACL is projected to be met, and maintain existing accountability measures. Therefore, **Alternative 1** is not expected to affect recreational gag fishing and would not result in economic effects.

Alternatives 2 and **4** and **Preferred Alternative 3** consider modifications to the recreational fishing season for gag opening date and accountability measures. Due to the drastic reductions in the gag stock ACL proposed in Action 2, recreational anglers are expected to harvest the totality of the recreational gag allocation, regardless of the opening date and accountability measures selected. Therefore, additional changes in CS to recreational anglers would not be expected to result from this action. Expected economic effects would only result from changes in PS to for-hire operators due to changes in for-hire trips targeting gag. In general, other things equal (start date and AM), a longer fishing season would be expected to result in more for-hire target trips, thereby resulting in increases in PS. Because the average distribution of target trips is not uniform across waves, longer recreational seasons associated with changes to the opening date may result in fewer for-hire trips targeting gag. Changes in for-hire gag target trips and associated changes in PS to for-hire operators are based on the preferred recreational gag ACL selected in Action 2 (Preferred Alternative 3 – Preferred Option 3b). These changes are evaluated following the method detailed in Action 2 (Section 4.2.3). Changes in for-hire trips targeting gag and associated changes in PS expected to result from each alternative are provided in Table 4.4.3.1.

Table 4.4.3.1. Estimated annual and total changes in for-hire trips and in producer surplus.

Year	Changes relative to **Alternative 1**					
	Alternative 2		**Preferred Alternative 3**		**Alternative 4**	
	Trips	Producer Surplus	Trips	Producer Surplus	Trips	Producer Surplus
2024	-871	-$130,611	-1,721	-$258,162	-3,272	-$490,780
2025	-1,058	-$158,753	-1,489	-$223,304	-958	-$143,726
2026	-1,361	-$204,111	-1,166	-$174,924	-804	-$120,594
2027	-2,771	-$415,695	-1,859	-$278,860	-1,665	-$249,780
2028	-2,304	-$345,599	-1,818	-$272,658	-1,624	-$243,578
Total	-8,365	-$1,254,769	-8,053	-$1,207,909	-8,323	-$1,248,458

Between 2024 and 2028, **Alternatives 2** and **4** are expected to result in decreases in for-hire trips targeting gag estimated at 8,365 trips and 8,323 trips relative to **Alternative 1**, respectively. Reductions in PS expected to result from **Alternatives 2** and **4** are estimated at $1.26 million ($2021) and 1.25 million ($2021), respectively.

Between 2024 and 2028, **Preferred Alternative 3** is expected to result in cumulative decreases in for-hire trips targeting gag estimated at 8,053 trips relative to **Alternative 1**. Associated reductions in PS to for-hire operators are estimated at $1.21 million ($2021). Although it would set a longer fishing season relative to **Alternative 1**, **Preferred Alternative 3** is expected to result in a decrease in the number of gag target trips, due to changing the recreational season opening date from June 1 to September 1 and to the uneven average distribution of target trips across waves illustrated in Table 3.3.2.4.

4.4.4 Direct and Indirect Effects on the Social Environment

Although additional effects are not usually expected from retaining **Alternative 1**, without additional measures, it would be likely that the ACL would be exceeded by retaining both the June 1 start date for the recreational season opening for gag and the in-season closure based on the ACL (until the ACL is exceeded, then the prior year's ACT is used to trigger an in-season closure). More stringent harvest restrictions could be required to end overfishing and rebuild the overfished stock if catch levels are continually exceeded. In addition, by not constraining landings until the ACL is met, under **Alternative 1** larger overage adjustments may result than under **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4**, resulting in greater negative effects from the greater loss of fishing opportunities in the following year.

To reduce the likelihood that the ACL is exceeded, **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** would modify the in-season closure to apply when the ACT is met rather than the ACL. Thus, an in-season closure would occur sooner following the start date of the fishing season selected in any of **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** compared to **Alternative 1**, resulting in negative effects in the short-term related to the extent of fishing opportunities that are lost before the end of the year. These negative effects are expected to be mitigated over the long term as overfishing ends and the overfished stock rebuilds.

Table 2.4.1 provides estimates of the fishing season durations before an in-season closure is triggered due to the ACT being met for a season start date of June 1 (**Alternative 2**), September 1 (**Preferred Alternative 3**), and October 1 (**Alternative 4**). In general, setting the longest fishing season that coincides with anglers' preferred times to fish (e.g., during optimal weather conditions or when other seasonal recreational activities are not available) would be expected to result in the greatest positive effects. With the need to reduce harvest, the alternatives present a trade-off between a longer fishing season and preferred fishing times.

Assuming Action 1's **Alternative 2** is selected as preferred alongside any Action 2 alternative except Options 2a and 3a, an in-season closure would be expected to occur before December 31 under each of **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** from 2024 through 2027; with the increasing yield stream, an in-season closure is not projected for some preferred alternative combinations in 2028.

Comparing season duration alongside a 10% or 20% buffer between the ACL and ACT, retaining a June 1 season start date would provide the shortest estimated fishing season (**Alternative 2**) and thus the greatest negative effects would be expected. The longest season duration before an in-season closure set to the ACT is estimated for a September 1 season start date (**Preferred Alternative 3**), providing the greatest benefits among the action alternatives. Beginning the fishing season on October 1 (**Alternative 4**) would be expected to result in intermediary effects between **Alternative 2** and **Preferred Alternative 3**. Anglers differ for their preferences as to when to fish. Further input from stakeholders regarding the preferred times to fish will be gathered during public hearings.

4.4.5 Direct and Indirect Effects on the Administrative Environment

This action would affect the administrative environment mostly through in-season closures for the recreational sector that are likely to be triggered under any of the current management alternatives. It is not until 2028 under Option 2c of **Alternative 2** in Action 2 and **Preferred Alternative 3** of Action 4, and Option 3c of **Alternative 3** in Action 2 and **Alternative 2** and **3** of Action 4, that a recreational fishing season closure is not expected. A closure is expected under all scenarios for **Alternative 1** of Action 4. A closure of the recreational sector for gag would only have minor effects on the administrative environment as closures already occur for many reef fish species. There is no effect on the administrative burden for law enforcement as law enforcement officers would continue to monitor compliance with any established closed season. Some administrative burden is anticipated under **Alternative 2** and **Preferred Alternative 3** with respect to outreach as it relates to notifying stakeholders of the change to the recreational fishing season start date, and any in-season recreational closures that occur. It should be noted that as the stock rebuilds, seasons may need to be adjusted so that OY can be achieved, which would create further rulemaking and add to the administrative burden. None of the expected effects are expected to be significant.

4.5 Cumulative Effects

Cumulative effects are those effects that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions (RFFA), regardless of which agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions that take place over a period of time (40 C.F.R. 1508.1(g)(3)). Below is the five-step cumulative effects analysis that identifies criteria that must be considered in an Environmental Assessment (EA).

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

2. *The impacts that are expected in that area from the proposed action* - The proposed actions would modify Gulf gag status determination criteria, the gag rebuilding timeline, catch limits, catch allocations between the recreational and commercial sectors, sector ACTs, and the recreational season opening date. The environmental consequences of the proposed actions are analyzed in Sections 4.1.1, 4.1.2, 4.2.1, 4.2.2, 4.3.1, 4.3.2, 4.4.1, and 4.4.2, and are not expected to be significant. The combined actions are not expected to have significant effects on the physical environment, as they are not expected to alter the manner in which the gag portion of the reef fish fishery is prosecuted (Sections 4.1.1, 4.2.1, 4.3.1, and 4.4.1). These measures are expected to have non-significant but positive effects on the biological environment because the actions would reduce gag harvest and mortality, end overfishing, and allow for rebuilding of the gag stock (Section 4.1.2, 4.2.2, and 4.3.2). Since gag is part of a multi-species fishery and fishermen can specifically target them, bycatch mortality is expected to be reduced due to reduced directed targeting of gag. However, regulatory discards are expected to increase because the gag recreational season duration would be reduced and thus gag must be discarded when caught while fishing for other species. In particular, the recreational red snapper fishing season previously overlapped completely with the gag recreational fishing season, allowing for harvest of gag caught while targeting red snapper. This would no longer be the case since the gag season would not completely overlap with the red snapper season, so legal-sized gag would be required to be released during any portion of the red snapper season that is open when the gag season is closed. Despite this change, overall gag mortality is expected to decrease. Further, changing fishing practices on one stock does not generally change overall fishing effort or fishing practices. Although it is likely that a short-term negative effect on the social and economic environments will occur due to the actions taken herein, as more harvest is allowed as the stock rebuilds, benefits to the economic (Sections 4.1.3, 4.2.3, 4.3.3, and 4.4.3) and social environments (Sections 4.1.4, 4.2.4, 4.3.4, and 4.4.4) are expected. The actions are not expected to significantly affect the administrative environment (Sections 4.1.5, 4.2.5, 4.3.5, and 4.4.5), adversely or beneficially.

3. *Other past, present and RFFAs that have or are expected to have impacts in the area* - There are numerous actions under development in the Gulf annually. Many of these activities are expected to have impacts associated with them and are listed below.

Other fishery related actions - The cumulative effects associated with modifying gag ACLs, ACTs, and quotas were analyzed in the environmental impact statement (EIS) for Amendment 32 (GMFMC 2011b). In addition, cumulative effects relative to reef fish management have been analyzed in the EISs for Amendment 22 (GMFMC 2004b), Amendment 26 (GMFMC 2006), and Amendment 27/14 (GMFMC 2007), Amendment 29 (GMFMC 2008b), Amendment 30A (GMFMC 2008c), Amendment 30B (GMFMC 2008a), Amendment 31 (GMFMC 2010), Amendment 40 (GMFMC 2014), Amendment 28 (GMFMC 2015), and Amendment 53 (GMFMC 2021b). These cumulative effects analyses are incorporated here by reference. Other pertinent actions are summarized in the history of management (Section 1.3). Currently, there are several present and RFFAs that are being considered by the Council for the Reef Fish FMP or implemented by NMFS, which could affect reef fish stocks. These include: Amendment 55, which proposes to revise yellowtail snapper catch limits; and Amendment 36B, which would revise the red snapper and grouper-tilefish commercial IFQ programs. Several framework actions also are being developed, including a framework that proposes to modify the vermilion snapper bag limit, a framework that would modify red snapper calibrations and gray snapper catch limits, a framework that would modify the greater amberjack recreational fixed closed season and commercial trip limit, a generic framework which would modify the Council's ABC Control Rule, and a generic framework that addresses essential fish habitat. Documents being considered for implementation by NMFS that could affect reef fish stocks include a framework that proposes to modify red snapper catch limits; a framework to modify vermilion snapper catch limits; Reef Fish Amendment 54, which would revise greater amberjack catch limits and sector allocations; and gray triggerfish fixed closed season and trip limit. Descriptions of these actions can be found on the Council's Website.[45]

Non-fishery related actions - Actions affecting the reef fish fishery have been described in previous cumulative effects analyses. Three important events include impacts of the *Deepwater Horizon* MC252 oil spill, the Northern Gulf Hypoxic Zone, and climate change (See Sections 3.1 and 3.2). Impacts from the *Deepwater Horizon* MC252 oil spill are still being examined; however, as indicated in Section 3.2, the oil spill had some adverse effects on fish species. Further, the impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators may be significant in the future. Impacts to gag from the oil spill may similarly affect other species that may be preyed upon by gag. However, since the majority of the spawning biomass for gag occurs outside the main areas affected by the *Deepwater Horizon* MC252 oil spill plume, it is less likely that a direct effect on this species will be detected. Gag is a mobile species and is able to avoid hypoxic conditions, so any effects from the Northern Gulf Hypoxic Zone on gag are likely to be minimal.

[45] http://gulfcouncil.org/

There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. The Environmental Protection Agency's climate change web page provides basic background information on these and other measured or anticipated effects. In addition, the Intergovernmental Panel on Climate Change has numerous reports addressing their assessments of climate change.[46] Global climate changes could affect the Gulf fisheries as discussed in Sections 3.1 and 3.2. In addition, the distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the occurrence and intensity of toxic algae blooms. Climate change may significantly impact Gulf reef fish species in the future, but the level of impacts cannot be quantified at this time, nor is the time frame known in which these impacts would occur. The actions herein are not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing, as these actions should not change how the fishery is prosecuted. As described in Section 3.1, the contribution to greenhouse gas emissions from fishing is minor compared to other emission sources (e.g., oil platforms).

4. The impacts or expected impacts from these other actions - The cumulative effects from managing the reef fish fishery have been analyzed in multiple other actions.[47] They include a detailed analysis of the reef fish fishery, cumulative effects on non-target species, protected species, and habitats in the Gulf. Overall, bycatch of protected species in the gag portion of the reef fish fishery is negligible and effects to habitat are minimized due to the gear types used for harvest (Section 3.2). The effects of this action are positive, as they ultimately reduce overfishing and rebuild the gag stock, which is expected to result in increased fishing opportunities in the future. Short-term negative impacts on the social and economic environments are expected due to shortened seasons and limited allowable harvest of gag. However, as more harvest is allowed as the stock rebuilds, benefits to the economic and social environments are expected. Furthermore, it is assumed that recreational fishing trips would occur regardless of whether gag is open for recreational harvest, as recreational fishing for gag is generally part of a multi-species fishing strategy and fishermen typically switch to targeting other species when gag harvest is closed.

5. *The overall impact that can be expected if the individual impacts are allowed to accumulate*- These actions, combined with other past actions, present actions, and RFFAs, are not expected to have significant beneficial or adverse effects on the physical and biological environments. Any effects are expected to be positive, but are not expected to substantially change the manner in which the reef fish fishery is prosecuted (Sections 4.1.1, 4.1.2, 4.2.1, 4.2.2, 4.3.1, 4.3.2, 4.4.1, and 4.4.2). For the social and economic environments, some negative short-term but positive long-term effects are expected to result for fishing communities from reducing allowable harvest and shortening/moving the fishing season (Sections 4.1.3, 4.1.4, 4.2.3, and 4.2.4). These effects are likely minimal, as the proposed action, along with other past actions, present actions, and

[46] https://archive.ipcc.ch/
[47] https://gulfcouncil.org/reef-fish/

RFFAs, are not expected to alter the manner in which the fishery is prosecuted. Because it is unlikely there would be any changes in how the fishery is prosecuted, these actions, combined with past actions, present actions, and RFFAs, are not expected to have significant adverse effects on public health or safety.

6. Summary- The proposed actions are not expected to have individual significant effects on the physical, biological, economic, or social environments. Any effects of the proposed action, when combined with other past actions, present actions, and RFFAs are not expected to be significant. The effects of the proposed actions are, and will continue to be, monitored through collection of landings data by NMFS, individual state programs, 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 are collected through MRIP, Louisiana Creel Survey, Southeast Regional Headboat Survey, the Southeast For-Hire Integrated Electronic Reporting Program, Florida's State Reef Fish Survey, and Texas Parks and Wildlife Department. The cumulative social and economic effects of past, present, and future amendments may be described as increasing fishing opportunities, resulting in positive social and economic impacts. The proposed actions in this environmental assessment are expected to result in important long-term benefits to the for-hire fishing fleets, fishing communities and associated businesses, and private recreational anglers. This analysis found positive effects on the biophysical and socioeconomic environments because it would rebuild the Gulf gag stock, while allowing the optimum benefits in yield as rebuilding is occurring.

CHAPTER 5. REGULATORY IMPACT REVIEW

5.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866. This RIR analyzes the impacts this action would be expected to have on the gag component of the Gulf of Mexico (Gulf) reef fish fishery.

5.2 Problems and Objectives

The problems and objectives addressed by this action are discussed in Section 1.2.

5.3 Description of Fisheries

A description of the economic environment of the Gulf of Mexico reef fish fishery is provided in Section 3.3.

5.4 Impacts of Management Measures

5.4.1 Action 1: Modification of Gulf Gag Status Determination Criteria (SDC)

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.1.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

Preferred Alternative 2 is expected to result in more accurate determinations of the status of the gag stock in the future. Although the magnitude of the economic effects cannot be quantified at this time, **Preferred Alternative 2** is expected to result in indirect economic benefits in the long run because management measures based on the best scientific information available are designed to achieve optimum yield (OY) on a continuing basis, and thus would be expected to be more appropriate and effective.

5.4.2 Action 2: Modification of Gulf Gag Catch Limits, Sector Allocation, and Rebuilding Timeline

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.2.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

For the commercial sector, decreases in the commercial annual catch targets (ACL) for gag under **Preferred Alternative 3-Preferred Option 3b** result in reductions in the commercial gag quotas and therefore result in decreases in gag annual individual fishing quota (IFQ) allocation. Table 5.4.2.1 provides estimated nominal and discounted values (with 3% and 7% discount rates) for expected decreases in annual allocation between 2024 and 2028.

Table 5.4.2.1. Nominal and net present values of estimated changes in annual allocation for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$843,989	-$843,989	-$843,989
2025	-$796,306	-$773,113	-$744,211
2026	-$753,391	-$710,143	-$658,041
2027	-$704,914	-$645,096	-$575,420
2028	-$646,105	-$574,056	-$492,910
Total	-$3,744,704	-$3,546,397	-$3,314,571

In nominal value, cumulative reductions in annual allocation value expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028 are estimated at $3.75 million ($2021). Corresponding net present values, with 3% and 7% discount rates are estimated at $3.55 million and $3.15 million ($2021), respectively. **Preferred Alternative 3- Preferred Option 3b** would reduce the availability of commercially caught gag to consumers and therefore result in increased gag prices and losses in consumer surplus (CS) relative to **Alternative 1** (No Action). Table 5.4.2.2 provides estimated nominal and discounted values (with 3% and 7% discount rates) for expected changes in CS between 2024 and 2028.

Table 5.4.2.2. Nominal and net present values of estimated changes in consumer surplus for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$530,486	-$530,486	-$530,486
2025	-$502,095	-$487,471	-$469,248
2026	-$468,671	-$441,767	-$409,355
2027	-$421,942	-$386,137	-$344,430
2028	-$352,478	-$313,172	-$268,904
Total	-$2,275,672	-$2,159,033	-$2,022,423

In nominal value, cumulative reductions in CS expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028 are estimated at $2.28 million ($2021). Corresponding net present values, with 3% and 7% discount rates are estimated at $2.16 million and $2.02 million ($2021), respectively.

Decreases in gag commercial quotas would also result in decreases in gag commercial landings and therefore engender reductions in commercial gag revenues and in producer surplus (PS). Tables 5.4.2.3 and 5.4.2.4 provide estimated nominal and discounted values (with 3% and 7% discount rates) for changes in commercial revenues and PS expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028, respectively.

Table 5.4.2.3. Nominal and net present values of estimated changes in commercial revenues for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$2,187,145	-$2,187,145	-$2,187,145
2025	-$1,859,870	-$1,805,700	-$1,738,197
2026	-$1,581,069	-$1,490,309	-$1,380,967
2027	-$1,284,069	-$1,175,105	-$1,048,183
2028	-$949,327	-$843,464	-$724,237
Total	-$7,861,481	-$7,501,724	-$7,078,728

Table 5.4.2.4. Nominal and net present values of estimated changes in producer surplus for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$1,093,572	-$1,093,572	-$1,093,572
2025	-$929,935	-$902,850	-$869,098
2026	-$790,535	-$745,155	-$690,483
2027	-$642,035	-$587,553	-$524,092
2028	-$474,663	-$421,732	-$362,118
Total	-$3,930,740	-$3,750,862	-$3,539,364

In nominal value, cumulative reductions in commercial revenues and in PS expected to result from **Preferred Alternative - Preferred Option 3b** between 2024 and 2028 are estimated at 7.86 million ($2021) and $3.93 million ($2021), respectively. Corresponding net present values, with a 7% discount rate are estimated at $7.08 million and $3.54 million ($2021), respectively.

For the recreational sector, decreases in gag recreational ACLs (and associated reductions in annual catch targets (ACT) from **Preferred Alternative 3 - Preferred Option 3b** would reduce fishing opportunities for recreational anglers and for-hire trips targeting gag. Therefore, **Preferred Alternative 3 - Preferred Option 3b** would be expected to result in decreases in CS to anglers and in reductions in PS to for-hire operators. Tables 5.4.2.5 and 5.4.2.6 provide

estimated nominal and discounted values (with 3% and 7% discount rates) for changes in CS to anglers and PS to for-hire operators expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028, respectively.

Table 5.4.2.5. Nominal and net present values of estimated changes in anglers' consumer surplus for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$5,262,350	-$5,262,350	-$5,262,350
2025	-$4,741,579	-$4,603,475	-$4,431,382
2026	-$4,272,415	-$4,027,161	-$3,731,693
2027	-$3,737,569	-$3,420,405	-$3,050,970
2028	-$3,090,123	-$2,745,534	-$2,357,440
Total	-$21,104,037	-$20,058,925	-$18,833,835

In nominal value, cumulative reductions in recreational anglers' CS expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028 are estimated at $21.10 million ($2021). Corresponding net present values, with 3% and 7% discount rates are estimated at $20.06 million and $18.83 million ($2021), respectively.

Table 5.4.2.6. Nominal and net present values of estimated changes in for-hire producer surplus for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$3,667,780	-$3,667,780	-$3,667,780
2025	-$3,434,104	-$3,334,082	-$3,209,443
2026	-$3,229,993	-$3,044,578	-$2,821,201
2027	-$2,848,316	-$2,606,613	-$2,325,074
2028	-$2,551,527	-$2,266,999	-$1,946,548
Total	-$15,731,719	-$14,920,051	-$13,970,046

In nominal value, cumulative reductions in for-hire PS expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028 are estimated at $15.73 million ($2021). Corresponding net present values, with 3% and 7% discount rates are estimated at $14.92 million and $13.97 million ($2021), respectively.

For both sectors, combined changes in economic value, as measured by changes in CS to consumers purchasing commercially caught gag and in PS to commercial fishermen and changes in CS to recreational anglers and PS to for-hire operators are provided in Table 5.4.2.7.

Table 5.4.2.7. Nominal and net present values of estimated changes in commercial, recreational, and total economic values for **Preferred Alternative 3- Preferred Option 3b**. Dollar values are in $2021.

Year	Nominal Economic Value		Total Economic Value		
	Commercial	Recreational	Nominal	Net Present Value (3%)	Net Present Value (7%)
2024	-$1,624,058	-$8,930,130	-$10,554,188	-$10,554,188	-$10,554,188
2025	-$1,432,030	-$8,175,683	-$9,607,713	-$9,327,877	-$8,979,171
2026	-$1,259,206	-$7,502,408	-$8,761,614	-$8,258,661	-$7,652,733
2027	-$1,063,977	-$6,585,885	-$7,649,862	-$7,000,707	-$6,244,566
2028	-$827,141	-$5,641,650	-$6,468,791	-$5,747,437	-$4,935,010
Total	-$6,206,412	-$36,835,756	-$43,042,168	-$40,888,871	-$38,365,668
Annual Average	-$1,241,282	-$7,367,151	-$8,608,434	-$8,177,774	-$7,673,134

In nominal values, cumulative reductions in commercial and recreational economic values expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028 are estimated at $6.21 million ($2021) and $36.84 million ($2021), respectively. On average, nominal reductions in commercial and recreational economic values are estimated at $1.24 million ($2021) and $7.37 million ($2021) per year, respectively. Annual average decreases in economic value (commercial and recreational) expected to result from **Preferred Alternative 3- Preferred Option 3b** between 2024 and 2028 are estimated at $8.61 million ($2021) in nominal value. With a 7% discount rate, the net present value of the annual average decrease in total economic value is estimated at $7.67 million ($2021).

5.4.3 Action 3: Modify the Gulf Gag Sector ACTs Based on the Catch Limits and Sector Allocation Selected in Action 2

5.4.3.1 Action 3.1: Modify the Recreational ACT

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.3.1. The following discussion summarizes the expected economic effects of the preferred alternatives.

Reductions in gag recreational ACTs from **Preferred Alternative 3** would decrease fishing opportunities for recreational anglers and for-hire trips targeting gag. Therefore, **Preferred Alternative 3** would be expected to result in decreases in CS to anglers and in reductions in PS to for-hire operators.

Table 5.4.3.1.1 provides estimated nominal and discounted values (with 3% and 7% discount rates) for changes in CS to anglers, producer surplus to for-hire operators, and total changes in economic value expected to result from **Preferred Alternative 3** between 2024 and 2028.

Table 5.4.3.1. Nominal changes in anglers' consumer surplus and for-hire producer surplus, and nominal and net present values of total changes in economic value for **Preferred Alternative 3**. Dollar values are in $2021.

Year	Nominal Value		Total Economic Value		
	Consumer Surplus	Producer Surplus	Nominal	Net Present Value (3%)	Net Present Value (7%)
2024	-$146,770	-$52,244	-$199,014	-$199,014	-$199,014
2025	-$203,337	-$182,855	-$386,192	-$374,944	-$360,927
2026	-$254,299	-$208,977	-$463,276	-$436,682	-$404,643
2027	-$312,395	-$522,443	-$834,838	-$763,995	-$681,476
2028	-$382,723	-$626,931	-$1,009,654	-$897,065	-$770,260
Total	-$1,299,524	-$1,593,450	-$2,892,974	-$2,671,699	-$2,416,321
Annual Average	-$259,905	-$318,690	-$578,595	-$534,340	-$483,264

In nominal values, cumulative reductions in CS to anglers and in for-hire PS expected to result from **Preferred Alternative 3** between 2024 and 2028 are estimated at $1.30 million ($2021) and $1.59 million ($2021), respectively. On average, nominal reductions in CS and PS are estimated at $0.26 million ($2021) and $0.32 million ($2021) per year, respectively. Total decreases in economic value expected to result from **Preferred Alternative 3** between 2024 and 2028 are estimated at $2.89 million ($2021) in nominal value. With a 7% discount rate, the net present value of the annual average change in total economic value is estimated at $0.48 million ($2021).

5.4.3.2 Action 3.2: Modify the Commercial ACT

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.3.3.2. The following discussion summarizes the expected economic effects of the preferred alternatives.

Preferred Alternative 3, which would narrow the buffer between the commercial gag ACLs and corresponding gag quotas, would be expected to increase commercial gag landings. Therefore, **Preferred Alternative 3** is expected to increase CS to consumers purchasing commercially caught gag and PS to commercial fishermen. Estimated changes in CS and PS, as well as total changes in economic values are provided in Table 5.4.3.2.1.

Table 5.4.3.2.1. Nominal changes in consumer surplus and fishermen's producer surplus, and nominal and net present values of total changes in economic value for **Preferred Alternative 3**. Dollar values are in $2021.

Year	Nominal Value		Total Economic Value		
	Producer Surplus	Consumer Surplus	Nominal	Net Present Value (3%)	Net Present Value (7%)
2024	$75,506	$73,180	$148,686	$148,686	$148,686
2025	$105,023	$101,534	$206,557	$200,541	$193,044
2026	$130,691	$126,971	$257,662	$242,871	$225,052
2027	$160,850	$155,811	$316,661	$289,790	$258,490
2028	$196,357	$190,699	$387,056	$343,894	$295,283
Total	$668,427	$648,195	$1,316,622	$1,225,782	$1,120,555
Annual Average	$133,685	$129,639	$263,324	$245,156	$224,111

In nominal values, cumulative increases in consumer surplus to consumers purchasing commercially caught gag and in fishermen's PS expected to result from **Preferred Alternative 3** between 2024 and 2028 are estimated at $0.65 million ($2021) and $0.67 million ($2021), respectively. On average, nominal increases in CS and PS are estimated at $0.130 million ($2021) and $0.134 million ($2021) per year, respectively. Total increases in economic value expected to result from **Preferred Alternative 3** between 2024 and 2028 are estimated at $1.32 million ($2021) in nominal value. With a 7% discount rate, the net present value of the annual average increase in total economic value is estimated at $0.22 million ($2021).

5.4.4 Action 4: Modification of Gulf Gag Recreational Fishing Season Start Date and Accountability Measures (AMs)

A detailed analysis of the economic effects expected to result from this action is provided in Section 4.4.3. The following discussion summarizes the expected economic effects of the preferred alternatives.

Preferred Alternative 3 is expected to decrease for-hire trips targeting gag relative to **Alternative 1** and would therefore reduce PS to for-hire operators. Estimated decreases in PS in nominal values and in net present values are provided in Table 5.4.4.1.

Table 5.4.4.1. Nominal and net present values of changes in for-hire producer surplus for **Preferred Alternative 3**. Dollar values are in $2021.

Year	Nominal Value	Net Present Value (3%)	Net Present Value (7%)
2024	-$258,162	-$258,162	-$258,162
2025	-$223,304	-$216,800	-$208,695
2026	-$174,924	-$164,883	-$152,785
2027	-$278,860	-$255,196	-$227,633
2028	-$272,658	-$242,253	-$208,009
Total	-$1,207,909	-$1,137,294	-$1,055,285
Annual Average	-$241,582	-$227,459	-$211,057

Between 2024 and 2028, cumulative decreases in for-hire PS are estimated at $1.21 million ($2021). With a 7% discount rate, the annual average decrease in PS is estimated at 0.21 million ($2021). Although it would set a longer fishing season relative to **Alternative 1**, **Preferred Alternative 3** is expected to decrease the number of for-hire trips targeting gag due to the modification of the season's opening date from June 1 to September 1 and to the uneven average distribution of target trips across waves.

5.5 Changes in Net Benefits and in Economic Impacts

In terms of economic value, i.e., changes in CS and PS, the suite of preferred alternatives selected in this regulatory action is expected to result in changes in CS to consumers purchasing commercially caught gag and in PS to commercial fishermen (Actions 2 and 3.2) in the commercial sector. For the recreational sector, the suite of preferred alternatives is expected to result in changes in CS to anglers and in for-hire PS (Actions 2, 3.1, and 4). Changes in economic values to the commercial and recreational sectors are provided in Tables 5.5.1 and 5.5.2, respectively.

Table 5.5.1. Changes in commercial economic values by action. Dollar values are in $2021.

Year	Action 2	Action 3.2	Total
2024	-$1,624,058	$148,686	-$1,475,372
2025	-$1,432,030	$206,557	-$1,225,473
2026	-$1,259,206	$257,662	-$1,001,544
2027	-$1,063,977	$316,661	-$747,316
2028	-$827,141	$387,056	-$440,085
Total	-$6,206,412	$1,316,622	-$4,889,790
Annual Average	-$1,241,282	$263,324	-$977,958

Between 2024 and 2028, cumulative losses in economic value to the commercial sector are estimated at $5.50 million (2021). On average, the annual decrease in value is estimated at $0.98 million ($2021).

Table 5.5.2. Changes in recreational economic values by action. Dollar values are in $2021.

Year	Action 2	Action 3.1	Action 4	Total
2024	-$8,930,130	-$199,014	-$258,162	-$9,387,306
2025	-$8,175,683	-$386,192	-$223,304	-$8,785,179
2026	-$7,502,408	-$463,276	-$174,924	-$8,140,608
2027	-$6,585,885	-$834,838	-$278,860	-$7,699,583
2028	-$5,641,650	-$1,009,654	-$272,658	-$6,923,962
Total	-$36,835,756	-$2,892,974	-$1,207,909	-$40,936,639
Annual Average	-$7,367,151	-$578,595	-$241,582	-$8,187,328

Between 2024 and 2028, cumulative losses in economic value to the recreational sector are estimated at $40.94 million (2021). On average, the annual decrease in value is estimated at $8.19 million ($2021).

Changes in net benefits expected to result from the suite of preferred alternatives selected in this amendment are obtained by summing the changes in economic values to the commercial and recreational sectors, as provided in Table 5.5.3.

Table 5.5.3. Changes in commercial and recreational economic values and in net benefits.

Year	Nominal Economic Value		Net Benefits		
	Commercial	Recreational	Nominal	Net Present Value (3%)	Net Present Value (7%)
2024	-$1,475,372	-$9,387,306	-$10,862,678	-$10,862,678	-$10,862,678
2025	-$1,225,473	-$8,785,179	-$10,010,652	-$9,719,080	-$9,355,750
2026	-$1,001,544	-$8,140,608	-$9,142,152	-$8,617,355	-$7,985,110
2027	-$747,316	-$7,699,583	-$8,446,899	-$7,730,109	-$6,895,186
2028	-$440,085	-$6,923,962	-$7,364,047	-$6,542,860	-$5,617,996
Total	-$4,889,790	-$40,936,639	-$45,826,428	-$43,472,082	-$40,716,719
Annual Average	-$977,958	-$8,187,328	-$9,165,286	-$8,694,416	-$8,143,344

The drastic reductions in ACLs this amendment would implement are expected to be associated with sizeable decreases in net benefits. In nominal value, cumulative reductions in net benefits are estimated at $45.83 million ($2021) between 2024 and 2028. Using a 7% discount rate, the net present value of average losses in net benefits are estimated at $8.14 million per year.

In addition to the changes in net benefits provided in this section, the suite of preferred alternatives selected in this amendment is expected to result in reduced gross revenues in the commercial sector, which would be expected to reduce economic impacts in the onshore sector (e.g., dealers and processors) and related industries (e.g., grocers and restaurants). More specifically, the preferred alternatives in Actions 2 and 3.2 are expected to reduce annual gross

revenues by approximately $1.31 million (2021$) on average in the Gulf harvesting sector. Based on the model used to estimate the average annual economic impacts of the commercial sector for gag grouper, as illustrated in Table 3.3.1.28, the expected decrease in annual gross revenue in the commercial sector is expected to decrease employment, income, total value added, and output by 156 jobs, $4.75 million, $6.71 million, and $12.94 million in 2021$, respectively.

The suite of preferred alternatives in this amendment is also expected to result in fewer charter vessels trips targeting gag, which would be expected to reduce spending on various goods and services needed to conduct charter fishing trips and reduce the economic impacts resulting from those expenditures. This assumes the income that would have been spent on gag target trips by charter vessels is not spent on other goods and services unrelated to charter fishing (e.g., tourists choose not to spend that income on other activities such as site-seeing tours). The preferred alternatives in Actions 2, 3.1, and 4 are expected to result in a reduction of 24,711 gag grouper target trips by charter vessels. Based on the model used to estimate the average annual economic impacts of the recreational sector for red grouper, as illustrated in Table 3.3.2.10, the expected decrease in gag target trips by charter vessels is expected to decrease employment, income, total value added, and output by 134 jobs, $5.26 million, $9.01 million, and $15.12 million in 2021$, respectively. All of these impacts are expected to occur in Florida.

5.6 Public and Private Costs of Regulations

The preparation, implementation, and monitoring of this or any federal action involves the expenditure of public and private resources which can be expressed as costs associated with the regulations. Estimated costs associated with this action include:

Council costs of document preparation, meetings, public hearings, and information dissemination……$90,330

National Marine Fisheries Service (NMFS) administrative costs of document preparation, meetings and review ….....$81,400

TOTAL ….....$171,730

5.7 Determination of Significant Regulatory Action

Pursuant to Executive Order (E.O.) 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: 1) an annual effect of $200 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; 2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; 3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or 4) raise legal or policy issues for which centralized review would meaningfully further the President's priorities or the principles set forth in this E.O., as specifically authorized in a timely manner by the Administrator of Office of Information and Regulatory Affairs (OIRA) in each case. Based on the information

provided above, this action has been determined to not be economically significant for the purposes of E.O. 12866.

CHAPTER 6. INITIAL REGULATORY FLEXIBILITY ACT ANALYSIS

6.1 Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to ensure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic effects of various alternatives contained in the regulatory action and to ensure the agency considers alternatives that minimize the expected economic effects on small entities while meeting the goals and objectives of the applicable statutes (e.g., the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)).

With certain exceptions, the RFA requires agencies to conduct an initial regulatory flexibility analysis (IRFA) for each proposed rule. The IRFA is designed to assess the effects various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those effects. An IRFA is primarily conducted to determine whether the proposed regulatory action would have a significant economic effect on a substantial number of small entities. In addition to analyses conducted for the Regulatory Impact Review (RIR), the IRFA provides: 1) a description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed regulatory action; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed regulatory action will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed regulatory action, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule; and 6) a description of any significant alternatives to the proposed regulatory action which accomplish the stated objectives of applicable statutes and would minimize any significant economic effects of the proposed regulatory action on small entities.

In addition to the information provided in this section, additional information on the expected economic effects of the proposed action is included in the RIR.

6.2 Statement of the need for, objectives of, and legal basis for the rule

A discussion of the reasons why action by the agency is being considered is provided in Section 1.1. The purpose of this proposed regulatory action is to modify the status determination criteria (SDC), optimum yield (OY), catch limits, accountability measures (AM), sector allocations, and

the recreational fishing season and establish a rebuilding timeline for Gulf of Mexico (Gulf) gag. The objective of this proposed regulatory action is to use the best scientific information available to end overfishing of Gulf gag and rebuild the stock to a level commensurate with maximum sustainable yield (MSY), consistent with the authority under the Magnuson-Stevens Act. The Magnuson-Stevens Act serves as the legal basis for the proposed regulatory action. All monetary estimates in the following analysis are in 2021 dollars.

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

This proposed regulatory action would revise the status determination criteria for gag based on the results of the updated Southeast Data, Assessment, and Review (SEDAR) 72 stock assessment State Reef Fish Survey (SRFS) Run as reviewed by the Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC). The definition of MSY would change from the fishing mortality rate (F) assuming the maximum yield per recruit (F_{MAX}) to the yield when fishing at a 40% spawning potential ratio (SPR) or $F_{40\%SPR}$. The definition of maximum fishing mortality threshold (MFMT) would change from being equal to F_{MAX} to being equal to the fishing mortality at the F_{MSY} proxy (e.g., $F_{40\%SPR}$). The definition of minimum size stock threshold (MSST) would change from 50% of the biomass at F_{MAX} (B_{MAX}) to 50% of the biomass at MSY or its proxy. OY is currently defined as 75% of the yield at F_{MAX}. The proposed definition of OY would be conditional on whether a rebuilding plan is in place. Specifically, if the stock is under a rebuilding plan, OY would be equal to the stock ACL. However, if the stock is not under a rebuilding plan, OY would be equal to 90% of MSY or its proxy.

This proposed regulatory action would also revise the sector allocation of the total ACL from 61% recreational and 39% commercial to 65% recreational and 35% commercial. This proposed regulatory action would also establish a rebuilding plan based on the amount of time the stock is expected to take to rebuild if fished at 75% of the yield at $F_{40\%SPR}$, which is equal to 18 years. In turn, the proposed rebuilding plan in combination with the proposed sector allocation would change the overfishing limit (OFL), acceptable biological catch (ABC) and stock ACL, the commercial ACL, and the recreational ACL. Assuming the current allocation of the stock ACL between sectors, the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota are 4.18 million pounds (mp) gutted weight (gw), 3.12 mp gw, 1.903 mp gw, 1.217 mp gw, 1.708 mp gw, and 0.939 mp gw, respectively. The recreational portion of the OFL, ABC and stock ACL, the recreational ACL, and the recreational ACT are based on Marine Recreational Information Program (MRIP) Coastal Household Telephone Survey (CHTS) data. Under the proposed sector allocation and rebuilding plan, the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota would be reduced in 2024 and subsequently increase through 2028 as indicated in Table 6.3.1. The recreational portion of the revised OFL, ABC and stock ACL, the recreational ACL, and the recreational ACT are based on MRIP Fishing Effort Survey (FES) and Florida SRFS data.

Table 6.3.1. Proposed changes to OFL, ABC/stock ACL, sector ACLs, and recreational ACT, and commercial quota from 2024-2028.

Year	OFL (mp gw)	ABC/ Stock ACL (mp gw)	Recreational ACL (mp gw)	Commercial ACL (mp gw)	Recreational ACT (mp gw)	Commercial quota (mp gw)
2024	0.591	0.444	0.288	0.155	0.258	0.120
2025	0.805	0.615	0.399	0.215	0.358	0.166
2026	0.991	0.769	0.499	0.269	0.448	0.208
2027	1.200	0.943	0.613	0.330	0.550	0.255
2028	1.454	1.156	0.751	0.404	0.674	0.312

This proposed regulatory action would also revise the buffer between the recreational ACL and ACT, which is currently set equal to the yield at 75% of F_{MAX}, resulting in a 10.25% buffer (i.e., the recreational ACT is 89.75% of the recreational ACL). Under the proposed regulatory action, the buffer between the recreational ACL and ACT would be 20% (i.e., the recreational ACT would be 80% of the recreational ACL).

In addition, this proposed regulatory action would also modify the commercial ACT and quota. The commercial ACT is currently set equal to the yield at 75% of F_{MAX}, while the commercial quota is set at 86% of the commercial ACT. As a result, the commercial quota is currently 77% of the commercial ACL. This proposed regulatory action would set the commercial ACT equal to 95% of the commercial ACL and set commercial quota equal to the commercial ACT. Thus, the commercial quota would be 95% of the commercial ACL.

Finally, this proposed regulatory action would also change the recreational season start date and modify the recreational AM for Gulf gag. Specifically, the recreational season start date would change from June 1 to September 1. The current AM requires NMFS to prohibit harvest when the recreational ACL is projected to be met, whereas this proposed regulatory action would require the National Marine Fisheries Service (NMFS) to prohibit harvest when the recreational ACT is projected to be met. The current AM also requires NMFS to maintain the recreational ACT for the following fishing year at the level of the prior year's ACT unless the best scientific information available determines that maintaining the prior year's ACT is unnecessary. This provision would be removed under the proposed regulatory action.

Given these individual actions, this proposed regulatory action is expected to regulate commercial fishing businesses that possess Gulf gag shares in the Grouper-Tilefish Individual Fishing Quota (IFQ) program and for-hire fishing businesses that target gag.

The commercial gag quota is allocated annually based on the percentage of gag shares in each IFQ account (e.g., if an account possesses 1% of the gag shares and the commercial quota is 1 mp, then that account would receive 10,000 pounds of commercial gag quota). Although it is common for a single IFQ account with gag shares to be held by a single business, some businesses have multiple IFQ accounts with gag shares. As of July 8, 2021, there were 536 IFQ accounts, of which 506 held gag shares. These 506 accounts and the associated gag shares were

owned by 455 businesses. Thus, it is assumed this proposed regulatory action would regulate 455 commercial fishing businesses.

A valid charter-headboat (for-hire) Gulf reef fish vessel permit is required to legally harvest gag in the Gulf. NMFS does not possess complete ownership data regarding businesses that hold charter-headboat (for-hire) Gulf reef fish vessel permits, and thus potentially harvest gag. Therefore, it is not currently feasible to accurately determine affiliations between vessels and the businesses that own them. As a result, for purposes of this analysis, it is assumed each for-hire vessel is independently owned by a single business, which is expected to result in an overestimate of the actual number of for-hire fishing businesses regulated by this proposed regulatory action.

NMFS also does not have data indicating how many for-hire vessels actually harvest Gulf gag in a given year. However, in 2020, there were 1,289 vessels with valid charter-headboat Gulf reef fish vessel permits. Further, Gulf gag is only targeted and almost entirely harvested in waters off the west coast of Florida. Of the 1,289 vessels with valid charter-headboat Gulf reef fish vessel permits, 803 were homeported in Florida. Of these permitted vessels, 62 are primarily used for commercial fishing rather than for-hire fishing purposes and thus are not considered for-hire fishing businesses (i.e., 1,227 vessels are for-hire fishing businesses). In addition, 46 of these permitted vessels are considered headboats, which are considered for-hire fishing businesses. However, headboats take a relatively large, diverse set of anglers to harvest a diverse range of species on a trip, and therefore do not typically target a particular species. Therefore, it is assumed that no headboat trips would be canceled, and thus no headboats would be directly affected as a result of this proposed regulatory action. However, charter vessels often target gag. Of the 803 vessels with valid charter-headboat Gulf reef fish vessel permits that are homeported in Florida, 695 vessels are charter vessels. Souza and Liese (2019) reported that 76% of charter vessels with valid charter-headboat permits in the Gulf were active in 2017 (i.e., 24% were not fishing). A charter vessel would only be directly affected by this proposed regulatory action if it is fishing. Given this information, our best estimate of the number of charter vessels that are likely to harvest Gulf gag in a given year is 528, and thus this proposed regulatory action is estimated to regulate 528 for-hire fishing businesses.

On December 29, 2015, NMFS issued a final rule establishing a small business size standard of $11 million in annual gross receipts (revenue) for all businesses primarily engaged in the commercial fishing industry (NAICS code 11411) for RFA compliance purposes only (80 FR 81194, December 29, 2015). In addition to this gross revenue standard, a business primarily involved in commercial fishing is classified as a small business if it is independently owned and operated, and is not dominant in its field of operations (including its affiliates). NMFS does not collect revenue data specific to businesses that have IFQ accounts; rather, revenue data are collected for commercial fishing vessels. In addition, NMFS does not possess complete ownership data to determine affiliations between businesses with IFQ accounts. Thus, revenue estimates for commercial fishing businesses with IFQ accounts, including their affiliates, are not currently available. However, from 2017 through 2021, the maximum annual gross revenue earned by a single commercial fishing vessel during this time was about $3.25 million. Based on this information, all commercial fishing businesses regulated by this proposed regulatory action are determined to be small entities for the purpose of this analysis.

For other industries, the Small Business Administration (SBA) has established size standards for all major industry sectors in the U.S., including for-hire businesses (NAICS code 487210). A business primarily involved in for-hire fishing is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has annual receipts (revenue) not in excess of $12.5 million for all its affiliated operations worldwide. The maximum annual gross revenue for a single headboat in the Gulf was about $1.45 million in 2017 (D. Carter, pers. comm.). According to Savolainen, et al. (2012), on average, annual gross revenue for headboats in the Gulf is about three times greater than annual gross revenue for charter vessels, reflecting the fact that businesses that own charter vessels are typically smaller than businesses that own headboats. Based on this information, all for-hire fishing businesses regulated by this proposed regulatory action are determined to be small businesses for the purpose of this analysis.

6.4 Description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

This proposed regulatory action would not establish any new reporting or record-keeping requirements.

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

No duplicative, overlapping, or conflicting federal rules have been identified.

6.6 Significance of economic effects on small entities

Substantial number criterion

If implemented, this proposed regulatory action is expected to directly affect 455 of the 536 businesses with IFQ accounts, or approximately 85% of those commercial fishing businesses. Further, this proposed regulatory action is expected to directly affect 528 of the 1,227 for-hire fishing businesses with valid charter/headboat permits in the Gulf reef fish fishery, or approximately 43% of those for-hire fishing businesses. All regulated commercial and for-hire fishing businesses have been determined, for the purpose of this analysis, to be small entities. Based on this information, the proposed regulatory action is expected to affect a substantial number of small businesses.

Significant economic effects

The outcome of "significant economic impact" can be ascertained by examining two factors: disproportionality and profitability.

Disproportionality: Do the regulations place a substantial number of small entities at a significant competitive disadvantage to large entities?

All entities directly regulated by this regulatory action have been determined to be small entities. Thus, the issue of disproportionality does not arise in the present case.

Profitability: Do the regulations significantly reduce profits for a substantial number of small entities?

The action to revise the SDCs would not regulate or directly affect any entities, and thus would not affect the economic profits of any entities. Therefore, that action is not discussed further in this analysis.

Because revenue and cost data are not collected for the commercial fishing businesses that are expected to be regulated by this proposed regulatory action, direct estimates of their economic profits are not available. However, economic theory suggests that annual allocation (quota) prices should reflect expected annual economic profits, which allows expected economic profits to be estimated indirectly. Further, the 455 businesses with gag shares also own shares in the other IFQ share categories and thus are expected to earn profits from their ownership of these shares as well, i.e., red snapper, red grouper, shallow water grouper, deep-water grouper, and tilefish.

However, economic profits will only be realized if the allocated quota is used for harvesting purposes. For example, practically all of the commercial red snapper quota has been used for harvesting in recent years, and so it is assumed that all of that quota will be harvested in the foreseeable future. Important management changes have occurred for red grouper, which partly resulted in 96% of the commercial quota being harvested in 2021. Thus, this analysis also assumes that all of the red grouper quota will be harvested in the future as well. However, based on 2017-2021 data, only 82% of the deep-water grouper commercial quota, 38% of the shallow water grouper commercial quota, and 73% of the tilefish commercial quota have been harvested. Those percentages are expected to continue in the foreseeable future. For gag, the quota utilization rate from 2017-2021 was approximately 52%. Given these quota utilization rates in combination with average annual allocation prices from 2017-2021 (see Table 3.3.1.15) and annual commercial quotas in 2021, the total expected economic profits for businesses with gag shares are estimated to be at least $29.4 million at the present time. This estimate does not account for any economic profits that may accrue to businesses with gag shares that own commercial fishing vessels that harvest non-IFQ species. Such profits are likely to be small because harvest of IFQ species accounts for around 84% of commercial IFQ vessels' annual revenue and economic profits from the harvest of non-IFQ species tend to be smaller than those from IFQ species (C. Liese, pers. communication, 2019). Given that there are 455 businesses

with gag shares, the average annual expected economic profit per commercial fishing business is at least $64,620.

However, most of these expected economic profits (84%) are the result of owning red snapper shares. Only approximately $502,930 (or 1.7%) of their expected economic profits is due to the ownership of gag shares. This proposed regulatory action is only expected to affect economic profits from the ownership of gag shares. Specifically, the proposed action to change the sector allocation, implement a rebuilding plan, and change the stock ACL would reduce the commercial ACL and commercial quota from their current values of 1.217 mp gw and 939,000 lbs gw, respectively. The average commercial ACL and commercial quota from 2024 through 2028 would be 275,000 lb gw and 212,000 lb gw under the proposed action. However, average annual commercial landings of gag from 2017-2021 were only 492,401 lb gw, noticeably below the commercial quota. Because average annual landings exceed the proposed commercial quotas through 2028, it is assumed all of the proposed commercial quota will be harvested in each year through 2028. Further, the expected average reduction in annual commercial landings is 280,401 lb gw. The expected reduction in commercial landings is expected to initially increase the average ex-vessel price of gag from $6.10 per lb gw to $7.78 per lb gw, or by $1.68 per lb gw, in 2024. However, the increase in ex-vessel price is expected to gradually decrease through 2028 as the quota and landings increase, with an expected ex-vessel price of $6.96 in 2028. The increase in the ex-vessel price is expected to partially offset the adverse effects of the expected landings reduction. Thus, the expected reduction in annual ex-vessel revenue for gag on average is approximately $1.57 million. Given an average annual allocation price of $1.03 per lb gw for gag from 2017-2021, the expected reduction in commercial landings of gag is expected to reduce economic profits to these commercial fishing businesses by about $288,813, or by approximately $635 per commercial fishing business. Thus, economic profits are expected to be reduced by around 1% on average per commercial fishing business as a result of the proposed action to change the sector allocation, implement a rebuilding plan, and change the stock ACL.

The proposed action that would would set the commercial ACT equal to 95% of the commercial ACL and set commercial quota equal to the commercial ACT would cause the commercial quota to be equal to 95% of the commercial ACL, as opposed to only 77% of the commercial ACL as is presently the case. As such, this action is expected to increase the commercial quota relative to what it would be otherwise. The increase would still yield commercial quotas below the recent average commercial landings and thus, it is assumed all of the expected increase in the quota will be harvested. Specifically, the average annual increase in the commercial quota and landings from 2024 through 2028 is expected to be about 48,527 lb gw, which in turn is expected to increase average annual revenue by $267,371. Again, assuming an average annual allocation price of $1.03 per lb gw, the expected average increase in economic profit to commercial fishing businesses per year is $49,983, or about $110 per commercial fishing business.

Based on the above, this proposed regulatory action is expected to decrease average revenue for commercial fishing businesses by about $1.31 million per year from 2024 through 2028, or by $2,868 per commercial fishing business. The total reduction in economic profit for commercial fishing businesses is expected to be $238,830, or $525 per commercial fishing business, which represents a decrease of about .8%.

According to Savolainen, et al. (2012), which contains the most recent estimates of economic returns, including economic profits, in the for-hire sector, average annual economic profits are $27,948 per charter vessel. The proposed action to change the sector allocation, implement a rebuilding plan, and change the stock ACL would change the gag recreational ACL from its current value of 1.903 mp gw in MRIP-CHTS units. Specifically, the average recreational ACL for gag would be .51 mp gw in MRIP-FES units from 2024 through 2028 under the proposed action. However, average recreational landings from 2017-2021 were approximately 2.538 mp gw in MRIP-FES units. Given that average recreational landings have been considerably greater than the proposed recreational ACL, all of the proposed recreational ACL is expected to be harvested in the future. The recreational ACL reduction is expected to reduce the recreational season length from 214 days to 25 days in 2024, with the season length steadily increasing to 120 days by 2028. The reduction in the season length is expected to reduce the number of angler trips targeting gag on charter vessels. From 2024 through 2028, the average reduction in angler trips targeting gag on charter vessels is expected to be 20,976 trips. Net Cash Flow per Angler Trip (CFpA) is the best available estimate of profit per angler trip by charter vessels. According to Souza and Liese (2019), CFpA on charter vessels is estimated to be $150 per angler trip. Thus, the estimated reduction in charter vessel profits from this action is expected to be $3.146 million, and the reduction in charter vessels profits is estimated to be $5,960 per vessel, or about 21.3 percent on average per for-hire fishing business.

In combination with the proposed action to require NMFS to close the recreational season based on when the recreational ACT is projected to be met rather than the recreational ACL, the proposed action to increase the buffer between the recreational ACL and recreational ACT from 10.25% to 20% would be expected to reduce the recreational season length further from the proposed action to change the sector allocation, implement a rebuilding plan, and change the stock ACL. Specifically, the season length is expected to be further reduced by two days in 2024, but this reduction is expected to gradually increase to 24 days by 2028. The average additional reduction in the recreational season length is expected to be 12 days. Again, a reduction in the season length is expected to reduce the number of angler trips targeting gag on charter vessels. From 2024 through 2028, the average reduction in angler trips targeting gag on charter vessels is expected to be 2,125 trips. Based on an estimate of $150 in economic profit per angler trip, the estimated reduction in charter vessel profits from this action is expected to be $318,690, and the reduction in charter vessels profits is estimated to be $604 per vessel, or about 2.2 percent on average per for-hire fishing business.

The proposed action that would change the recreational season start date from June 1 to September 1 is expected to further decrease the number of angler trips targeting gag on charter vessels. Although the reduction in trips from 2024 through 2028 varies slightly from year to year, the average reduction per year is 1,610 trips. Based on an estimate of $150 in economic profit per angler trip, this proposed action is expected to decrease economic profits for charter vessels by about $241,500 million, or by $456 per charter vessel. Thus, this proposed action is expected to decrease economic profits by around 1.6% on average per for-hire fishing business.

Based on the above, the total expected reduction in target trips by charter vessels as a result of this proposed regulatory action is 24,711 trips. The total reduction in economic profits for charter vessels is expected to be about $3.707 million, or approximately $7,020 per charter

vessel. Thus, economic profits are expected to be reduced by approximately 25.1% on average per for-hire fishing business.

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

Six alternatives, including the status quo, were considered for the proposed action to change the sector allocation of the stock ACL from 65% to the recreational sector and 35% to the commercial sector, establish a rebuilding plan of 18 years based on the amount of time the stock is expected to take to rebuild if fished at 75% of the yield at $F_{40\%SPR}$, and change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota to the values specified in Table 6.3.1 for 2024 through 2028. The status quo alternative would have retained the current sector allocation of the stock ACL of 61% to the recreational sector and 39% to the commercial sector based on MRIP-CHTS recreational landings data. The status quo alternative would not have established a rebuilding plan or modified any of the catch limits based on MRIP-FES and SRFS landings estimates. This alternative was not selected because the sector allocation would have been based on MRIP-CHTS recreational landings estimates, which the SSC no longer supports as being consistent with the best scientific information available and would result in a de facto reallocation to the commercial sector of approximately 4%, which the Council did not consider to be equitable. This alternative also would not have rebuilt the overfished stock of gag and would not have reduced overfishing, as required by the MSA.

A second alternative would have also retained the current sector allocation of the stock ACL of 61% to the recreational sector and 39% to the commercial sector, but would have established a rebuilding plan of 11 years assuming a fishing mortality rate of zero and used MRIP-FES and SRFS recreational landings data to change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota accordingly for 2024 through 2028. This alternative would have ended overfishing and used MRIP-FES and SRFS recreational landings data to change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota. However, as with the status quo alternative, the sector allocation would be based on MRIP-CHTS recreational landings data. Prohibiting harvest of gag would have resulted in all catch limits being set equal to zero. Further, prohibiting harvest of gag would not be expected to eliminate all fishing mortality, as some gag would still be expected to be discarded and die as fishermen continue fishing for other species that live in similar habitats as gag. This alternative was not selected because, as discussed above, the SSC no longer supports the use of MRIP-CHTS recreational landings data as being consistent with the best scientific information available, and would result in a *de facto* reallocation from the recreational to the commercial sector of approximately 4%, which the Council did not considerable to be equitable. Further, because it is not feasible to eliminate dead discards of gag when fishermen are targeting other species, it is unlikely the stock would actually be rebuilt in 11 years. This alternative would have also resulted in significantly larger adverse economic effects on commercial and for-hire fishing businesses compared to the proposed action, which the Council did not support.

A third alternative would have also retained the current sector allocation of the stock ACL of 61% to the recreational sector and 39% to the commercial sector. But, like the proposed action, it would have established a rebuilding plan of 18 years based on the amount of time the stock is expected to take to rebuild if fished at 75% of the yield at $F_{40\%SPR}$, and change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota for 2024 through 2028. This alternative would have ended overfishing and rebuilt the stock in 18 years. But, as with the status quo and the second alternative, the sector allocation of the stock ACL would be based on MRIP-CHTS recreational landings data. Thus, this alternative was not selected because the SSC no longer supports the use of MRIP-CHTS recreational landings data as being consistent with the best scientific information available, and would result in a *de facto* reallocation from the recreational to the commercial sector of approximately 4%, which the Council did not considerable to be equitable.

A fourth alternative would have also retained the current sector allocation of the stock ACL of 61% to the recreational sector and 39% to the commercial sector, but would have established a rebuilding plan of 22 years based on the TMin*2 rebuilding scenario and used MRIP-FES and SRFS recreational landings data to change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota accordingly for 2024 through 2028. This alternative would have ended overfishing and used MRIP-FES and SRFS recreational landings data to change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota. Although this alternative would have rebuilt the stock and resulted in higher catch limits and smaller adverse economic effects on commercial and for-hire fishing businesses compared to the proposed action, it was not selected because the stock is expected to take four more years to rebuild compared to the proposed action, and the MSA requires overfished stocks to be rebuilt in as short a time period as possible, considering various factors. This alternative was also not selected because the SSC no longer supports the use of MRIP-CHTS recreational landings data as being consistent with the best scientific information available, and would result in a *de facto* reallocation to the commercial sector of approximately 4%, which the Council did not considerable to be equitable.

Like the proposed action, a fifth alternative would have changed the sector allocation of the stock ACL to 65% to the recreational sector and 35% to the commercial sector based on MRIP-FES and SRFS data for 1986-2005. As with the second alternative, it would have also established a rebuilding plan of 11 years assuming a fishing mortality rate of zero and used MRIP-FES and SRFS recreational landings data to change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota accordingly for 2024 through 2028. As discussed above, prohibiting harvest of gag would have resulted in all catch limits being set equal to zero. However, prohibiting harvest of gag would not be expected to eliminate all fishing mortality, as some gag would still be expected to be discarded and die as fishermen continue fishing for other species that live in similar habitats as gag. This alternative was not selected because it is not feasible to eliminate dead discards of gag when fishermen are targeting other species, and therefore it is unlikely the stock would rebuild in 11 years. This alternative would have also resulted in significantly larger adverse economic effects on commercial and for-hire fishing businesses compared to the proposed action, which the Council did not support.

Like the proposed action, a sixth alternative would have changed the sector allocation of the stock ACL to 65% to the recreational sector and 35% to the commercial sector based on MRIP-FES and SRFS data for 1986-2005. However, this alternative would have also established a rebuilding plan of 22 years based on the TMin*2 rebuilding scenario and used MRIP-FES and SRFS recreational landings data to change the OFL, ABC and stock ACL, recreational ACL, commercial ACL, recreational ACT, and commercial quota accordingly for 2024 through 2028. This alternative would be based on the best scientific information available, end overfishing, and rebuild the stock. This alternative would have also resulted in higher catch limits and therefore resulted in small adverse economic effects on commercial and for-hire fishing businesses compared to the proposed action. This alternative was not selected because it is expected to take four more years to rebuild compared to the proposed action, and the MSA requires overfished stocks to be rebuilt in as short a time as possible, considering various factors.

Two alternatives, including the status quo, were considered for the proposed action to increase the buffer between the recreational ACL and recreational ACT from 10.25% to 20%. The status quo alternative would have maintained the buffer between the recreational ACL and recreational ACT at 10.25% based on setting the recreational ACT equal to the yield at 75% of F_{MAX}. However, the Council's SSC no longer supports the use of F_{MAX} as a proxy for F_{MSY}, as it allows for setting catch limits based on the maximum yield per recruit. Given the current low proportion of male gag, hermaphroditism, and the stock's susceptibility to red tide, the SSC thought F_{MAX} was too aggressive and not sustainable. Following its review of the SEDAR 72 run using SRFS for the private angling component of the recreational sector, the SSC recommended revising the F_{MSY} proxy to equal the yield at $F_{40\%SPR}$. Thus, this alternative was not selected because F_{MAX} no longer represents the best scientific information available.

The second alternative would have revised the recreational ACT using the Council's ACL/ACT Control Rule based recreational landings data from 2018 through 2021. This alternative would have resulted in a 10% buffer between the recreational ACL and ACT, which would have left the buffer essentially unchanged. This alternative was not selected because the Council concluded it was necessary to increase the buffer between the ACL and ACT in order to reduce the probability of the recreational sector exceeding the ACL, reduce the likelihood of overfishing, and reduce the level of discards associated with directed harvest, which is expected to increase the probability of meeting the 18-year timeline for rebuilding the gag stock.

Three alternatives, including the status quo, were considered for the proposed action to change the recreational season start date from June 1 to September 1 and require NMFS to close the recreational season based on when the recreational ACT is projected to be met rather than the recreational ACL. The status quo alternative would have maintained the recreational season start date of June 1 and required NMFS to close the recreational season based on when the recreational ACL is projected to be met. This alternative was not selected mainly because it would have resulted in a shorter average recreational season length (75 days) compared to the proposed action (81 days) for 2024 through 2028. In general, a longer fishing season would result in more fishing opportunities for both the private recreational and for-hire components of the fishery. Further, shifting fishing effort to a historically low-effort month (September) may reduce the overall magnitude of recreational discards compared to starting the season in June.

Shifting fishing pressure to the fall would also reduce directed fishing effort for gag in deeper waters, which may further reduce the probability of harvesting or discarding dead male gag.

The second alternative would have retained the June 1 start date for the recreational season. But, like the proposed action, this alternative would have required NMFS to close the recreational season based on when the recreational ACT is projected to be met. This alternative was not selected mainly because it would have resulted in a shorter average recreational season length (52 days) compared to the proposed action (81 days) for 2024 through 2028. In general, a longer fishing season would result in more fishing opportunities for both the private recreational and for-hire components of the fishery. Further, shifting fishing effort to a historically low-effort month (September) may reduce the overall magnitude of recreational discards compared to starting the season in June. Shifting fishing pressure to the fall would reduce directed fishing effort for gag in deeper waters, which may further reduce the probability of harvesting or discarding dead male gag.

The third alternative would have changed the recreational season start date to October 1. But, like the proposed action, this alternative would have required NMFS to close the recreational season based on when the recreational ACT is projected to be met. This alternative was not selected because it would have resulted in a shorter average recreational season length (63 days) compared to the proposed action (81 days) for 2024 through 2028 and would have also resulted in greater adverse effects to for-hire fishing businesses. In general, a longer fishing season would result in more fishing opportunities for both the private recreational and for-hire components of the fishery.

CHAPTER 7. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

1. National Marine Fisheries Service:
   - Southeast Fisheries Science Center
   - Southeast Regional Office
     i. Protected Resources
     ii. Habitat Conservation
     iii. Sustainable Fisheries

2. NOAA General Counsel
3. U.S. Coast Guard
4. Alabama Department of Conservation and Natural Resources/Marine Resources Division
5. Florida Fish and Wildlife Conservation Commission
6. Louisiana Department of Wildlife and Fisheries
7. Mississippi Department of Marine Resources
8. Texas Parks and Wildlife Department

CHAPTER 8. LIST OF PREPARERS

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John Froeschke	Fishery Biologist	Review	GMFMC
Carrie Simmons	Fishery Biologist	Review	GMFMC

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

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APPENDIX A. LETTER REGARDING GULF GAG GROUPER INTERIM RULE MEASURES

Gulf of Mexico Fishery Management Council
Managing Fishery Resources in the U.S. Federal Waters of the Gulf of Mexico

4107 W. Spruce Street, Suite 200, Tampa, Florida 33607 USA
Phone: 813.348.1630 • Toll free: 888.833.1844 • Fax: 813.348.1711
www.gulfcouncil.org

July 18, 2022

Mr. Andrew Strelcheck, Regional Administrator
Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, Florida 33701

007050JUL2022

Dear Mr. Strelcheck:

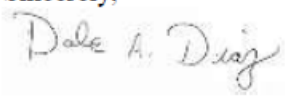
At its June 2022 meeting, the Gulf of Mexico (Gulf) Fishery Management Council (Council) discussed a proposed interim rule and corresponding proposed management measures for Gulf gag grouper. The stock assessment (SEDAR 72 2021) found gag grouper to be overfished and undergoing overfishing, and the National Marine Fisheries Service (NMFS) notified the Council of this stock status on January 26, 2022. Per the rebuilding guidelines defined in the Magnuson-Stevens Fishery Conservation and Management Act, the Council must develop and implement a rebuilding plan that ends overfishing within two years, or by January 26, 2024. However, the commercial sector is managed under the Grouper-Tilefish Individual Fishing Quota (IFQ) Program and the rebuilding plan will include reduced catch levels from status quo that will need to take effect prior to January 1, 2024, when the commercial quota for the 2024 fishing year is scheduled to be released. Likewise, for the 2023 fishing year which occurs in the interim between the present day and the deadline for implementing a rebuilding plan for gag, any interim rule to reduce or end overfishing will need to be implemented by January 1, 2023.

During the June 2022 meeting, the Council reviewed proposed management alternatives for the interim rule. The Council decided to recommend that NMFS adopt catch limits consistent with the current sector allocation of 61% recreational, 39% commercial, based on the rebuilding timeline of T_{MIN}*2, or twice the minimum time to rebuild the stock if fishing mortality were reduced to zero. This results in a stock ACL of 661,901 pounds gutted weight (lbs gw) in MRIP-FES currency, with a commercial annual catch limit of 258,142 lbs gw and a commercial quota of 199,147 lbs gw, and a recreational ACL of 403,759 lbs gw. The Council elected not to make any modifications to the commercial sector's IFQ multi-use provision for red and gag grouper. Further, the Council recommended that NMFS implement a revision to the fishing season closure for gag grouper, such that the recreational fishing season opens on September 1 and closes by November 10 for the 2023 fishing year.

The Council requests that NMFS implement these interim measures to reduce overfishing of gag as soon as practicable, with an effective date of January 1, 2023. These measures were expected to reduce or end overfishing of gag grouper for the 2023 fishing year, and are expected to aid in the pace of recovery of the stock while the Council works to develop the rebuilding plan via Reef Fish Amendment 56. During its August 2022 in Corpus Christi, Texas, the Council will be considering the SSC-approved catch limit recommendations based on

the requested SEDAR 72 alternative base model run using the State of Florida's State Reef Fish Survey for informing private angling landings and discards. If you have questions, please do not hesitate to contact Council staff.

Sincerely,



Dale Diaz
Council Chair

RR

cc: Council Members / Council Staff / John F. Walter, Ph.D. / Clay Porch, Ph.D. / Jack McGovern, Ph.D. / Peter Hood / Mara Levy / Dan Luers / Jim Nance, Ph.D. / Luiz Barbieri, Ph.D.

APPENDIX B. RECREATIONAL FISHING SEASON DURATION PROJECTIONS

Recreational Season Projection Analyses for Gulf of Mexico Gag
Southeast Regional Office LAPP/DM Branch
April 2023

Gulf of Mexico gag are managed in federal waters under the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP). In January 2022, there was notification that the stock was overfished and experiencing overfishing. To address this notification, Amendment 56 to the Reef Fish FMP proposes to adjust catch levels (annual catch limits), revise sector allocations, and revise recreational seasonal closures. This analysis predicts recreational season closures based on all management options being considered.

Recreational landings data
Gulf gag recreational landings were obtained from the Southeast Fisheries Science Center (SEFSC) recreational ACL files (accessed October 2022). The SEFSC recreational landings dataset includes landings from the Texas Parks and Wildlife recreational creel survey (TPWD), Louisiana Department of Wildlife and Fisheries creel survey (LA Creel), Southeast Region Headboat Survey (SRHS) and Marine Recreational Information Program (MRIP) Fishing Effort Survey (FES; Florida, Alabama, and Mississippi). The MRIP FES files contain estimates from MRIP's Access Point Angler Intercept Survey (APAIS), FES (private angler effort estimates), and For-Hire Telephone Survey (FHS; for-hire effort estimates). For 2020 and 2021, imputed MRIP FES catch estimates are used to account for disruptions in the dockside sampling due to COVID.

The Florida Fish and Wildlife Conservation Commission's (FWC) State Reef Fish Survey (SRFS; accessed January 2023) provides private angling landings for red snapper, gag and several other reef fish species harvested in state and federal water of the west coast of Florida. FWC SRFS data were consistent with the best available data by the Scientific and Statistical Committee (SSC) at the July 2022 meeting for reporting and analyzing Florida private recreational landings of gag. As a result, Florida private recreational landings of gag in the MRIP FES landings file were replaced with SRFS landings that are calibrated to MRIP FES to generate a SRFS informed recreational landings time series with which future landings could be projected. SRFS landings are reported in whole weight but were converted to pounds gutted weight (lb gw) using a revised gutted to whole weight conversion factor of 1.05 (SEDAR 72). All landings are reported in lb gw (**Table 1**).

A three-year average (2019-2021) of monthly landings was used to predict future landings (**Figure 1**). Since MRIP data are provided in two-month waves (e.g., January and February = wave 1, March and April = wave 2, etc.), data from other sources are shown in waves. Monthly landings were estimated for MRIP, TPWD and LA Creel by assuming equal daily catch rates for months within a wave and then combined with SRHS and SRFS, which are provided monthly. Monthly recreational landings in January through April were minimal due to the seasonal closure

that runs January 1 through May 31. Landings for the month of May included those that were reported to SRHS and SRFS, while June landings were estimated by adding SRHS and SRFS landings for that month to all the landings reported for wave 3 for the MRIP survey. Estimated monthly landings were then divided by the number of days in each month to provide a daily catch rate to project expected closure dates. Based on the cumulatively summed projected recreational landings of gag, the recreational sector can expect a fishing season between 0 and 70 days the first year following implementation depending on the management options selected (**Tables 2 and 3**). Season durations would be expected to increase in successive years. These results assume no effort shifting and that no landings are made during the spawning season closure.

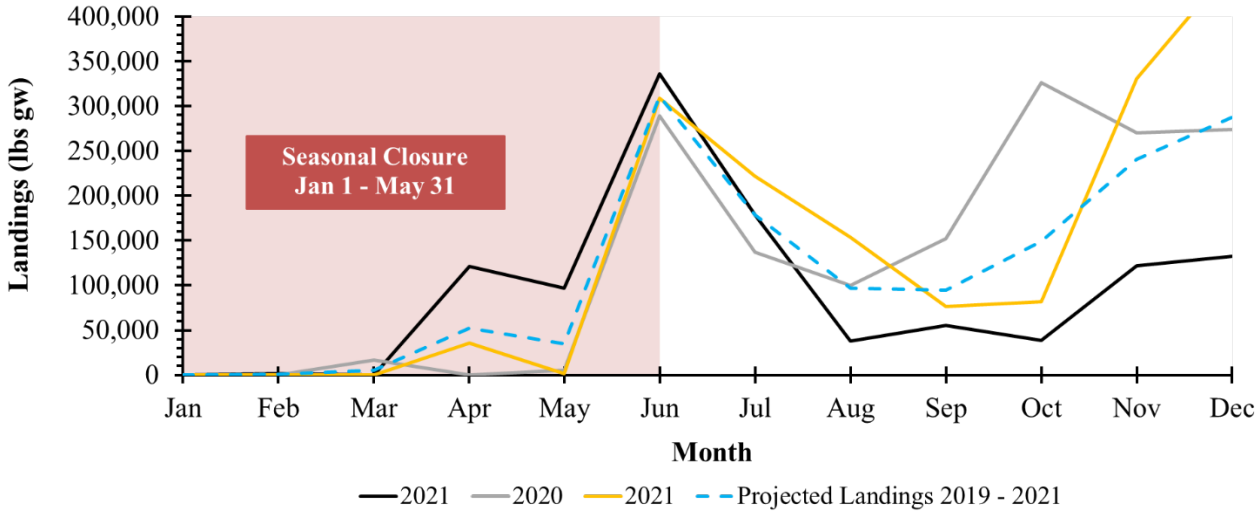


Figure 1. Gulf gag monthly recreational landings (lb gw) for 2019-2021, and projected landings from 2019-2021. Source: SEFSC Recreational MRIP FES ACL Dataset (October 2022) and FWC SRFS Dataset (January 2023)

Table 1. Recreational Gulf gag landings (lb gw) by two-month waves from 2017-2021.

Year	Wave	MRIP FES	SRHS	Charter	Private and Shore (Excl. MRIP's Florida Priv)	SRFS (Florida Priv)	Combined MRIP/SRFS
2017	1	389	25	-	364	-	389
	2	60,215	8	-	67	56,246	56,321
	3	834,210	6,318	52,307	208	252,589	311,422
	4	176,884	3,562	3,942	201	72,783	80,488
	5	142,703	3,986	2,784	549	174,344	181,663
	6	1,173,813	10,803	154,150	-	206,718	371,671
2018	1	18	18	-	-	-	18
	2	35,248	37	-	-	12,849	12,886
	3	705,215	10,133	120,683	578	202,756	334,150
	4	953,445	5,640	26,262	498	288,069	320,469
	5	212,119	3,672	2,089	281	87,343	93,385
	6	632,844	8,144	37,691	33,377	123,909	203,120
2019	1	55	55	-	-	1,469	1,524
	2	30	30	-	-	121,113	121,143
	3	856,819	6,137	109,544	6,943	310,582	433,206
	4	502,765	3,828	31,122	20,533	160,955	216,438
	5	80,670	2,033	7,066	157	84,552	93,808
	6	747,200	9,824	91,935	17,820	135,449	255,028
2020	1	-	-	-	-	-	-
	2	63,713	50	-	-	16,648	16,698
	3	387,745	6,540	126,397	16,645	145,293	294,875
	4	358,669	4,794	145,479	93	86,637	237,003
	5	922,407	2,935	9,002	3,454	463,384	478,776
	6	1,216,526	9,936	40,001	13,139	481,340	544,416
2021	1	-	-	-	-	-	-
	2	158,117	19	-	-	35,485	35,503
	3	478,507	7,513	155,734	16,232	130,701	310,181
	4	575,837	6,442	116,070	10,053	243,112	375,676
	5	98,857	5,530	32,995	10,952	109,237	158,714
	6	1,469,293	12,156	170,462	-	604,406	787,024

Source: SEFSC MRIP FES recreational ACL database [October 2022], FWC SRFS database [January 2023].
Notes: MRIP FES landings are presented as a reference and include all Gulf gag landings (TPWD, SRHS, LA Creel, MRIP FES). SRHS, Charter, Shore, Non-Florida Private, and SRFS landings are also presented separately. Combined MRIP/SRFS landings include MRIP FES landings with SRFS data in place of Florida private recreational landings.

Table 2. The projected Gulf of Mexico gag closure dates expected for the recreational sector with each proposed management option for **Action 1** and **Action 2** with a 10.25% buffer and a 20% buffer between the ACL and ACT. Upper and lower 95% confidence intervals were also provided for 2024 Annual Catch Targets (ACT). Source: SEFSC MRIP FES Recreational ACL Dataset (October 2022); FWC SRFS (January 2023)

	Action 2, Alternative 1 (No Action): 39% commercial | 61% recreational								
Action 2 Alternatives	Action 4, Alt 1	Rec ACT (lb gw)	Action 4, Alt 2	Action 4, Alt 3	Action 4, Alt 4	Rec ACT (lb gw)	Action 4, Alt 2	Action 4, Alt 3	Action 4, Alt 4
No Action		1,708,000	No Closure			1,708,000	No Closure		
	Action 2, Alternative 2: 39% commercial | 61% recreational								
	Jun 1 Open		Jun 1 Open	Sep 1 Open	Oct 1 Open		Jun 1 Open	Sep 1 Open	Oct 1 Open
	No Buffer	**Action 3.1, Alt 2: 10% ACT Buffer**				**Action 3.1, Alt 3: 20% ACT Buffer**			
Alt 2a: TMin at F=0	0	0	**No Season**	**No Season**	**No Season**	**0**	**No Season**	**No Season**	**No Season**
Alt 2b: 75% of F40% SPR									
2024	**Jun 27 Jun 25 – 30** (27 days)	248,000	**Jun 24 Jun 23 – 27** (24 days)	**Nov 1 Oct 10 – Dec 28** (62 days)	**Nov 13 Oct 24 – None** (44 days)	221,000	**Jun 22 Jun 20 – Jun 24** (22 days)	**Oct 27 Oct 7 – Dec 20** (57 days)	**Nov 9 Oct 22 – None** (40 days)
2025	**Jul 13** (43 days)	344,000	**Jul 6** (36 days)	**Nov 13** (74 days)	**Nov 25** (56 days)	305,000	**Jun 30** (30 days)	**Nov 8** (69 days)	**Nov 20** (51 days)
2026	**Jul 29** (59 days)	429,000	**Jul 21** (51 days)	**Nov 24** (85 days)	**Dec 5** (66 days)	381,000	**Jul 13** (43 days)	**Nov 18** (79 days)	**Nov 29** (60 days)
2027	**Aug 31** (92 days)	527,000	**Aug 12** (73 days)	**Dec 5** (96 days)	**Dec 15** (76 days)	468,000	**Jul 28** (58 days)	**Nov 28** (89 days)	**Dec 9** (70 days)
2028	**Oct 8** (130 days)	646,000	**Sep 19** (111 days)	**Dec 18** (109 days)	**Dec 28** (89 days)	574,000	**Aug 27** (88 days)	**Dec 10** (101 days)	**Dec 20** (81 days)
Alt 2c: TMin * 2									
2024	**July 4 Jun 30 – Jul 12** (34 days)	300,000	**Jun 29 Jun 27 – Jul 4** (29 days)	**Nov 7 Oct 15 – None** (68 days)	**Nov 19 Oct 29 – None** (50 days)	266,000	**Jun 26 Jun 24 – Jun 29** (26 days)	**Nov 3 Oct 11 – None** (64 days)	**Nov 15 Oct 26 – None** (46 days)
2025	**Jul 26** (56 days)	411,000	**Jul 18** (48 days)	**Nov 21** (82 days)	**Dec 3** (64 days)	364,000	**Jul 10** (40 days)	**Nov 15** (76 days)	**Nov 27** (58 days)

2026	**Aug 24** (85 days)	508,000	**Aug 6** (67 days)	**Dec 3** (94 days)	**Dec 13** (74 days)	451,000	**Jul 25** (55 days)	**Nov 26** (87 days)	**Dec 7** (68 days)
2027	**Oct 1** (123 days)	619,000	**Sep 10** (102 days)	**Dec 15** (106 days)	**Dec 25** (86 days)	549,000	**Aug 19** (80 days)	**Dec 7** (98 days)	**Dec 18** (79 days)
2028	**Nov 1** (154 days)	752,000	**Oct 15** (137 days)	**Dec 29** (120 days)	No Closure	668,000	**Sept 26** (118 days)	**Dec 20** (111 days)	**Dec 30** (91 days)
Action 2, Alternative 3: 35% commercial | 65% recreational									
			Jun 1 Open	Sep 1 Open	Oct 1 Open		Jun 1 Open	Sep 1 Open	Oct 1 Open
		Action 3.1, Alt 2: 10% ACT Buffer				**Action 3.1, Alt 3: 20% ACT Buffer**			
Alt 3a: TMin at F=0	0	0	**No Season**	**No Season**	**No Season**	0	**No Season**	**No Season**	**No Season**
Preferred Alternative 3b: 75% of F40% SPR									
2024	**Jun 28 Jun 26 – Jul 1** (28 days)	259,000	**Jun 25 Jun 23 – 28** (25 days)	**Nov 2 Oct 11 – None** (63 days)	**Nov 14 Oct 25 – None** (45 days)	230,000	**Jun 23 Jun 21 – Jun 25** (23 days)	**Oct 29 Oct 8 – Dec 22** (59 days)	**Nov 11 Oct 22 – None** (42 days)
2025	**Jul 16** (46 days)	359,000	**Jul 9** (39 days)	**Nov 15** (76 days)	**Nov 27** (58 days)	319,000	**Jul 2** (32 days)	**Nov 10** (71 days)	**Nov 22** (53 days)
2026	**Aug 3** (64 days)	449,000	**Jul 24** (54 days)	**Nov 26** (87 days)	**Dec 7** (68 days)	399,000	**Jul 16** (46 days)	**Nov 20** (81 days)	**Dec 1** (62 days)
2027	**Sep 8** (100 days)	551,000	**Aug 20** (81 days)	**Dec 8** (99 days)	**Dec 18** (79 days)	490,000	**Jul 31** (61 days)	**Dec 1** (92 days)	**Dec 11** (72 days)
2028	**Oct 15** (137 days)	676,000	**Sep 28** (120 days)	**Dec 21** (112 days)	No Closure	600,000	**Sep 4** (96 days)	**Dec 13** (104 days)	**Dec 23** (84 days)
Alt 3c: TMin * 2									
2024	**Jul 7 Jul 2 – Jul 16** (37 days)	314,000	**Jul 1 Jun 28 – Jul 7** (31 days)	**Nov 9 Oct 16 – None** (70 days)	**Nov 21 Oct 30 – None** (52 days)	279,000	**Jun 27 Jun 25 – Jun 30** (27 days)	**Nov 5 Oct 13 – None** (66 days)	**Nov 17 Oct 27 – None** (48 days)
2025	**Jul 29** (59 days)	430,000	**Jul 21** (51 days)	**Nov 24** (85 days)	**Dec 5** (66 days)	382,000	**Jul 13** (43 days)	**Nov 18** (79 days)	**Nov 29** (60 days)
2026	**Sep 2** (94 days)	533,000	**Aug 14** (75 days)	**Dec 6** (97 days)	**Dec 16** (77 days)	473,000	**Jul 28** (58 days)	**Nov 29** (90 days)	**Dec 9** (70 days)
2027	**Oct 8**	648,000	**Sep 20**	**Dec 18**	**Dec 28**	576,000	**Aug 28**	**Dec 10**	**Dec 21**

	(130 days)		(112 days)	(109 days)	(89 days)		(89 days)	(101 days)	(82 days)
2028	**Nov 6** (159 days)	789,000	**Oct 23** (145 days)	No Closure	No Closure	700,000	**Oct 4** (126 days)	**Dec 24** (125 days)	No Closure

The reliability of these results is dependent upon the accuracy of the underlying data and input assumptions. The analysis intends to create a realistic baseline as a foundation for comparisons, under the assumption that projected future landings will accurately reflect actual future landings. These closure dates are our best estimate, but uncertainty still exists 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 any assumption.

References:

SEDAR. 2021. SEDAR 72 Gulf of Mexico Gag Grouper Final Stock Assessment Report. SEDAR, North Charleston SC. 319 pp. available online at: http://sedarweb.org/sedar-72

APPENDIX C. CONSIDERED BUT REJECTED

January 2023 Council Meeting:

The Council chose to move Alternative 2, Option 2c and Alternative 3, Option 3c, to the Considered but Rejected Appendix. The Council determined that these options were not very different from Alternative 2, Option 2b and Alternative 3, Option 3b, and thus were not necessary for further consideration. The Council also recognized uncertainty in the estimation of generation time, especially given the concerns stated in Chapters 1 and 2 regarding the current reproductive capacity of the stock.

Alternative 2: Revise the catch limits for gag and establish a rebuilding time for the gag stock. The OFL, ABC, ACLs, and ACTs are based on an F_{MSY} proxy of the fishing mortality at a 40% spawning potential ratio ($F_{40\%SPR}$), and were derived, in part, using the State of Florida's State Reef Fish Survey (SRFS) data. The ABC equals the combined total ACLs from both sectors. Retain the current sector allocation percentages of 61% recreational, 39% commercial, which were derived in part using MRIP-CHTS recreational data. The catch limits in lb gw are rounded to the nearest thousand pounds, with the recreational ACL and ACT informed by SRFS for private recreational vessels, by MRIP's Fishing Effort Survey (FES) data for the for-hire and shore modes, and are as follows for each rebuilding timeline option:

Option 2c: T_{Min} plus one generation time (8 years for gag), which would rebuild the stock in 19 years.

F = $F_{40\%SPR}$	**OFL**	**ABC**	**Rec ACL**	**Rec ACT**	**Com ACL**	**Com ACT**
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.603	0.497	0.303	0.272	0.193	0.162
2025	0.821	0.685	0.417	0.376	0.267	0.224
2026	1.009	0.851	0.519	0.467	0.331	0.278
2027	1.222	1.04	0.634	0.571	0.405	0.340
2028	1.48	1.27	0.774	0.697	0.495	0.416

Alternative 3: Revise the catch limits for gag and establish a rebuilding time for the gag stock. The OFL, ABC, ACLs, and ACTs are based on the F_{MSY} proxy of $F_{40\%SPR}$, and were derived, in part, using the State of Florida's State Reef Fish Survey (SRFS) data. The combined ACLs from both sectors equal the ABC. Revise the sector allocation to 65% recreational, 35% commercial, using the SRFS recreational data in place of MRIP-FES for the private recreational vessel fleet only. The catch limits in lb gw are rounded to the nearest thousand pounds, with the recreational ACL and ACT in SRFS units for the private recreational vessel fleet, in MRIP-FES units for the recreational for-hire and shore modes, and are as follows for each rebuilding timeline option:

Option 3c: T_{Min} plus one generation time (8 years for gag), which would rebuild the stock in 19 years.

$F = F_{40\%SPR}$	OFL	ABC	Rec ACL	Rec ACT	Com ACL	Com ACT
Year	**mp gw**	**mp gw**	**mp gw**	**mp gw**	**mp gw**	**mp gw**
2024	0.591	0.489	0.317	0.285	0.171	0.143
2025	0.805	0.674	0.438	0.394	0.235	0.198
2026	0.991	0.838	0.544	0.490	0.293	0.246
2027	1.200	1.024	0.665	0.599	0.358	0.301
2028	1.454	1.251	0.812	0.731	0.437	0.367

After hearing public testimony, the Council chose to move Alternative 4 in Action 2 to the Considered but Rejected Appendix. The Council determined that there was little to no public support for a recreational fishing season opening on November 1 and, with sufficient scope in management alternatives in the remaining options in Action 2, decided to not consider the November 1 date further.

Alternative 4: The federal recreational fishing season for Gulf gag would open at 12:01 am local time on November 1. NMFS would close harvest when the recreational ACL is projected to be met.

APPENDIX D. ACL/ACT CONTROL RULE FOR THE RECREATIONAL SECTOR FOR GULF GAG

The Gulf of Mexico (Gulf) Fishery Management Council's Annual Catch Limit (ACL)/Annual Catch Target (ACT) Control Rule was applied for the recreational sector for Gulf gag, using recreational landings from the 2018 – 2021 fishing years:

As of 02/10/2023					**Gulf Gag**
ACL/ACT Buffer Spreadsheet			version 4.1 - April 2011		**Sector: Rec**
sum of points	2				**Years: 2018-2021**
max points	5.0		Buffer between ACL and ACT (or ABC and ACL)	Unweighted	8
Min. Buffer	**0**	**min. buffer**	User adjustable	Weighted	**10**
Max Unw.Buff	19	max unwt. Buff			
Max Wt Buff	**25**	**max wt. buffer**	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)		
	Precision of Landings Data Recreational		**Apply this component to recreational fisheries**		2
		0	Method of absolute counting		
		1	MRIP proportional standard error (PSE) <= 20		
		2	MRIP proportional standard error (PSE) > 20	x	
			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		
	Weighting factor				
		Element weight	**Element**	**Selection**	**Weighting**
	Overfished status	0	1. Stock biomass is at or above B_{OY} (or proxy).		0.3
		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 (MSST).		
		0.3	4. Stock is overfished, below MSST.	x	
		0.3	5. Status criterion is unknown.		

Fishing Year	Rec Landings	Rec ACL	% Landed
2018	1,008,468	1,903,000	53%
2019	859,828	1,903,000	45%
2020	909,703	1,903,000	48%
2021	1,280,823	1,903,000	67%

Source: SERO ACL Monitoring Database 2/10/2023

Note: Landings data are in MRIP-CHTS units to be comparable with the current recreational ACL.

APPENDIX E. OTHER APPLICABLE LAWS

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for management of stocks included in fishery management plans (FMP) in federal waters of the exclusive economic zone. However, management decision-making is also affected by a number of other federal statutes designed to protect the biological and human components of U.S. fisheries, as well as the ecosystems that support those fisheries. Major laws affecting federal fishery management decision-making include the Endangered Species Act (Section 3.3.3), E.O. 12866 (Regulatory Planning and Review, Chapter 5) and E.O. 12898 (Environmental Justice, Section 3.5). Other applicable laws are summarized below.

Administrative Procedure Act

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

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 generally required to provide a consistency determination to the relevant state agency at least 90 days before taking final action.

Regulations at 15 CFR 930.32(b) state: "A federal agency may deviate from full consistency with an approved management program when such deviation is justified because of an emergency or other similar unforeseen circumstance ("exigent circumstance"), which presents the federal agency with a substantial obstacle that prevents complete adherence to the approved program." The dynamic circumstances supporting the request for the emergency rule, and the associated need to implement this emergency rule qualify as exigent circumstances.

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 FMPs, amendments, and regulations, consistent with National Standard 2 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which requires the use of best scientific information available. They should also properly reference all supporting materials and data, and be reviewed by technically competent individuals. With respect to original data generated for FMPs and amendments, it is important to ensure that the data are collected according to documented procedures or in a manner that reflects standard practices accepted by the relevant scientific and technical communities. Data will also undergo quality control prior to being used by the agency and a pre-dissemination review.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, (Public Law 89-665; 16 U.S.C. 470 *et seq.*) is intended to preserve historical and archaeological sites in the United States of America. Section 106 of the NHPA requires federal agencies to evaluate the impact of all federally funded or permitted projects for sites listed on, or eligible for listing on, the National Register of Historic Places and aims to minimize damage to such places.
Historical research indicates that over 2,000 ships have sunk on the Federal Outer Continental Shelf between 1625 and 1951; thousands more have sunk closer to shore in state waters during the same period. Only a handful of these have been scientifically excavated by archaeologists for the benefit of generations to come. Further information can be found at:
http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx
The proposed action does not adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places nor is it expected to cause loss or destruction of significant scientific, cultural, or historical resources. In the Gulf of Mexico (Gulf), the *U.S.S. Hatteras*, located in federal waters off Texas, is listed in the National Register of Historic Places. Fishing activity already occurs in the vicinity of this site, but the proposed action would have no additional adverse impacts on listed historic resources, nor would

they alter any regulations intended to protect them.

Executive Orders (E.O.)

E.O. 12630: Takings

The E.O. on Government Actions and Interference with Constitutionally Protected Property Rights that became effective March 18, 1988, requires each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of 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 United States Fish and Wildlife Service 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) and Coral Amendment 9 (GMFMC 2018), which established additional habitat areas of particular concern (HAPCs) and gear restrictions to protect corals throughout the Gulf. There are no implications to coral reefs by the actions proposed in this amendment.

E.O. 13132: Federalism

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

No Federalism issues were identified relative to the action to modify the management of the Gulf 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. The existing areas are entirely within federal waters of the Gulf. They do not affect any areas reserved by federal, state, territorial, tribal or local jurisdictions.

APPENDIX F. SECTOR ALLOCATION LANDINGS TABLE

The data in Table F1 below show landings by sector corresponding to the inputs to the SEDAR 72 SRFS Run (2022), which uses the State of Florida's State Reef Fish Survey in place of the Marine Recreational Information Program's Fishing Effort Survey (MRIP-FES) recreational landings and discards for Florida private vessels. MRIP-FES was still used to inform for-hire and shore mode landings and discards, and the Southeast Region Headboat Survey to inform the same for headboats in the Gulf of Mexico. These data were reviewed with the Gulf of Mexico Fishery Management Council (Council) and its Scientific and Statistical Committee, at multiple points during 2022 to evaluate potential sector allocation scenarios. The years 1986 – 2005 were used in Amendment 30B to the Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP), and these years were deemed appropriate for consideration in Amendment 56 at the Council's August 2022 meeting in Corpus Christi, Texas. Note that landings data retrieved from the Southeast Regional Office Annual Catch Limit Monitoring Database may differ from the data generated by the SEDAR 72 sock assessment model due to differences in mean weight estimation. Also note that while the native unit of the recreational landings inputs to the assessment model were in numbers of fish, corresponding values in weight (pounds gutted weight) are show here. In order to calculate total recreational landings in weight, headboat landings in weight were provided directly by the SRHS, and the remainder of recreational landings were converted to weight using the SEFSC weight estimation procedure – with the time series of FL private landings converted to SRFS units using the calibration ratio of SRFS to MRIP-FES estimates in weight (0.41; Cross et al. 2020).

Table F1. Recreational and commercial landings in pounds gutted weight (lb gw) corresponding to* the data inputs of the SEDAR 72 (2022) stock assessment. Percentages are rounded to the nearest whole number. *Actual recreational landings input to the assessment model are in numbers of fish.

Year	Commercial (lb gw)	Recreational (lb gw)	% Com	% Rec
1986	1,665,863	4,545,368	27%	73%
1987	1,498,267	3,418,959	30%	70%
1988	1,178,831	3,397,752	26%	74%
1989	1,642,663	3,472,327	32%	68%
1990	1,787,066	2,268,605	44%	56%
1991	1,539,371	2,259,021	41%	59%
1992	1,626,801	2,876,140	36%	64%
1993	1,820,109	3,419,689	35%	65%
1994	1,596,385	2,003,725	44%	56%
1995	1,628,067	3,469,619	32%	68%
1996	1,540,549	2,337,219	40%	60%
1997	1,566,947	3,447,141	31%	69%
1998	2,459,114	5,578,974	31%	69%
1999	2,038,104	4,895,366	29%	71%
2000	2,225,974	5,257,804	30%	70%
2001	3,071,894	4,510,767	41%	59%
2002	2,922,366	4,984,944	37%	63%
2003	2,563,064	3,421,965	43%	57%
2004	2,851,369	5,398,809	35%	65%
2005	2,427,889	4,709,230	34%	66%
		Mean:	**35%**	**65%**

APPENDIX G. CATCH LIMIT TABLES WITHOUT ROUNDING

The data in the tables below represent the overfishing limit (OFL) and acceptable biological catch (ABC) recommendations from the Gulf of Mexico (Gulf) Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) from its July 2022 meeting. The SSC recommended these OFL and ABC recommendations for Gulf gag based on the results of the SEDAR 72 SRFS Run (2022) using the State of Florida's State Reef Fish Survey in place of the Marine Recreational Information Program's Fishing Effort Survey (MRIP-FES) recreational landings and discards for FL private vessels. MRIP-FES was still used to inform for-hire and shore mode landings and discards, and the Southeast Region Headboat Survey to inform the same for headboats in the Gulf. These tables represent the catch limit recommendations to the nearest whole pound, and are included for clarity and to aid in the analysis of the alternatives considered in Amendment 56 to the Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP). These values have been rounded down elsewhere in Amendment 56 for ease of presentation and interpretation (e.g., in Chapter 2 of this document). These catch limit values are shown below for the alternatives in Action 2 of Amendment 56. Further reduction to the sector-specific annual catch targets, and the commercial quota, can be determined from the alternatives in Action 3 (not presented in this Appendix).

Action 2 Alternatives:

Alternative 1: No Action. Retain the current catch limits and sector allocation of 61% recreational, 39% commercial for gag. The current OFL, ABC, and ACLs are based on a proxy for F_{MSY} of F_{MAX} and were derived, in part, using the MRIP Coastal Household Telephone Survey (CHTS) data. These catch limits in pounds (lb) gutted weight (gw) are as follows, with the recreational ACL in MRIP-CHTS units:

OFL	4,180,000
ABC	3,120,000
Stock ACL	3,120,000
Commercial ACL (39% of Stock ACL)	1,217,000
Recreational ACL (61% of Stock ACL)	1,903,000

The Council requested interim measures to reduce overfishing for the 2023 fishing year. NMFS implemented these measures on May 3, 2023, which will be effective for up to 366 days. Catch limits are in MRIP-FES units and in lb gw as follows:

OFL	4,180,000
ABC	3,120,000
Stock ACL	661,901
Commercial ACL (39% of Stock ACL)	258,142
Recreational ACL (61% of Stock ACL)	403,759

Alternative 2: Revise the catch limits for gag and establish a rebuilding time for the gag stock. The OFL, ABC, and ACLs are based on an F_{MSY} proxy of the yield when fishing at $F_{40\%SPR}$. The ABC is equal to the stock ACL, which equals the combined total ACLs from both sectors. Retain the current sector allocation percentages of 61% recreational, 39% commercial, which were based on the percentages of recreational to commercial landings from a 1986-2005 reference period using MRIP-CHTS recreational data. The catch limits in lb gw are rounded down to the nearest thousand pounds to ensure the sum of the sector ACLs does not exceed the ABC; the recreational ACL is informed by SRFS for private recreational vessels, by MRIP-FES data for the for-hire and shore modes, and by the Southeast Region Headboat Survey for headboats, and are as follows for each rebuilding timeline option:

Option 2a: The minimum time to rebuild (T_{Min}) in the absence of direct fishing pressure (F = 0), equal to 11 years. This option does not include dead discards.

F = $F_{40\%SPR}$	OFL	ABC/ Stock ACL	Rec ACL	Com ACL
Year	**lb gw**	**lb gw**	**lb gw**	**lb gw**
2024	603,001	0	0	0
2025	821,001	0	0	0
2026	1,009,001	0	0	0
2027	1,222,002	0	0	0
2028	1,480,002	0	0	0

Option 2b: 75% of $F_{40\%SPR}$, which would rebuild the stock in 18 years.

F = $F_{40\%SPR}$	OFL	ABC	Rec ACL	Com ACL
Year	**lb gw**	**lb gw**	**lb gw**	**lb gw**
2024	603,001	453,001	276,330	176,670
2025	821,001	627,001	382,471	244,530
2026	1,009,001	783,001	477,631	305,370
2027	1,222,002	961,001	586,211	374,791
2028	1,480,002	1,177,002	717,971	459,031

Option 2c: T_{Min} * 2, which would rebuild the stock in 22 years.

F = $F_{40\%SPR}$	OFL	ABC	Rec ACL	Com ACL
Year	**lb gw**	**lb gw**	**lb gw**	**lb gw**
2024	603,001	547,001	333,670	213,330
2025	821,001	749,001	456,891	292,110
2026	1,009,001	926,001	564,861	361,140
2027	1,222,002	1,127,002	687,471	439,531
2028	1,480,002	1,371,002	836,311	534,691

Preferred Alternative 3: Revise the catch limits for gag and establish a rebuilding time for the gag stock. The OFL, ABC, and ACLs are based on the F_{MSY} proxy of the yield when fishing at $F_{40\%SPR}$. The ABC is equal to the stock ACL, which equals the combined total ACLs from both sectors. Revise the sector allocation to 65% recreational, 35% commercial, using average landings from 1986 – 2005, but using SRFS recreational landings data for the private recreational vessel fleet and MRIP-FES for all other recreational landings data. The catch limits in lb gw are rounded down to the nearest thousand pounds to ensure the sum of the sector ACLs does not exceed the ABC; the recreational ACL is informed by SRFS for private recreational vessels, by MRIP-FES data for the for-hire and shore modes, and by the Southeast Region Headboat Survey for headboats, and are as follows for each rebuilding timeline option:

Option 3a: The minimum time to rebuild (T_{Min}) in the absence of direct fishing pressure (F = 0) is equal to 11 years. This option does not include dead discards.

F = $F_{40\%SPR}$	**OFL**	**ABC/ Stock ACL**	**Rec ACL**	**Com ACL**
Year	**lb gw**	**lb gw**	**lb gw**	**lb gw**
2024	591,176	0	0	0
2025	805,452	0	0	0
2026	991,029	0	0	0
2027	1,200,433	0	0	0
2028	1,454,052	0	0	0

Preferred Option 3b: 75% of $F_{40\%SPR}$, which would rebuild the stock in 18 years.

F = $F_{40\%SPR}$	**OFL**	**ABC**	**Rec ACL**	**Com ACL**
Year	**lb gw**	**lb gw**	**lb gw**	**lb gw**
2024	591,176	443,784	288,460	155,324
2025	805,452	615,299	399,945	215,355
2026	991,029	768,944	499,813	269,130
2027	1,200,433	943,281	613,133	330,148
2028	1,454,052	1,155,771	751,251	404,520

Option 3c: T_{Min} * 2, which would rebuild the stock in 22 years.

F = $F_{40\%SPR}$	**OFL**	**ABC**	**Rec ACL**	**Com ACL**
Year	**lb gw**	**lb gw**	**lb gw**	**lb gw**
2024	591,176	537,035	349,073	187,962
2025	805,452	736,430	478,680	257,751
2026	991,029	911,312	592,353	318,959
2027	1,200,433	1,109,000	720,850	388,150
2028	1,454,052	1,348,956	876,821	472,135

APPENDIX H. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

National Standard 9 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires that conservation and management measures, to the extent practicable: 1) Minimize bycatch, and 2) To the extent bycatch cannot be avoided, minimize the mortality of such bycatch. 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.

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 Fishery Management 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 harvest of Gulf of Mexico (Gulf) gag is currently regulated with size limits, bag limits, quotas, area closures, and seasonal closures. These measures are generally effective in limiting fishing mortality, the size of fish landed, the number of targeted fishing trips, and the time fishermen spend pursuing a species. However, these management tools may have the unavoidable effect of creating regulatory discards, which reduce yield from the directed fishery. This amendment would modify the status determination criteria for gag, implement a rebuilding plan and associated catch levels necessary to end overfishing and rebuild the gag stock, consider modification of gag allocation between commercial and recreational sectors using data based on the 2022 Florida State Reef Fish Survey (SRFS) run update to Southeast Data, Assessment, and

Review (SEDAR) 72, modify the commercial and recreational annual catch target (ACTs) and recreational accountability measures, and modify the recreational season opening date for gag.

Gulf Gag Bycatch

Commercial Discards

Gag discard rates were calculated for the Gulf of Mexico (Gulf) vertical line fishery and bottom longline fishery (reef fish and shark longline gear) using both self-reported data (discard coastal logbook) and observer data for the Southeast Data, Assessment and Review (SEDAR) 72 (2021). Calculation of discards followed the methods used in the previous SEDAR 33 Update (2016) and SEDAR 33 (2013) assessment and are presented below. Figure H1 provides the commercial discards used in SEDAR 72 by year and gear type in numbers of fish. The commercial discard mortality rate used in SEDAR 72 is 25% (cumulative for all commercial gear types).

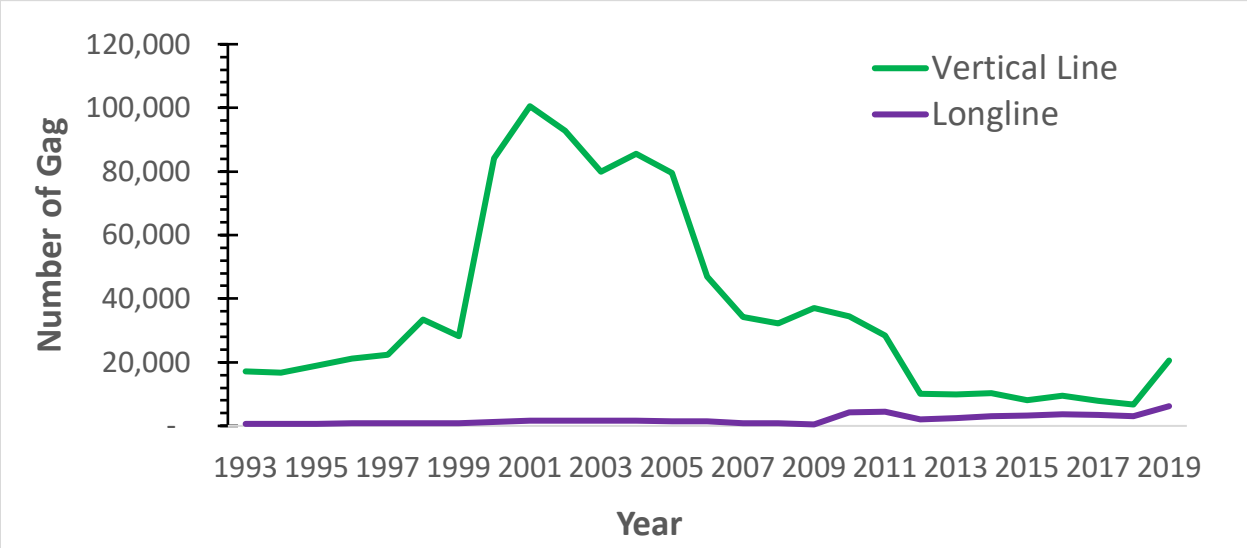


Figure H1. Gulf of Mexico Gag commercial discards in numbers.

Discard estimation was conducted separately for two gear types, vertical line and bottom longline. A verification step compared annual total landed catch from logbook data with the estimated observer annual total landed catch. Gag annual total discards in weight and number were estimated for the observer data period 2007-2019, and then hindcasted for the period 1993-2006. This estimation model utilized revised correction factors for gag/black grouper misreporting in the commercial fishery prior to implementation of individual fishing quotas (IFQs) in 2010 (Smith et al. 2021). The correction factors showed that misreporting corrections were necessary for the pre-IFQ time period (1993-2009), but were not needed after implementation of IFQ in 2010.

Vertical Line

Estimates of commercial discards were based on observer data between 2007 and 2019. The observer database included 1,317 vertical line trips with corresponding trip and set information. Observer sampling effort is summarized in Table H1, distinguishing all trips from the subset of

trips that captured gag or black grouper during the pre-IFQ period and the subset of trips that captured gag during the IFQ time period (Smith et al., 2021).

Table H1. (A) Number of GOM total and gag/black grouper combined observer vertical line trips by year for the pre-IFQ period (2007-2009). **(B)** Number of GOM total and gag observer vertical line trips by year for the IFQ period (2010-2019).

A. Pre-IFQ		Gag/Black Grouper
Year	Total Trips	Combined Trips
2007	97	59
2008	53	32
2009	45	27
B. Under IFQ		Gag Trips
2010	54	29
2011	103	66
2012	253	162
2013	125	63
2014	108	48
2015	201	92
2016	142	70
2017	67	22
2018	39	20
2019	30	10

For the pre-IFQ period 2007-2009, the disposition (kept or discarded) of Gulf gag corresponded with the minimum size limit of 24 inches total length (TL). Lengths of discards were mostly equal to or less than the minimum size limit, and lengths of retained fish were mostly greater than the minimum size limit. For the IFQ period, 2010-2019, discards included fish less than and greater than the minimum size limit. In addition, legal-sized fish were discarded on some of the same trips that retained legal-sized fish. Data for observer and logbook frequency distributions of trip-level catch, effort, and catch per unit effort (CPUE) suggest that observer sampling of gag trips was representative of the commercial fleet. Ratios of observer catch for a historical management regime to the current regime were used to adjust logbook catches and CPUE estimates for hindcasting for historical management regimes. CPUE expansion estimates of annual total landed catch of Gulf gag compared favorably with reported logbook landings for 1993-2019. CPUE expansion estimates for annual discards in numbers and weight of Gulf gag are provided in Table H2.

Table H2. Time-series of CPUE expansion estimates for gag vertical line discards in weight (lb) and number (with associated standard errors).

Year	Estimated Discards in Weight	Estimated Discards in Number
1993	48,329.2	17,084.7
1994	47,592.1	16,824.1
1995	53,723.1	18,991.5
1996	60,078.0	21,238.0
1997	63,207.2	22,344.2
1998	94,755.7	33,496.8
1999	79,604.3	28,140.7
2000	336,879.8	84,100.5
2001	402,610.5	100,509.9
2002	371,423.9	92,724.3
2003	319,866.3	79,853.2
2004	342,821.2	85,583.7
2005	318,613.8	79,540.5
2006	187,795.9	46,882.4
2007	136,964.2	34,192.5
2008	128,995.0	32,203.0
2009	148,250.0	37,009.9
2010	137,038.1	34,423.4
2011	113,020.1	28,390.2
2012	50,086.9	10,015.7
2013	49,796.9	9,957.7
2014	51,713.1	10,340.9
2015	40,054.2	8,009.5
2016	47,522.0	9,502.8
2017	39,443.2	7,887.3
2018	33,586.2	6,716.1
2019	82,091.5	20,621.0

Changes in the estimated number of discards mostly corresponded with changes in minimum size limit regulations, with peak levels of 80,000 to 100,000 fish during 2000-2005 (pre-IFQ 24 inches TL) and lowest levels of 7,000 to 10,000 fish during 2012-2018 (IFQ 22 inches TL). Discards in weight also changed according to management regime, accounting for about 6% of the total catch (retained + discards) during 1993-1999 (pre-IFQ 20 inches TL), an average of 20% during 2000-2009 (pre-IFQ 24 inches TL), an average of 30% during the IFQ 24 inches TL regime (2010-11, 2019), and an average of 15% during the IFQ 22 inches TL regime (2012-2018).

Bottom Longline

The observer database included 415 bottom longline line trips with corresponding trip and set information. Observer sampling effort is summarized in Table H3, distinguishing all trips from the subset of trips that captured gag or black grouper during the pre-IFQ period and the subset of trips that captured gag during the IFQ period (Smith et al., 2021).

Table H3. (A) Number of Gulf total and gag/black grouper combined observer bottom longline trips by year for the pre-IFQ period (2007-2009). **(B)** Number of Gulf total and gag observer bottom longline trips by year for the IFQ period (2010-2019).

Pre-IFQ		Gag/Black Grouper
Year	Total Trips	Combined Trips
2007	11	9
2008	5	1
2009	33	24
Under IFQ		Gag Trips
2010	53	40
2011	81	71
2012	19	16
2013	82	68
2014	27	22
2015	26	22
2016	55	45
2017	14	11
2018	4	3
2019	5	5

For the pre-IFQ period 2007-2009, the disposition of Gulf gag corresponded with the minimum size limit of 24" TL. Discards were mostly fish near or below the minimum size limit, and kept fish were mostly above the minimum size limit. For the IFQ period, 2010-2019, discards included fish below and above the minimum size limit. In addition, legal-sized fish were discarded on some of the same trips that kept legal-sized fish. Data for observer and logbook frequency distributions of trip-level catch, effort, and CPUE suggest that observer sampling for the IFQ 24" TL management regime (2010-2011, 2019) for gag trips was representative of the commercial fleet. This was not the case for gag and black grouper combined trips during the pre-IFQ 24" TL (2007-2009) management regime or for gag trips during the IFQ 22" TL (2012-2018) regime. Mean CPUE on observed trips by management regime are the basis for expansion estimates of gag catch and discards. CPUE expansion estimates for annual discards in numbers and weight of Gulf gag are provided in Table H4.

Table H4. Time-series of CPUE expansion estimates for Gulf gag bottom longline discards in weight (lbs.) and number (with associated standard errors).

Year	Estimated Discards in Weight	Estimated Discards in Number
1993	2,115.5	588.0
1994	2,402.9	673.4
1995	2,363.1	660.0
1996	2,890.8	808.6
1997	2,798.5	778.8
1998	2,937.7	806.7
1999	2,970.0	819.1
2000	6,068.3	1,303.5
2001	7,393.6	1,586.2
2002	7,583.8	1,626.7
2003	8,049.5	1,726.9
2004	7,894.7	1,693.1
2005	6,790.9	1,456.5
2006	6,284.3	1,350.5
2007	3,553.6	763.8
2008	4,082.6	878.4
2009	2,122.7	456.7
2010	48,332.2	4,252.4
2011	51,177.8	4,502.7
2012	30,569.4	2,017.1
2013	36,959.6	2,472.5
2014	45,917.7	3,012.2
2015	49,106.8	3,241.8
2016	54,680.7	3,642.3
2017	54,153.2	3,504.8
2018	47,981.3	3,085.9
2019	70,385.7	6,192.7

Increases in the estimated number of discards corresponded with implementation of IFQ, averaging about 5,000 fish during the IFQ 24" TL management regime and 3,000 fish during the IFQ 22" TL regime, compared to annual discards below 1,500 fish for the pre-IFQ period. Similarly, discards in weight also changed with implementation of IFQ accounting for about 1% of the total catch before IFQ implementation (1993-2009) compared to an average of 35% during the IFQ 24" TL regime (2010-11, 2019) and an average of 20-25% during the IFQ 22" TL regime (2012-2018).

Annually, the commercial sector dead discards averaged just under 50,000 lb of gag prior to IFQ implementation in 2009, and have been considerably lower since. Estimated red grouper

discards for both commercial gear types for the most recent years available (2012 through 2019) were some of the lowest of the time series. The number of discards dropped substantially beginning in 2012 with total discards estimated at around 10,400 per year from 2012-2019. The lowest total number of discards in the entire time series was recorded in 2018. As outlined above, some of the reduction in estimated discards from 2012 through 2018 is likely due to the reduction in the commercial minimum size limit from 24 to 22" TL. When the size limit was again increased to 24" TL in 2019, discards increased to the highest level since 2011. The RFOP listed gag as a commonly captured IFQ species observed with a higher percentage (20.2%) of discards occurring compared to any species except red grouper (Table H5).

Table H5. The number of captures and percentage for each disposition observed by the Reef Fish Observer Program (RFOP) from 2012-2018 for IFQ species.

	Number Observed	Kept	Discarded
Gag Grouper	14,570	79.8%	20.2%
Red Grouper	283,879	64.9%	35.1%
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: Southeast Fisheries Science Center (SEFSC) RFOP (2019).

Recreational Discards

Recreational discards from the recreational headboat, charter, and combined recreational private and shore fleets (1981-2019) are presented in Table H6. Recreational discards were computed using fully calibrated estimates from MRIP- FES for recreational charter (1981-2019), recreational private + shore (1981-2019) and recreational headboat (1981-1985). SRHS discard estimates were provided for 2008-2019. Recreational discards were reported as numbers of fish, and a discard mortality rate of 12%, as recommended in SEDAR33, was applied to all recreational fleets.

Table H6. Gulf of Mexico gag recreational discards in numbers. Discards refer to the total number of fish discarded before applying the discard mortality rate.

Year	Charter	Headboat	Private + Shore
1981	89,783	56,153	615,085
1982	14,601	9,132	449,415
1983	15,011	9,388	823,774
1984	6,215	3,887	176,365
1985	22,980	14,373	256,737
1986	91,324	7,385	796,323
1987	17,620	4,304	648,759
1988	20,296	5,814	453,159
1989	46,217	21,810	1,075,491
1990	71,078	51,036	845,307
1991	3,502	1,187	2,284,401
1992	86,121	7,347	1,619,457
1993	97,098	12,369	3,530,464
1994	113,478	35,261	3,345,565
1995	308,655	43,452	4,335,845
1996	240,693	13,292	2,133,037
1997	168,734	12,984	3,597,320
1998	351,124	54,357	4,956,251
1999	233,276	48,522	4,342,616
2000	134,811	30,277	2,828,745
2001	201,966	30,345	5,096,702
2002	246,969	24,157	5,799,453
2003	296,289	43,680	6,765,832
2004	337,988	52,364	8,915,107
2005	339,608	36,512	5,606,645
2006	140,619	9,848	3,679,859
2007	113,324	35,003	5,067,763
2008	313,363	53,173	9,134,811
2009	267,022	52,392	5,976,209
2010	325,174	46,592	4,758,116
2011	190,736	45,679	3,436,386
2012	170,375	37,878	2,388,552
2013	234,277	34,756	2,403,121
2014	67,971	20,162	1,945,896
2015	72,623	15,967	1,211,294

2016	104,765	20,739	2,037,197
2017	145,159	16,555	3,215,085
2018	126,194	21,040	2,141,792
2019	99,177	18,297	2,333,626
2020			
2021			

The recreational sector discards substantially more fish than the commercial sector, averaging 4.344 million fish per year, versus approximately 38,000 fish/year in the commercial fishery from 1993-2019.

Other Bycatch

The directed gag fishery in the Gulf of Mexico has had documented interactions with marine mammals. U.S. fisheries are classified under the Marine Mammal Protection Act (MMPA) according to the level of interactions that result in incidental mortality or serious injury of marine mammals. In the most recent List of Fisheries (88 FR 16899; March 1, 2023), the Gulf commercial reef fish fishery is listed as a Category III fishery under the MMPA. 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 percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. 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 and sea turtles are known to occur.

The National Marine Fishery Service (NMFS) has conducted specific analyses (Section 7 consultations) to evaluate potential effects from the Gulf reef fish fishery on species protected under the Endangered Species Act (ESA). On September 30, 2011, the Protected Resources Division released a biological opinion (Opinion), which concluded that the continued operation of the Gulf reef fish fishery managed under the Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP) is likely to adversely affect but not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish. An incidental take statement was 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.

After the completion and release of the biological opinion, NMFS published final rules listing several additional species that are found in the Gulf of Mexico, including corals, (lobed star, mountainous star, boulder star, and rough cactus), two green sea turtle distinct populations segments (DPSs) (Gulf and South Atlantic), Nassau grouper, giant manta ray, oceanic whitetip shark, and Rice's whale. NMFS has reinitiated consultation and determined that the operation of the Gulf reef fish fishery in federal waters during the re-initiation period will not violate Section 7(a)(2) or 7(d) of the ESA.

The Council originally addressed protected species bycatch in Amendment 18A (GMFMC 2005), 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 sea 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.

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

Other species of reef fish are also incidentally caught and often intentionally targeted when targeting gag. Most gag trips also target 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 gag. Black grouper, red grouper, scamp, and yellowmouth grouper are all estimated as not overfished and not undergoing overfishing (SEDAR 19, 2010; SEDAR 61, 2019; and, SEDAR 68, 2021, respectively). Vermilion snapper is not overfished or undergoing overfishing (SEDAR 67, 2020) and bycatch is not expected to jeopardize the status of this stock. Greater amberjack (SEDAR 70, 2021) is overfished and undergoing overfishing. Greater amberjack release mortality is estimated to be fairly low, ranging from 10 to 20 percent. 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 versus 34 inches FL recreational). Because greater amberjack is pelagic and grouper are bottom fish, bycatch of greater amberjack is relatively low when fishing for gag and likely not greatly affected by changes in grouper management measures. Red snapper is not overfished or undergoing overfishing, but is under a rebuilding plan because the spawning stock biomass is below targeted population levels (SEDAR 52, 2018). Red snapper has 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. 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. Scamp and yellowmouth grouper are not overfished and overfishing is not occurring, and bycatch of these species is not expected to jeopardize the stocks. The statuses of other shallow-water grouper species are unknown. Bycatch is not known to be significant for other SWG.

Practicability of current management measures in the directed gag 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, including optimizing 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 gag fishery. The commercial gag 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, and minimum size limits. The recreational gag fishery is managed with size limits, bag limits (4 total SWG, maximum of 2 gag), gear restrictions, and a closed season from January 1 through May 31. 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 gag fishery (Pulver & Stephen, 2019). Currently, there is a 24-inch total length (TL) minimum size limit for both the commercial and recreational sectors. There are also minimum size limits for red grouper (20-inch TL minimum size limit for recreational, 18-inch TL for commercial), black grouper (24- inch TL for both sectors), yellowfin grouper (20-inch TL), and scamp (16-inch TL). Recent analysis of observer data from 2012-2018 indicates that over 99% of all commercially discarded gag and red grouper are discarded due to minimum size limit regulations. The minimum size limit is the primary regulatory reason cited for discarding gag (54.3%), red grouper (97.0% of discards), and other SWG (46.4%-89.2%) in the commercial sector. Size limits are also the primary reason for gag discards in the recreational sector. Size limits are intended to protect immature fish and reduce fishing mortality. Gag minimum size limits are slightly above the length at which 50 percent of females reach sexual maturity (L50; ~21 inches; SEDAR 33 Update 2016). The red grouper minimum size limit in the commercial sector is similar to the L50 (~16-20 inches; Moe 1969; Collins et al. 2002). The L50 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 L50, while the size limit for black grouper is below the L50.

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. Some 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. This is evidenced for gag in the IFQ era of the commercial fishery by the higher discards that have occurred under the 24-inch TL minimum size-limit management regime (2010-2011; 2019) when compared to the 22-inch TL management regime (2012-2018). The reduced minimum size is believed to be the primary reason behind this the lower discards from 2012-2018.

Closed Seasons

The commercial sector of the Gulf reef fish fishery for groupers (including DWG and SWG) is managed under an IFQ program. DWG includes yellowedge grouper, warsaw grouper, snowy grouper, speckled hind, and scamp. SWG includes red grouper, gag, and Other SWG. IFQ shares are assigned to permitted vessels 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 Southeast Regional Office Catch Shares webpage at http://portal.southeast.fisheries.noaa.gov/cs/main.html.

Discards by individual fishers who have exhausted their yearly gag or red grouper catch shares are not thought to be significant in the commercial sector, as several measures are available that may allow catch after an IFQ catch share has been harvested (Pulver & Stephen, 2019). Both gag and red grouper 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 gag and red grouper by allowing fishers 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 quota from other shareholders with available quota. This provision allows fishers to retain catch that would otherwise be required to be released as bycatch.

The recreational gag fishery is closed in Gulf waters from January through May (although several Florida counties have allowed an early gag season beginning in April).[48] The closure is

[48] Four Florida counties (Franklin, Wakulla, Jefferson, and Taylor) have different season dates and are open April 1-June 30 and September 1-December 31. The Florida Fish and Wildlife Commission eliminated these special early seasons beginning in 2023.

intended to protect gag during spawning and reduce bycatch. Closed season discards may be prominent in the gag recreational sector, as closures for other species that often occupy similar habitats (e.g., other SWG, red grouper) are much shorter in duration. Thus, recreational anglers that are targeting red grouper and other SWG when the gag season is closed would be obligated to discard any captured gag.

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 gag discards are primarily the result of the capture of undersized fish prior to reaching the bag limit, the targeting of other reef fish in areas where gag is present after the gag bag limit has been reached, and discarding of gag when captured while fishing for other species when the gag fishery is closed. 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., 2015), and its prominence in the Gulf gag fishery in 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 gear 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. It is unknown how extensively venting tools and dehooking devices were used prior to these gear requirements.

The vertical-line component account for a majority of the gag commercial discards. From 2012 through 2019, approximately 75 percent of gag commercial discards were from the vertical line component of the fishery (see Tables 2 and 4 above). However, the bottom longline has a higher estimated discard mortality rate for most species, although SEDAR 72 did not differentiate between gear types when setting the commercial discard mortality rate at 25% in the model.

Recreational discards are primarily due to the recreational minimum size limit, but allowable gear 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. NMFS doesn't currently have adequate information on the size of circle hooks used by anglers in the Gulf or on the effect 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. Since January

2022, all recreational fishermen have been required to have a descending device or venting tool onboard the vessel when fishing for Gulf reef fish species. It is unknown what effect this has had on discard mortality of gag to date. SEDAR 72 assumed a recreational discard mortality rate of 12% for gag.

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

Time/Area Closures

The Edges marine protected area is currently closed to all fishing from January through April of each year. In addition, 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 that is shoreward of rhumb lines connecting, in order, the following points:

Point	North lat.	West long.
A	28°58.70′	85°30.00′
B	28°59.25′	85°26.70′
C	28°57.00′	85°13.80′
D	28°47.40′	85°3.90′
E	28°19.50′	84°43.00′
F	28°0.80′	84°20.00′
G	26°48.80′	83°40.00′
H	25°17.00′	83°19.00′
I	24°54.00′	83°21.00′
J	24°29.50′	83°12.30′
K	24°26.50′	83°00.00′

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 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). NMFS recently implemented (86 FR 38418, July 21, 2021) more stringent regulations in these areas that 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.

Recreational harvest of gag is currently prohibited in Federal waters of the Gulf from January through May of each year.

Alternatives being considered to minimize bycatch

No measures are proposed in this amendment to directly reduce the bycatch of gag and other species. However, the choice of alternatives in Action 2, Action 3.1, and Action 4 are likely to impact the amount of bycatch. Action 2 sets the recreation and commercial catch limits, and designate allocation percentages to the commercial and recreational sector. **Option a** of **Alternative 2** and **Preferred Alternative 3** would result in the highest gag discards, because it would set the gag bag and possession limit at zero for both sectors. Thus, all captured gag would have to be discarded, no matter the size or season. The other options (**b** and **c**) under both **Alternative 2** and **Preferred Alternative 3** also involve drastic cuts to the current catch limits, but would allow some harvest of gag. Because the differences in the ACL resulting from selection of **Alternative 2** versus **Preferred Alternative 3** are minimal when compared to the status quo, the effect on bycatch based on selection of either **Option b** or **c** of **Alternative 2** or **Preferred Alternative 3** is expected to be negligible when compared to each other.

Action 3.1 modifies the recreational ACT, and preferred **Alternative 3** increases the buffer between the recreational ACL and ACT from approximately 10.25% to 20%. This is expected to decrease directed fishing mortality and the bycatch associated with that directed fishing.

Action 4 modifies the recreational fishing season for Gulf gag. Alternatives in this action would set the opening date for the recreational season. It is unclear what effect the choice of season opening date would have on gag bycatch, but {for a full discussion, please see Criteria 1 below.

Practicability Analysis

Criterion 1: Population effects for the bycatch species (gag)

Measures considered in this Amendment would: 1) Revise the Gulf gag status determination criteria; 2) Set a rebuilding timeline, revise sector allocations, and set catch limits; 3) modify the commercial and recreational ACTs (based on selections in Action 2); and 4) modify the recreational gag fishing season and accountability measures.

Bycatch of gag due to management measures including reduced catch limits are expected to result in loss of yield. In addition, reducing the catch limits for gag is expected to result in an increase in regulatory discards. However, fishermen have stated in public testimony that gag may be targeted and avoided while fishing. To the extent this is true for both commercial and recreational fishermen, the scope of the decreased ACL and associated effort is expected to result in a decrease in overall gag mortality and may reduce gag bycatch.

Action 1
Action 1 would revise the status determination criteria (SDC) for gag based on the best scientific information available and the recommendations of the Council's Scientific and Statistical

Committee (SSC). This action would have no direct impact on bycatch but does influence the catch limits in Action 2.

Action 2

Action 2 would modify Gulf gag catch limits to end overfishing of gag and rebuild the stock. The alternatives in this action include rebuilding timelines based on the time estimated to be required to rebuild the gag stock from its current overfished condition to a condition at which the spawning stock biomass (SSB) is equal to the SSB at MSY. The need to rebuild the stock requires a significant reduction in the total allowable harvest. Thus, all of the alternative rebuilding time periods would be expected to increase regulatory discards that result when directed harvest is prohibited (either because commercial allocation is unavailable or recreational harvest is prohibited). The minimum time to rebuild the stock, or T_{Min}, is estimated to be 11 years assuming no fishing mortality (F = 0). In practice, closing all directed harvest of gag would not be expected to eliminate all fishing mortality, as some gag would still be expected to be discarded and die as fishermen continue fishing for other species that co-occur with gag. Thus, the estimation of 11 years to rebuild the stock under T_{Min}, does not account for dead discards related to fishing activity targeting other species. This action considers two additional rebuilding time periods: (1) 18 years, which is based on fishing at 75% of the yield at the MSY proxy ($F_{40\%SPR}$); and (2) 22 years, which is based on twice the minimum time to rebuild or T_{Min} * 2. The longer the rebuilding time, the higher the allowable harvest during rebuilding, which would be expected to reduce regulatory discards. However, because the total allowable harvest must be significantly reduced under either the 18 year (**Option b** of **Alternative 2** and **Preferred Alternative 3)** or 22-year rebuilding time period, the difference in the expected discards is negligible. Further, the Magnuson-Stevens Act requires that the rebuilding time period be as short as possible, considering certain factors, such as the biology of the stock and the needs of fishing communities. The Council determined that **Option b** was consistent with this statutory mandate.

Action 2 would also modify the commercial-recreational allocation. **Alternative 2** would retain an allocation of 61% recreational, 39% commercial. **Preferred Alternative 3** adopts an allocation of 65% recreational, 35% commercial, which is based on historical landings from the reference period (1986 – 2005) calibrated to SRFS data units (See Section 4.2 for more information the allocation split). **Alternative 2** would results in a *de facto* reallocation to the commercial sector of approximately 4% because it does not account for the fact that SRFS data was used to inform the assessment catch level projections. Conversely, **Preferred Alternative 3** would be expected to result in a comparatively similar allocation of the stock ACL for both the commercial and recreational sectors compared to the status quo in **Alternative 1**. Although the recreational sector has substantially greater discards than the commercial sector, **Alternative 2** and **Preferred Alternative 3** are expected to have the same impact on bycatch and overall mortality. This is because the greater recreational discards expected under **Alternative 3** are accounted for in the assessment projections, resulting in a slightly lower total ACLs (the total ACLs in **Alternative 3** are approximately 2 percent lower than the total ACLs in **Alternative 2**).

Action 3: Sub-Action 1

Sub-Action 1 of Action 3 would change the recreational ACT. **Alternative 1** would retain the current buffer between the recreational ACL and ACT. The recreational ACT is set equal to the

yield at 75% of F_{MAX}. This resulted in the recreational ACT being set at 89.75% of the recreational ACL. Because F_{MAX} no longer represents the best scientific information available, **Alternative 1** is a non-viable alternative. **Alternative 2** would set the ACT using the Council's ACL/ACT control rule and would result in an ACT that is 10% below the ACL. **Preferred Alternative 3** would set the ACT at 20% below the ACL.

Both **Alternative 2** and **Preferred Alternative 3** would set the ACT values below the ACL, with Alternative 2 reducing the current buffer by only 0.25% and **Preferred Alternative 3** increasing the buffer by 9.75%. Action 4 would determine whether the ACT chosen here would be used in management of the species in every fishing season (Alternatives 2-4 of Action 4) or only in the year following an overage of the ACL (Action 1). In the fishing years that the ACT is used to determine the length of the fishing season, **Alternative 2** would have no impact no on bycatch. **Preferred Alternative 3** would reduce the allowable harvest and the estimated duration of the recreational fishing season, which could increase regulatory discards. However, a shorter season for gag would result in less targeted effort. Thus, it is difficult to estimate the impacts of **Preferred Alternative 3** on gag discards. However, given the drastic reduction in catch limits and fishing seasons that are expected to be implemented, a 20% (**Preferred Alternative 3**) decrease from the ACL is expected to have only minor effects on total discards, and the relative effects on discards between Alternative 2 and **Preferred Alternative 3** are expected to be negligible.

Action 3: Sub-Action 2

Sub-Action 2 of Action 3 would consider changes to the commercial ACT. **Alternative 1** would maintain the status quo, such that the commercial ACT is set equal to the yield at 75% of F_{MAX}. The commercial quota is set at 86% of the commercial ACT. This results in a commercial quota that is approximately 77% of the commercial ACL. Because F_{MAX} no longer represents the best scientific information available, **Alternative 1** is a non-viable alternative. **Alternative 2** would set the commercial quota for the gag IFQ program equal to the commercial ACT. The commercial ACT would be fixed at 86% of the commercial ACL. **Preferred Alternative 3** would set the commercial quota for the gag IFQ program equal the commercial ACT. The commercial ACT would be fixed at 95% of the commercial ACL.

Both **Alternative 2** and **Preferred Alternative 3** would reduce the buffer between the ACL relative to the current quota (i.e., 77% of commercial ACL). Commercial gag fishermen have stated during public testimony that they can catch or avoid gag as necessary when fishing. Assuming this is true and that commercial fishermen will avoid catching gag (at times when catching them would require them to discard), when considering the drastic cuts to catch limits considered in this action, both alternatives would result in greatly reduced gag discards by the commercial sector (relative to **Alternative 1**) assuming a corresponding decrease in effort targeting gag. However, the extent to which commercial fishermen would opt to avoid gag because they require discard is unknown, as prolific gag fishing areas could also contain many other targeted species, giving the fishermen incentive to fish in the area anyway despite the potential for gag discards. Setting the commercial quota equal to the commercial ACT is consistent with the treatment of the ACT/quota relationship used in other IFQ program species in the Gulf (e.g., red grouper, shallow-water grouper). **Alternative 2** takes the current buffer between the commercial ACT and commercial quota (14%), as specified in **Alternative 1**, and

applies it as the buffer between the commercial ACT and commercial ACL. **Preferred Alternative 3** would reduce the buffer between the commercial ACT and commercial ACL to 5%. The current buffer was put in place through Amendment 32 to compensate for compensate for dead discards not being reduced to projected levels needed to achieve 100% of the annual catch target. However, since the analysis in Amendment 32, considerable improvements in the estimation of commercial landings and discards have occurred (SEDAR 72 2022). Commercial landings are known with greater precision and are modeled with a coefficient of variation in the stock assessment model of 0.01. Commercial discards and the fraction of commercial catch that is discarded are also included in the model and are factored into the yield projections that inform catch limit recommendations from the SSC. Further, the fraction of gag discarded compared to the total number of gag caught has remained low, especially for the commercial longline fleet (NMFS 2022b). Thus, despite lower buffers than **Alternative 1**, neither **Alternative 2** nor **Preferred Alternative 3** are expected to result in an appreciable increase in discards relative to no action, and both may result in reduced discards of gag in the commercial sector, provided fishermen can and will avoid gag while targeting other co-occurring species. Because of the smaller buffer which allows for a higher catch limit, **Preferred Alternative 3** is expected to result in slightly more discards relative to **Alternative 2**.

Action 4

Action 4 would set the recreational fishing season for Gulf gag. Alternatives in this action would reduce the gag recreational fishing season duration and would consider changing the opening date for the season as well as the recreational accountability measure. **Alternative 1** would keep the June 1 season opening date, and requirement that NMFS prohibit harvest when the recreational ACL is met or projected to be met, unless landings exceeded the ACL in the prior fishing year. If landings exceeded the ACL, NMFS is required to prohibit harvest based on the ACT. NMFS estimates that the gag season duration under **Alternative 1** would be about 28 days.[49] Thus, any gag that are captured outside of that June 1 through June 28 (estimated) season would be required to be discarded. However, and importantly, the gag season would be open concurrent with the first month of both the federal for-hire red snapper season and most Gulf states private angling recreational red snapper season. In addition, since season durations are expected to increase each fishing year, **Alternative 1** would provide a season that is projected to be open for a greater portion (or all) of the red snapper for-hire and red grouper season each year from 2025 through 2028. Since moving to a June 1 opening date in 2016, gag harvest has been higher during June than in any other month. This is likely due to the overlap with the red snapper season, where gag is harvested when they are incidentally hooked by fishermen while targeting red snapper. If the gag season were not open during this period, each gag captured would have to be discarded, no matter the size or condition of the fish.

Alternative 2 would also set the season start date at June 1, but NMFS would prohibit harvest every year when the ACT is met or projected to be met. This results in less available harvest for recreational anglers, and a corresponding reduction in the duration of the gag season.

[49] All estimates season durations in this discussion are based on the Council preferred alternative and option in Action 2, i.e., Preferred Alternative 3b. These season duration estimates would vary based on the Alternative chosen. Please see Section 2.4 for comprehensive season duration estimates for each alternative.

NMFS projects that the gag recreational season under **Alternative 2** would be 25 days (but would increase each year with the increase in catch limits). Thus, any gag captured outside of that June 1 through June 25 (estimated) season would be required to be discarded. Again, because the gag season would be open concurrent with the first portion of most Gulf state private angling recreational seasons, the alternative would minimize discards during this period of high gag catch. However, all gag captured incidentally during any other time of year would be required to be discarded. This is expected to result in higher discards of gag during trips targeting other species outside of this gag season. **Alternative 2** would be expected to have slightly higher discards than **Alternative 1** because the season would be three days shorter (based on current projections), and all gag caught on those days would have to be discarded.

Preferred Alternative 3 would set the season start date on September 1, and NMFS would prohibit harvest every year when the ACT is met or projected to be met. A September 1 season start date is projected to result in the longest season of the four alternatives (63 days). Because this projected September 1 – November 2 season is the longest, it corresponds to the least number of days that gag must be discarded when captured while targeting other species (i.e., outside the gag fishing season). In addition, as fall weather arrives and the waters begin to cool (likely toward the middle to end of this season), gag are commonly captured in shallower waters, which not only make them more available to fishermen, but also is likely to result in lower mortality of any gag that are discarded, as both depth of capture and temperature of water are positively correlated with discard mortality (Pulver, 2017). However, September and October are historically a period of low harvest for not only gag, but for most other reef fish species. Thus, gag that are caught during a season opening September 1 would likely be the target species, and fishermen would be expected to shift effort to target gag from times of historically higher gag catch (e.g., June, November) to September and October. This increase in fishing effort in September is likely to result in substantially higher gag landings, but also may result in higher discards during this time of year than would normally occur in September, when historically, there is low fishing pressure. In addition, the gag fishing season would be closed for most or all of the recreational red snapper for-hire season and state private recreational fishing seasons, which is also the time when gag catch has been highest in recent history. Thus, gag discards could also be higher than normal during June through August, when anglers fishing for red snapper and other co-occurring species (e.g., red grouper) would be required to discard any gag that were captured, no matter the size or condition. However, there is too much uncertainty related to fishing effort changes, changes in bycatch rates, and changes in bycatch mortality due to area fished, depth fished, and water temperature to estimate any change in bycatch or bycatch mortality relative to the other alternatives in this Action.

Like **Preferred Alternative 3**, **Alternative 4** proposes a season that would begin later in the year and mostly outside of the time period when gag fishing effort and catch are high. **Alternative 4** is projected to result in the second longest fishing season for 2024 of the alternatives (45 days), although the season length would not increase the same extent as in the other alternatives, and by 2028 would provide the shortest fishing season of the alternatives. In addition, more of the season under **Alternative 4** would occur when waters are cooler, and fish would be more likely to be caught in shallow and nearshore waters. This is expected to result in reduced mortality for any gag captured and discarded. However, like **Preferred Alternative 3**, there are myriad factors that increase the uncertainty in determining the effects on overall

discards and discard mortality. The historically low fishing effort in October is likely to result in substantially higher gag catch, but also may result in higher discards during this time of year than would normally occur in October. In addition, the gag fishing season would be closed for most or all of the recreational red snapper fishing seasons (as set by the Gulf states) which is also the time when gag catch has been highest in recent history. Thus, gag discards could also be higher than normal during June through August, when anglers fishing for red snapper and other co-occurring species (e.g., red grouper) would be required to discard any gag that were captured, no matter the size or condition.

Action 4 alternatives would result in shorter recreational seasons than in the recent past due to the Alternatives chosen in Action 2. **Alternatives 1** and **2** would maintain the status quo season opening date, but would result in shorter seasons than **Preferred Alternative 3** and **Alternative 4** in 2024. However, each year between 2025 and 2028, the season would be longer and would overlap more fully with the red snapper and red grouper seasons, which would be likely to reduce bycatch in each successive year when compared to the other alternatives. Because gag is often captured when targeting co-occurring species including red snapper, shortened seasons could result in an increase of gag bycatch, despite the greatly reduced catch limits. However, experienced recreational fishermen and for-hire captains have given testimony (at public meetings) that gag can be avoided when fishing for other species. This may serve to reduce the amount of gag bycatch relative to what would be expected based on previous catch of gag while targeting species such as red snapper. However, it is unknown the proportion of recreational fishermen that are experienced enough to avoid gag while fishing for other species. It is also unclear as to the extent to which recreational fishermen would opt to avoid gag even if they were required to be discarded, since prolific gag fishing areas could also contain many other targeted species, giving the fishermen incentive to fish in the area anyway despite the potential for gag discards.

In addition, all Action 4 alternatives are likely to result in lower discards during November (after the gag season closure) and December, because fishing effort for reef fish that co-occur with gag (and thus gag bycatch) are expected to be minimal. The confounding factors that influence bycatch under each of the alternatives make it difficult to anticipate overall discards and discards in each alternative compared to the others. The overall effect of these alternatives on discards is difficult to foresee, but it is expected that the alternative chosen in Action 4 will have less effect on discards than the reduction in the catch limits required in Action 2. Some Action 4 alternatives are likely to result in greater or less discards than others, but given the many unknowns surrounding the effects of each alternative, the increase or decrease in bycatch of each alternative relative to others is unknown.

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

Relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict. The Council's Scientific and Statistical Committee accepted the projections from SEDAR 72 for the purposes of developing management advice. Gag are opportunistic predators that feed on reef fishes, benthic and pelagic fishes, and crustaceans (Grüss et al., 2015). Newly settled gag juveniles are estuarine dependent

and are usually found in shallow seagrass beds during late spring and summer (Koenig and Coleman 1998; Strelcheck et al. 2003). As gag matures, it moves to deeper, offshore waters to spawn. Gag is protogynous, transitioning from female to male at older ages (see Section 3.2). Reductions in overall fishing mortality, including an expected reduction in gag bycatch and discards, will allow the stock to increase in abundance, resulting in increased competition for prey with other predators. Consequently, it is possible that forage species and competitor species could decrease in abundance in response to an increase in gag abundance.

The primary effects on other species in the ecosystem from Amendment 56 are expected to come from Action 2 and Action 4. Action 1 would have no direct effects on gag fishing other than those covered in Action 2, and although the Action 3 will reduce allowable gag catch relative to Action 2, the effects are expected to be negligible to other species considering the small changes in gag effort and catch that would be expected.

The effects of bycatch on other species in the ecosystem would largely result from the decreased catch limits being considered in Action 2 and the change in fishing seasons being considered in Action 4. Although the changes in gag fishing effort, timing, and landings in the gag fishery are likely to have some impact on other species in the ecosystem, the effects are difficult to quantify due to the complex nature of the ecosystem they live in. In any case, it is unlikely that any changes in gag bycatch as a result of these actions will negatively impact other species in the ecosystem.

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

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. Fishermen can specifically target gag while fishing, although they may still catch other species. Snappers, groupers, and other reef fishes are commonly caught in association with gag. Those most commonly caught include: red snapper, vermilion snapper, red grouper, and other shallow water groupers. None of these species are currently undergoing overfishing (NMFS 2023 Summary of Stock Status for Non-FSSI Stocks). Regulatory discards contribute to fishing mortality in all of these reef fish species, especially when captured in deeper waters. However, if the substantial reduction in fishing effort that is expected to occur for gag results in lower overall fishing effort for reef fish species, there may be a corresponding decrease in bycatch of species commonly caught while fishing for gag. However, given the multispecies nature of the reef fish fishery, much or all of the effort put forth toward gag in previous is expected to be shifted to other species, especially in the private angler recreational fishery.

Criterion 4: Effects on marine mammals and birds

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 gag for food, and they are not generally caught by fishers harvesting gag.

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

Changes in fishing, processing, disposal, and marketing costs are expected as a result of Actions 2, 3, and 4. Short term negative effects of the reduced ACLs that would be implemented under Action 2 would be exacerbated by the ACT chosen in Action 3.1, especially under **Preferred Alternative 3** which would reduce allowable harvest by 20% relative to the ACL chosen in Action 2. Although Action 4 does not further reduce the catch levels, the preferred alternative would change the recreational season opening date and require that NMFS prohibition harvest each year when the ACT is met. These changes are expected to have substantial effects on the recreational for-hire sector.

The gag commercial sector allocation is expected to be greatly reduced due to reductions in the ACLs, and also relative to the recreational sector given the Council's selection of Preferred Alternative 3b in Action 2. The action alternatives in Action 3 would reduce the ACT relative to the no action, resulting in greater allowable harvest for the commercial sector. This would result in a reduction in allocation for commercial fishermen which is expected to result in reduced costs associated with fishing, processing, disposal, and marketing cost.

Recreational anglers would be allotted greatly decreased levels of catch through this action. Due to the multi-species nature of the reef fish fishery, the reduced opportunity for fishermen to harvest gag is likely to be supplemented by increasing effort and harvest for other species, so it is unlikely to have a substantive effect on private anglers. The for-hire (charter/headboat) industry would also have a greatly diminished opportunity to offer trips targeting gag under all alternatives, which would result in reduced costs. However, setting the fishing season such that it would begin when historic effort for other species is low (as in **Preferred Alternative 3** and Alternative 4 in Action 4) is expected provided greater opportunity for for-hire fishermen to target gag and schedule trips, and thus would increase these costs relative to Alternatives 1 and 2. This is because **Preferred Alternative 3** would result in scheduling and taking substantially more fishing trips relative to other Action 4 action alternatives.

In general, cumulative changes in this amendment are expected to result decreased costs for fishermen, especially for the commercial sector and the for-hire recreational component. For a more complete discussion of the changes in fishing costs associated with the various management actions, see Sections 4.1.3, 4.2.3, 4.3.3, 4.4.3 and 5 of this Amendment.

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 gag anglers. The cumulative effect of the measures of Actions 1 through 4 would result in recreational catch limits that are substantially reduced from current levels, and a recreational season that is substantially shorter than the current season. This reduction would be most pronounced under Action 2 **Option a** alternatives, which would set gag possession and bag limits and commercial allocation at zero. The reduction would be lowest in Action 2 under **Option c** of **Alternative 3**, which would result in the highest catch limits, and thus the longest recreational fishing season (as set in Action 4). However, aside from Action 2 **Option a** alternatives, the difference in the cumulative effects between the alternatives would be minor

because the reduction in catch limits, and thus overall effects relatives to the status quo are much more substantial. Thus, any of the alternatives are likely to reduce fishing opportunities, effort, and landings in the recreational sector when compared to status quo. The reduction in the recreational catch limits would also reduce the number of target trips for-hire operators could offer. The negative effects would be most pronounced initially under Action 4, **Alternative 2** (which would allow on an estimated 25-day fishing season which would open concurrent with red snapper and red grouper recreational seasons), although **Alternative 4** would have the shortest season by 2028. **Preferred Alternative 3** would allow for the greatest number of trips at a time when other popular reef fish species would not be available for harvest (estimated 65-day season which would not be concurrent with for-hire seasons for red snapper and red grouper based on recent years, and would thus allow targeted fishing days for only gag).

Measures proposed in this action are expected to result in changes to fishing practices and behavior of commercial fishermen. Action 2 would set recreational and commercial catch limits and allocations, which includes catch limits for the gag commercial IFQ program. This reduction for the commercial sector would be most pronounced under Action 2 **Option a** alternatives, which would set gag possession and bag limits at zero. The least pronounced in Action 2 is under **Option c** of **Alternative 2**, which would result in the highest catch limits for the commercial sector. However, the difference in ACL among the alternatives is minor relative to the decrease when compared to the status quo. Because gag is part of the IFQ program, any reduction in allocation due to the catch limit reductions considered in this action are expected to reduce fishing effort and gag harvest. However, because most fishermen who have gag allocation and/or shares also have allocation and/or shares for other IFQ species, and have commercial permits that allow them to harvest and sell other reef fish species, some of the reduced fishing effort resulting from this amendment due to gag catch limit reductions on the commercial fleet may be partially mitigated, although probably only to a small extent given the reliance of many shareholders and allocation holders on gag.

In summary, here is expected to be a reduction in fishing effort for commercial gag IFQ shareholder and those holding allocation. There is also expected to be a reduction in the recreation fishing season, resulting in reduced fishing days targeting gag for both the for-hire and private angler components. These effects may be largely mitigated in the private angler component due to the ability of these fishermen to target other species when gag harvest is prohibited. It is likely to have a greater negative effect on the for-hire component, but these effects are expected to be the least under **Preferred Alternative 3**.

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

Proposed measures are not expected to significantly impact research, administration, and enforcement costs and management effectiveness. 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 commercial or recreational closure or take additional action to prevent overfishing. All alternatives would result in a decrease in both the commercial and recreational ACL. Because the IFQ program acts as the accountability measure for the commercial sector, no in-season closure would be implemented based on the new catch limits.

Decreasing the recreational ACL is expected to result in a need to implement in-season closures for most alternatives through at least 2028.

Effects on research, administration, and enforcement costs and management effectiveness will be mostly due to alternatives chosen in Actions 2, 3, and 4. If the recreational ACL is exceeded in a given year, regulations require that the amount of the overage be deducted from the recreational ACL in the following year. Given that the ACLs would be greatly reduced in this rule, a large overage of the recreational ACL could result in a closed recreational season (no days of gag fishing allowed) in the following fishing year. Because recreational catch allowances under each of the Action 2 alternatives (with the exception of **Option a** which would prohibit gag harvest) are relatively similar to each other but small when compared to the status quo, there is expected to be little difference in potential for overfishing among these alternatives, regardless of the viable Action 2 alternative selected or the Action 3 alternative selected, which would further reduce the allowable catch. This is because all action alternatives under Action 2, as reduced by Action 3, are expected to result in closure of the recreational season, which will require a projection of catch based on the catch rates of previous seasons. Action 4, which sets the recreational season opening date, would result in closures based on pre-season projections of catch. Because these projections are speculative and are developed based on prior year catch rates when catch limits were much higher and, in some cases, involved different opening dates, the likelihood of exceeding the ACL may be quite high. This is especially true in the first few years of the rebuilding plan when there is no comparable data from which to estimate effort or harvest. **Alternatives 1** and **2** of Action 4 may be less likely to result in an overage of the recreational ACL because they have the same opening date as in recent gag recreational seasons, so that data may be more comparable. However, given the catch limits will be much lower than in those previous years and that fishing pressure may increase because of the reduced opportunity to fish for gag, landings may be higher than in previous season.

Each of the action alternatives in Action 2 and Action 3 are expected to result in closure of the recreational fishing season. The effects of the choice of season in Action 4 are speculative, and each alternative carries substantial risk of allowing the recreational ACL to be exceeded. The catch limits and seasons chosen in Amendment 56 will require estimates of catch to manage appropriately such that the season closes when the catch limit is reached. This will be difficult to do given the limitations in the data, especially in the initial years of this rebuilding plan. For this reason, administrative effort and management effectiveness (in the form of effectively managing to the chosen catch limit) is expected to be negatively affected, no matter the alternative chosen in Actions 2, 3, and 4.

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

The proposed gag recreational ACLs and ACTs are expected to positively impact the stock by fostering a faster recovery rate, but have negative economic and social implications. It is expected that decreasing the ACL as specified in any of the Action 2 action alternatives, regardless of the Action 3 and Action 4 alternatives selected, will lead to a substantially shorter fishing season.

The decreased catch limits for the commercial sector are expected to result in fewer fishing days targeting gag. Each of the Action 2 action alternatives (as reduced by the Action 3 alternative chosen) are expected to result greatly reduced gag commercial allocation, which is expected to result in reduced targeted fishing effort for gag in the commercial sector. **Alternative 2** of Action 2 (with the exception of **Option a** which would allow no gag harvest) would allocate a higher proportion of the gag ACL to the commercial sector (39%) versus the recreational sector (61%) when compared to **Preferred Alternative 3**. Although the short-term benefit to the commercial sector would be relatively minor due to the extreme cuts in allowable gag catch in the initial years of the rebuilding plan, the long-term benefits would be more substantial since catch limits are expected to increase each year.

The opposite is true with the private recreational component of the recreational sector, which would benefit slightly in the short term under **Preferred Alternative 3** compared to **Alternative 2**, but would see increased social and economic benefits as the stock continues to rebuild. The for-hire component of the recreational sector would not only see negative impacts from the reduced ACL and ACT, but would also see effects based on the season start date (and associated season duration) selected in Action 4. Although all Action 4 alternatives are expected to have negative economic, social, and cultural effects, **Alternative 3**, which would implement the longest fishing season which would also likely be temporally separated from the red snapper for-hire season and red grouper recreational season, would have the least negative effects relative to the other alternatives, and **Alternative 2** would have the most negative effects.

There are expected to be negative effects in the economic, social, and cultural value of fishing activities and non-consumptive uses of fishery resources associated with Amendment 56, although the effects in the private recreational component are likely to be largely mitigated because of the multi-species nature of the reef fish fishery, which will allow fishermen to target other species when fishing for gag is not permitted. This is less true for both the recreational for-hire component and the commercial sector, as neither is expected to have difficulty be able to recover the revenue lost from the gag ACL reductions (and season changes for the for-hire component) by targeting other species. Any reduction in bycatch or overall mortality may result in an increase in the gag stock in the long-term, which would positively affect the social and economic value of fishing activities. For a more complete discussion, see sections 3.3 and 3.4 and sections 4.2.3, 4.3.3, 4.4.3, 4.2.4, 4.3.4, and 4.4.4 of this document.

Criterion 9: Changes in the distribution of benefits and costs

Alternative 2 addresses changes in distribution of catch allocations to the commercial and recreational sector, and most appropriately addresses Criterion 9. Currently, the gag ACL is split between the commercial sector (39% of the allocation) and the recreational sector (61% of the allocation). This ratio was developed based on historical catch from each sector using the best data available at the time. However, SEDAR 72 used revised historical data streams including SRFS data which have resulted in new estimates of recent and historic recreational catch. These estimates resulted in changes to the percentages of recreational and commercial catch that occurred in the reference period (1986-2005). Action 2 of this amendment would consider revising the commercial/recreational allocation ratio based on this new ratio.

Alternative 2 would maintain the 61% recreational / 39% commercial split in setting the rebuilding plan, including catch limits, for the gag stock. Alternative 3 would update the allocation to 65% recreational / 35% commercial. Both the **Alternative 2** (which are based on status quo allocation) and the **Preferred Alternative 3** allocation split percentages are based on the reference years of 1986-2005. **Alternative 2** ratios are based on MRIP-CHTS data (data is no longer being collected using MRIP-CHTS methodology), while **Preferred Alternative 3** ratios are based on private landings from SRFS, as supplemented by charter boat and shore mode data from MRIP-FES and headboat data from the Southeast Regional Headboat Survey. The most recent stock assessment model was run using SRFS-supplemented data.

All alternatives are expected to result in short-term negative impacts to both the commercial and recreational sectors. Action 2, **Options 2a** and **3a** result in the largest decrease in net economic benefits in both sectors and in total, since they allow no harvest of gag over the entire rebuilding timeline. **Alternative 2b** and **Preferred Alternative 3b** provide an approximately equivalent decrease in net economic benefit, but the decrease in economic benefit is greater than either alternative with **Option c. Alternatives 2c** and **3c** also provide an approximately equivalent reduction in net economic benefit, as well as the smallest decrease in net economic benefits of the alternatives. All alternatives will greatly reduce the ACL, and would result in net negative economic benefits and costs, especially the recreational for-hire component and the commercial sector.

Criterion 10: Social effects

Bycatch is considered wasteful because it reduces overall yield obtained from the fishery. However, bycatch is generally unavoidable given the regulations necessary to limit the size and number of fish harvested, and the multi-species nature of the reef fish fishery. Further, the commercial and recreational sectors have different economic, social, and cultural goals and objectives. Participants in the commercial sector tend to seek to maximize harvest and efficiency while participants in the recreational sector tend to seek to maximize access and opportunities. Although lower recreational and commercial catch limits and shorter seasons are expected to have negative social effects under all actions and alternatives, adjusting the allocation to better reflect the current understanding of historical harvest by both sectors is expected to more fairly and equitable distribute those impacts. See Sections 4.1.4, 4.2.4, 4.3.4, and 4.4.4 for a more detailed discussion of the social effects associated with Amendment 56.

CONCLUSIONS

Analysis of the ten bycatch practicability factors indicates there are positive biological impacts associated with reducing the gag ACL, which will allow the gag stock to rebuild to a sustainable level. Revising the allocation between the recreational and commercial sector is expected to have net neutral biological effects, because the assumed discards by each sector are included in the stock assessment projections and the resulting OFLs and ABCs recommended by the SSC. Thus, the greater amount of discards associated with the recreational sector are accounted for through the reduction in the total allowable harvest. All viable alternatives are expected to decrease overall gag mortality, although the amount of associated bycatch is uncertain. The main benefits of reducing gag 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 gag ACLs is expected to reduce gag mortality while protecting the stock from overfishing. The benefits of the ACL reduction on gag bycatch may be offset by the regulatory discards that would occur by fishermen that target other species and catch gag during the closed season for the recreational sector. There are likely to be negative social and economic effects to both the commercial and recreational sectors, stemming largely from the expected reductions in economic benefits that are likely if Amendment 56 is implemented. The Council had to weigh the benefits of reducing gag mortality with the negative social and economic effects that both sectors would face.

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APPENDIX I. SUMMARY OF PUBLIC COMMENTS RECEIVED

Public Hearing Summary
Reef Fish Amendment 56: Modifications to Catch Limits, Sector Allocation, and Recreational Fishing Seasons for Gulf of Mexico Gag

Virtual Hearing
May 8, 2023

Council/Staff
Bob Gill
Emily Muehlstein
Ryan Rindone
John Froeschke
Carrie Simmons
Bernie Roy

26 members of the public attended.
8 members of the public spoke.

Bill D'Antuono: Charter and Commercial - Naples, Florida
Recently, it's one thing after the next and the Council keeps cutting what he can fish for. This is one of the best years for gags he's seen in a long time. On the charter side, it'll be very disappointing on June 1st that anglers have to release a trophy fish that will likely die anyways. He prefers Action 4; he supports June 1 opening even if the season is short because that's when a lot of people will be targeting the bigger gags. On the commercial side, the lease price has gone up 400% – 700%, if you can even find it. He spent $3000 for 600 pounds and people keep asking him for it. He wants to know what measures are stopping the allocation price from skyrocketing. Cutting harvest by 85% and giving extra to the recreational sector doesn't make sense when the commercial sector is accountable.

Eric Brazer: Commercial - Reef Fish Share Holders Alliance
The fact that the Council is even considering reallocation at this point, regardless of which sector it is exchanged to, when a stock is in terrible shape makes no sense. It's not good for the resource to reallocate from the commercial sector to recreational sector. Even if you take social and economic considerations off the table, reallocation doesn't make sense. He expressed support for Action 2, Alternative 2c. There are lots of fishermen seeing lots of gags and the data being used to create this rebuilding plan is already five years old. If the stock is doing better like we're hearing, then the Council should select to rebuild using the longer timeline. Action 2 addresses three major changes in one bite: catch limit data, allocations, and the timeline to rebuild. This is a lot to take in at once and he believes it should have been split into three separate actions. This would at least allow for a proper allocation review. 99% of gag discards are in the recreational sector (28 million fish), compared to the small number of discards from the commercial sector (200 thousand fish), however, nothing in the document accounts for this.

We need to request interim analyses because the fishermen are seeing more in the past few years and the commercial sector has already caught half of its quota so far this year. Lowering catch limits could cause huge problems. If the stock is doing that much better and harvest exceeds catch limits, this could result in a fishery wide shut down.

Gary Jarvis: Charter and Seafood Restaurant Owner – Destin, Florida
He thinks the Council shouldn't reallocate from an accountable fishery to an unaccountable fishery. It doesn't make sense when you're trying to rebuild a fishery. Regardless of the data program used, we need to use common sense. Grouper, greater amberjack, and triggerfish reallocations to the recreational sector make no sense. Fish shouldn't be taken away from the most accountable sector in America when the fisheries are stressed. Re-writing history is not the problem when we have collapsing fisheries. If gag are coming back faster than we think they are, it still doesn't justify reallocation at this point.

Rachal Histler: Commercial - Texas
If the fishery is rebounding faster than the assessments are showing, then we're setting ourselves up for failure.

Forest Pressnell: Recreational - Carrabelle, Florida
He has been fishing in Carrabelle, Florida since 1999 and sees more grouper than ever. He can fill the boat in depths from 28-100 feet with grouper and red snapper of all sizes. The gag population is so insane, you can't catch lane snapper or triggerfish. He believes that this cut aims to close the Florida economy. He has never seen more grouper and easily catches his limit in one hour. He has never caught a spawning grouper in under 100 feet of water. If the Council is going to shut it down, leave gag open for 70 days during the red snapper season. That's the only fair solution with gas prices as high as they are.

Robert Houghton:
In northwest Florida the grouper stock is great. The last four years, it has been off the charts good and he's been fishing for 30 years. Fishing in November and December you catch them in 30 minutes. There are more male fish that are being accounted for. The science isn't right because people don't give accurate information in the surveys. The fishery is much stronger than the science is making it out to be. He doesn't know about other parts of the state, but the stock is strong in the big bend. Northwest Florida shouldn't be included with the rest of the state because an October through December season is best for him. It doesn't make sense for the whole state to share the same season. The Council is forcing people to stop fishing for grouper even though they're there.

Andrew and Cherry Norris: Charter Captain
The fishery in the central Gulf coast of Florida is off the charts good and has been for 35 or 40 years. He has been making a living of it and can catch his limit in 8 and 15 feet of water every day of the year. The assessments are unbelievably wrong. He can catch all the fish he wants. He doesn't hardly ever get checked at the dock. Based on the number of fish he catches and throws back in the shallow water; he can't imagine how many are in deep water. As a family that depends on the fishery, there are lots of captains whose livelihoods will be hurt. Closing gag takes food off their table and impacts the restaurant industry. They would support cuts to harvest

if there was an issue with the stock, but there isn't. September and October is hurricane season and a storm might kick up the water and they'll end up losing precious fishing time. They prefer an earlier season opening. They also support increasing the size limit over changing the season.

Stephen Stang: Recreational – Wakulla, Florida
Franklin, Wakulla, Jefferson and Taylor counties are already managed differently and should have a different season. The special season drives tourism to the area. Cutting out December fishing hurts their region because it's an epic month for gag fishing and the water clears, allowing for better spearfishing opportunities.

Fort Myers, FL
May 15, 2023

Council/Staff
Phil Dyskow
John Froeschke
Lisa Hollensead
5 members of the public attended.
4 members of the public spoke.

Barry Nicholls: Recreational and Charter - Estero Bay, FL
No argument about the math, but the data are bad. He wants to hear about better research to inform facts as these decisions are affecting people's livelihoods. Commercial divers see fish and why aren't those numbers extrapolated to the reefs rather than mailing out comment cards to private recreational fishermen? They are seeing fish; know they are they are there; got to be a better way.

Timothy Dillingham: Commercial and fish company owner – Naples, FL
Why do the assessments take so long and are based on data that are years old? Fishermen are giving scientists landings logs; why can't an assessment be done every year? An interim assessment (IA) for gag grouper may be the way to go. Drastic cuts of landings at 85% is a lot. Perhaps reduce landings by 25%, then do an IA to check if another cut of 25% is needed and do that instead. The drastic cut is too much.

For the IFQ program, it is good for shareholders to be able to fish year-round, but quota keep getting cut and it is hard. It's too hard to buy-in and have no confidence in IFQ. Price for quota has gone up from $1 to $7 per pound, if you can even find it. Too many private outsiders can come in and buy up all the quota, and there is too much private money that aren't fishermen. The program should be a participation only fishery or you have to be a dealer. Get a boat and do the fishing. Shareholders that aren't fishing or dealing should have a year or two (set some kind of precedent) and then sell off shares to fishermen or dealers. Would be the only saving grace for commercial fishermen. Need to be considered just like agriculture. Since so much fish are international, if commercial fishermen are gone, you won't be able to supply local communities. This is for the American people, and its cheating people when they eat some important since that's all there is. The IFQ system needs an overhaul. New entrants can't get involved.

There is no commercial fishermen representation on the Council. Mostly sells catch to restaurants and country clubs in the community. The commercial industry represents other users like chefs, restaurants, and tourists. This reduction is worse than red grouper. The recreational sector should have some kind of an app to report when they are going fishing and what IFQ species they caught and would be better than 3% coverage. No one believes the numbers with methods through mailing and dockside only capturing 3% of the recreational sector and it doesn't make sense to base decisions off that. It's a waste of money to do dockside surveys on small boats that aren't going offshore. If a fishermen can't tell the difference between a gag and a black grouper, they shouldn't be on the water.

Willing to record and share videos of fish during dives.

Jesse Baughman: Commercial – Florida
Seconded everything Tim said.

Bill D'Antuono: Commercial and Charter – Naples, FL
Gag grouper is better than he can remember. For charter side, would like to see the season open June 1 and it would reduce discards. Gag grouper are floating by the time they are coming up to the surface and he doesn't think you'd be able to get them down. Would normally fish for them at 155-190 ft depth out to 85-90 miles offshore. When gag grouper closes, it's putti ng pressure on another fish. Hogfish will take a huge hit and they don't live when you catch them. Cobia is cut, lane is closed for part of the year, and with black group misidentified, there is only so much meat on the bone to go out for. The data was last looked at in 2019; need to go back to the drawing board and look at the data again. Would be good to have red snapper coincide with gag opening. September 1 and booking charters that far into hurricane season would be tough. Fishermen are on the chopping block and things have shifted away from commercial.

Went to talk about cobia, spoke 4 times, and didn't listen to what was said. There is no Council representation for commercial sector. People will be learning how to fish for black grouper. Gag grouper quota is $7 per lb to lease, if you can find it. Hopefully an IA would help out and it would be good to see the recreational sector more accountable.

Cedar Key, Florida
May 15, 2023

Council/Staff
Bob Gill
Emily Muehlstein
Charlotte Schiaffo

27 members of the public attended.
11 members of the public spoke.

Bob Bullard: Commercial – Steinhatchee, FL

There are several factors at play causing issues with gag. He used to catch thousands of pounds of fish in 60 feet, but since the big red tide the bait has disappeared. Fish follow bait and where you find bait you find fish. The fishery in Apalachicola and Panama City is beautiful, so is the fishery in Mexico. Unfortunately, there is no bait here, so the fish aren't here and the cost of bait is astronomical. Wayne Warner told him that the more snapper you have, the less grouper you have because snapper love grouper eggs. There are lots of problems with our fisheries beyond what we're thinking, including the problem that there are lots of people fishing. The cut to the commercial quota took $80,000 of his income, so he'll have to fish harder on a different species.

Vincent Biue: Commercial – Steinhatchee, FL
The only thing he disagrees with is that the commercial sector lost 80% of their gags and they continuously stay under their quota while the recreational sector overfishes ever year. Not only will both sectors be cut, but the commercial sector will lose an extra 4% if the allocation shifts. The commercial sector shouldn't be penalized for the recreational sector going over their limit.

Paul Reeves: Commercial – Steinhatchee, FL
He wants to see this fishery rebuild as much as anyone because it's nothing compared to what it was 15 years ago. Gag has already been under a rebuilding plan for 10 years; what happened to that? The quota was cut and then increased for the last 10 years and now we're talking about doing it again. He supports Preferred Alternative 2, Option 2b. He doesn't agree with giving the commercial sector a double hit with reallocation; there is no point to add that on top of an 80% decrease.

Jim Zubrick: Commercial – Steinhatchee, FL
He applauds the state of Florida for voting not to shift allocation to the recreational sector. The sheer number of people participating in the recreational sector causes incredible discards. He supports Alternative 2, Option 2b which retains the current allocation and initiates an 18-year rebuilding plan.

Robert Lanier: Commercial – Steinhatchee, FL
He doesn't think harvest should be cut and he believes the allocation should remain the same.

Ellis Dosher- Commercial – Steinhatchee, FL
He's been a captain since 1993 and his usual pattern is to fish in 120 feet all summer. Then, in October, he fishes 180-220 feet until April. Last November he had to lease extra gag because he was catching them so easily. In the winter, he predominately catches red snapper, then red grouper, then gag, scamp, and mangos. This year before the 1st of March, he got tired throwing gag back because he only has 900 pounds of quota for the whole year. He keeps 100 pounds per trip and his fish average 16-17 pounds apiece. He catches more like 4-6% males (n=200). He wonders if the sampling methods are not proper or if the data old enough that the sex ratio has changed since then? He encourages the Council to revisit the male ratio. He found two spawning aggregations he didn't know existed this year. What you observe creates your perspective, which is your reality, and he doesn't see a lack of fish. He doesn't know anything about what happens inside of 80 feet. The gag fishery is not as good as it was in the early 2000's or since the big red tide in 2014. He supports Alternative 2, Option 2b.

Anna Woods: Commercial - Keaton Beach, FL
Her family has been fishing full time since 2018. Reallocation is a problem. The commercial sector has already taken a huge cut and another 4% dips even deeper into their pockets. The commercial sector is accountable, we know what they catch and what they discard. The Council shouldn't reallocate to a sector that doesn't report.

Mark Rustemier: Recreational fisherman and diver – Cedar Key, FL
In this assessment there are six or seven new variables that could create misinterpretation or error. In Action 1, using $F_{40\%SPR}$, rather than F_{Max} as an MSY proxy, is very conservative and severe. He thinks there should be less conservative options, like $F_{30\%SPR}$. Action 2, represents an 85% recreational cut and 87% commercial cut. He is not sure how the commercial sector can make it with that magnitude of a cut. Action 3 increases the recreational buffer and reduces the buffer for the commercial sector. The ACL used to be the trigger to close the recreational season and using the ACT to set seasons is taking more fish away from the recreational sector in addition to the 85% reduction. So, even with allocation changes, the recreational sector essentially loses the gains with the increased buffer. While it looks like there is a bigger piece of the pie with the allocation change, but the ACT buffer takes that away.

Dan Martin: Recreational – Cedar Key, FL
The release kits from Return 'Em Right work great. They haven't dived down and seen how they do, but the fish don't come back up. He supports the use of descending devices and believes it helps the resource. He would like the recreational season to start in October. This would provide some weekend overlap with red snapper season which would be more efficient for him.

Everyone is concerned about the viability of the stock and he supports consideration of area/depth closures and slot limits. A moratorium on harvest of larger fish should be considered. Even though the Council has not done it before, that's no reason not to consider it now. He also supports the idea of increasing the minimum size limit incrementally, by an inch per year, if that would increase gag egg production exponentially. The 80% cut is catastrophic, so let's do something soon to ensure the viability of the stock.

Ron Kamzelski:
There is nothing in these alternatives that shows how these measures will increase the male population specifically. He would like to see targeted management measures to fix that.

Shawn Stephenson: Commercial - Cedar Key, FL
Compared to the rest of the Gulf there is a pretty impressive fishery in the area. He doesn't know if there is any better place in the state than Cedar Key to fish for gag. If the commercial and recreational sector have to share the resource it should be split 50/50, because that's what is fair. At the same time, he is concerned about the lack of male gags and believes something will have to be done about that. The Lumps, and other areas where spawning grounds have been identified, have been unfishable and maybe there should be more areas that give sanctuary to the older spawning fish to increase male populations. He's also concerned about the increased recreational red snapper season. Increasing the season to 70 days will put a lot more pressure on the gags because the recreational fishermen will fish, and they will have more discards. The gag season and the red snapper season should be set at the same time.

Matt Sky: Recreational - Cedar Key, FL
If the lack if males is the biggest issue threatening the stock then we should consider changing the size limit and or creating more area closures.

Clay Shidler: Charter – Crystal River, FL
He owns 11 charter vessels and permits. Last year, he killed over 5,300 gags and turned in every carcass over 43. Of those, only four were males (not in transition). His fleet doesn't fish out deep. He would rather see a longer season and one fish per person bag limit. If a guy can go out to fish on a slick calm day, he would rather have the opportunity even if it's just one fish. He supports Alternative 2. The season should start September 1st. He also believes that blacks and gags shouldn't be managed together because we assume the fishermen are incompetent. He knows that's coming in the next framework and blacks needs to be taken out.

Destin, Florida
May 15, 2023

Council/Staff
CJ Sweetman
Ryan Rindone
Carly
Somerset
4 members of the public attended.
4 members of the public spoke.

David Krebs III: Commercial and recreational - Destin, FL
He grew up in the commercial industry, but spent time recreational fishing while he was in the Air Force. He is familiar with the changes that have occurred in both sectors from the early 1990's. Many transplants have migrated to the Panhandle to buy boats, giving them direct access to the fishery that wasn't available over a decade ago. The gag grouper season is essentially "open" year-round because regardless of whether the fishing season is open, anglers are still catching gag and then have to discard them. When fishing in deeper waters, a discarded gag is a dead discard. He thinks the gag season should align with other reef fish seasons. He would prefer a June 1st recreational season open, to more or less coincide with the start of red snapper season; fish within the same group can be targeted at one time so they aren't discarded. He thinks the Florida weekend-only red snapper season is a great idea; this is when the maximum fishing effort occurs anyway. With that in mind, think about making a gag fishing season weekends only so that it could be extended for a longer time period.

In Action 3, Sub-Action 3.2, he supports Preferred Alternative 3. The commercial buffer doesn't need to be more than 5% since that sector is more accountable. He also thinks reallocating any of the quota away from the commercial sector is wildly inappropriate. The recreational sector should have a 20% buffer as this is closer to what they are probably already overfishing.

David Krebs: Commercial – Destin, FL
He has been a commercial fisherman for 42 years and prior to that was a bait fisherman. He thanked staff for providing valuable insights for gag grouper discussion. He is concerned about the actions that reallocate quota based on a 2023 understanding of the sectors; the commercial and charter industry have not been able to grow for a while, but the recreational sector is growing exponentially. Better technology allows them more access to the fish and makes their participation very effective. Managers have to account for all the recreational discards; this means doing more than writing white papers on descending devices. It may be a useful tool, but how well can it be enforced? Any control rule that will increase discards must be closely examined. Regulating through discards is not appropriate. He would like to see a Friday through Sunday gag season to hopefully appease more fishermen and reduce discards. He requested FWC to look at the SRFS red snapper data after the weekend only season concludes. He would like the Council to reinstate spawning closures in the Gulf and start the closure based on observer data. He doesn't want the sector allocation to change and he supports the shortest rebuilding timeline.

Austin Abrams: Commercial - Panama City, FL
He's been associated with his family business for 30 years. He recalled that the last time gag was not overfished was 2014. Since then, the commercial industry has decreased; fishermen are selling out yet the recreational sector has grown immensely, which is likely contributing to gag being overfished. He would like a 6-month closure during spawning season and prefers Action 2, Alternative 2, Option 2a for all sectors. He also recommends holding the recreational sector more accountable through stricter data collection measures.

Bob Zales II: Southern Offshore Fishing Association and National Association of Charter Boat Operators - Panama City, FL
He supports Action 1, Preferred Alternative 2, even though he is unsure about the $F_{40\%SPR}$; it seems like the SSC is using that more often now for other species. He also supports a rebuilding timeline of 18 years (Action 2, Option 3b). In Action 3, he supports preferred Alternative 3, to set the recreational sector buffer at 20% below the ACL. He would like a 5% buffer on the commercial side (Preferred Alternative 3).

Regarding the recreational season, he would like the Council to consider a September 1 to November 10th season, but in the meantime use information from the interim rule to analyze the best option for 2024. It may also be helpful to look at the weekend effort from the Florida red snapper season. He wants the allocation to remain at 61% recreational, 39% commercial. If the recreational sector gets another 4% it will just increase discards. He's very concerned about the number of recreational discards and increased fishing effort. This could turn into a situation similar to red grouper where the quota is reduced for everyone. He also reiterated continuing to discuss requiring a federal offshore fishing permit for all private recreational anglers. Mr. Zales also suggested a Gulf-wide closure from January to May or June for both sectors.

Saint Petersburg, Florida
May 17, 2023

Council/Staff
Tom Frazer
Carrie Simmons
Emily Muehlstein

36 members of the public attended.
13 members of the public spoke.

Eric Schmidt: Commercial and Charter – Saint Petersburg, FL
He's been talking to the SSC and the Council about gag for years. The stock was depleted in 2017 and 2018 along southwest Florida. However, in the last few years, he's been running charters and the number of juvenile fish is unbelievable. He has never seen anything quite like it. This entire science and management process needs to be streamlined. He is on four SEDAR panels and by the time you get through the stock assessment and implement management, you're managing with five- or six-year-old data. The grouper stocks are cyclical so you're managing to the dip when there is actually a pulse in the population. Based on the schedule, the next SEDAR won't change things again until 2027. He does not agree with a September 1st opening; it's the peak of hurricane season and September and October are the two slowest months for charter fishing on the coast. Gags need cold fronts and water temperature changes to move closer to shore. With a September 1st opening, the 63 proposed days will in reality work out to 35 or 40 days. He supports a November 1st start date to economically maximize this fishery. Remember, the June 1 red snapper opening was not based on biology of the stock, it was based on the start of tourism season in the north Gulf. Gag should be managed economically and socially as well.

Reese Reed: Recreational fisherman and diver – Crystal River, FL
The gag population has built lately. They're the secret service for the other fish because you can't get around them to get a shot at the other fish. There is a healthy fishery right now, and you have to pick through the small ones to get the keepers. He hopes the sampling is done properly in the same areas year over year to ensure an accurate comparison. In Crystal River, you catch as many gag as you want.

Jake Augburn: Recreational spearfisherman - Tampa Bay
Anglers and spearfishermen are willing to support change when it is good, and when it is necessary. Changes to gag management are not needed now because they are healthy. Amberjack and kingfish need help, not gags. Starting to manage this stock on limited and old data is a bad idea. When you close a species, another takes a hit. This is the definition of mismanagement. So many fish are being slashed and people are losing faith in the Council process. Fishermen are on the chopping block and these management changes are not reflecting what we're seeing. He would like a reevaluation of the management process and the stock.

Josh Weaver: Recreational diver and fisherman – Spring Hill, FL
We're seeing more gags than we've seen in the past going out of Hernando County. The Nature Coast is gag territory. The Coast of Florida is so large, if certain areas of the state are struggling, we should be able to manage them separately. Break management into areas and manage in ways that are reflective on the local populations.

Scott Stark: Recreational
From 20 feet out to the Middle Grounds, this is the best gag year he's seen. Maybe we need to build an APP and ask the recreational sector to report so we can get better data. The Council should consider reducing the recreational bag limit to one fish so the season can be longer. These huge cuts don't just hurt the fishermen, they hurt the whole industry.

Dylan Hubbard: Charter – John's Pass, FL
We're changing the data currencies and moving the goalpost in this fishery, so we don't need to change allocations right now. It's not an appropriate time to do this, especially when you look at the fact that taking 4% extra away from the commercial sector will only give the recreational sector two more days to fish. It doesn't make sense when the fishery is in trouble. We're seeing gag everywhere and the fishery is rebounding at an exponential rate. This year one and two fish are everywhere and we have a big recruitment to the fishery right now. The gag stock is doing better each year and we all agree that managing off data from 2019 isn't working. This has happened before. We started a rebuilding plan for gag and soon thereafter we had another assessment that said everything is ok. He supports the longest rebuilding timeline since the assessment is not agreeing with what we're seeing on the water. The September 1st opening date is important to him. When the private fleet starts fishing June 1st or 16th, it's going to cause discards, but the gag season would only be open for two weeks at that time so you're not going to make any progress to limit discards. He doesn't think it's a good idea to open gag in November/December when catchability is super high. Everyone in this area loves catching gag and if you wait that long, a million people will be eager to go after those easily targetable fish.

Any huge effort spike will be downtrodden come September 1st because catchability is lower. We kept moving goal posts with amberjack and noting has worked. None of the management changes the Council tried made a difference, let's not do that with gag. Hopefully, interim analysis will show us we're doing better. Also, black grouper should not be included in future gag management. There is no confusion; old-time fisherman called gags blacks, it's not an identification issue, it's just vernacular.

Scott Morris: President Suncoast Seals - recreational spearfisherman
His club has been around since the 1950's and as divers they actually put eyes on the reef. They have harvest data and technology in their club and they can report their fish and share footage of the gags. He has been spearfishing since 1994 and he's seen more gags in the last two years than he ever has. His club wants to help, if there is a way to get more data.

Randy Lauser: Commercial longliner – Madeira Beach, FL
He has seen a lot of fisheries build and rebuild and he believes the Council needs to postpone action on this Amendment and give him back gag. He hasn't seen a single scientist collecting gonads. We have to harvest gag so we can study them. If they're not bringing them to the dock then there are no grouper to keep studying. It was harsh to take 80% away. Last year he caught 15,000 pounds and this year he was allocated 1,500. It's hard to take that hit based on old science. There needs to be more sampling before these cuts are made.

Troy Smith: Recreational - Hernando County, FL

He supports the June opening because it's during snapper season. If the goal is to not kill fish unnecessarily during snapper season, then the gag season should be open concurrently. Even if it's a shorter season you can still minimize discards. He can't imagine closing gag during snapper season when a ton of them are going to die. He doesn't believe that the season would only be allowed for two weeks in June; it should run during the entire red snapper season. Snapper season is a huge success and he supports the Council allowing the states to start managing it. Could the states manage gag? The state could manage it and then there could be zone management within the state.

Dan Hosimer: Recreational spearfisherman – Saint Petersburg, FL
He is a member of the St. Pete Underwater Club which has been around for 71 years. He wants to understand how to improve the science. The gag population has vastly improved over the years.

Charlie Ranier: Commercial – Madeira Beach and Key West, FL
He was born and raised in the Keys and he grew up fishing his whole life. All he knows is catching, buying, and selling fish. Every single time he comes to a meeting it's because he is fighting for the fish. He wants his daughter to run the company one day and become third generation owner. When you need to do sampling, he has 30 boats that are almost all longliners and he will do anything to support better science. Since the fish were taken, all the boats have started talking about discards. The longliners catch gags and even though they've made a point to minimize discards, they are trying to support the fishery. You need to tell the Council what is happening because they don't believe us that the stock is healthy. This is scary; he is losing money. Get in touch; he is willing to help because he wants to survive in this business. He started buying quota and boats about six years ago because the thought that owning a fish house, boats, and quota would keep him in business. He's lost three to four million dollars in quota. He was told that the quota system would never allow for a bad year again and he was promised that he wouldn't have to stop fishing. There are lives and families at stake.

Steven Creesie: Recreational spearfisherman
If there is truly only a 2% male population, that would suggest a collapse. However, there is an abundance of fish. We don't know what the normal male sex ratio should be, it might be 2%. We need to find what the normal ratio is so we don't make a management mistake.

Brad Gorst: Charter and Commercial – Clearwater, FL
He has been fishing professionally for 35 years and caught his first grouper 50 years ago. He believes that the recreational season should be set from Thanksgiving through the end of the year. That would give him the best economic value. He would even take a 1-fish haircut to make that happen. The later the season, the shallower they are, so they're going to recover better. In June, if everyone uses descending devices like they should, the discards should be less. Next year, the season might be even shorter depending on what happens this year. He likes the one fish bag limit so you can bring back something, which is better than nothing. Seven years ago, the fishermen asked for the June gag opening (it was July). The biggest issue for the commercial fleet is the allocation. The Council shouldn't take the fish from an accountable fishery and give it to an unaccountable fishery. If the commercial sector can't catch 100% of its quota, then the quota is too high. Allocation shifting is not a solution. Whatever percent is

reallocated won't increase the recreational season significantly. The for-hire data should be separated out and shown because the for-hire guys are professional anglers and handle high volume of fish. Move to a recreational reporting program; use fish tags and collect data that way. You can buy as many tags as you want, but you don't get a new tag until you turn in your old tag in.

Virtual Hearing
May 30, 2023

Council/Staff
CJ Sweetman
Emily Muehlstein
Carly Somerset
Carrie Simmons
Charlotte Schiaffo

21 members of the public attended.
2 members of the public spoke.

Dylan Hubbard: Charter – John's Pass, FL
While we are changing status determination criteria and data currencies we should avoid changing more variables. The science and management is lagging behind what's happening on the water. We are seeing more and more gag every day and the fishery is rebounding. The terminal year of gag stock assessment is killing us. We are hopeful that the science and management will catch up with interim analysis, showing the increase we're seeing. He supports the longest rebuilding timeline to ensure the fishery is fully utilized while we're going through this process. He supports a 22 year rebuild timeline or even longer, if possible. He cautions that the Council should avoid getting in a situation like with greater amberjack where regulations keep changing (bag limits and size limits) with no improvement to the stock. He supports a September 1st opening date. This will avoid derby fishing in the summer where there is a big effort spike on June 1. People hammer gag in the summer in deep water and this would cause a quick closure and be hard for NMFS to manage, possibly leading to a revolving door of payback provisions. Additionally, discards won't go down if we open a June season because the season would be so short; summer discards would continue to be an issue. He also noted that black grouper was added to a future framework action and he wants that to be removed from consideration because anglers are not confuse; it's very easy to identity the difference between the two fish.

Catherine Bruger – Ocean Conservancy
The Council has made it evident that this amendment lacks sufficient management changes that will result in rebuilding success. It's unclear that, even with no fishing, the stock will be rebuilt meaningfully. She is concerned about the lack of options for setting the MSY proxy and would like to see a more precautionary option. At minimum, catch levels should be set using constant catch to add baseline precaution to the vulnerable stock. The document also lacks management actions that address the main drivers of mortality, which include

recreational discards and environmental mortality from red tide. The Council should act to reduce reactional discards now. There was a motion to consider spatial temporal closures, bag limit, and slot limits and this should be done in this document. She encourages the Council to act now, rather than make future plans to address those issues. Regarding the environmental factors she thanks the Council for adding the CVA analysis and hopes to see this included more frequently in future management. Unfortunately, the CVA shows that gag are highly sensitive and vulnerable to environmental disruptions. The Council should include an environmental buffer to directly address these events that will increase in both frequency and duration. Management measures seem to have a low chance of ending overfishing and rebuilding gag, even under the legal obligation to do so.

Written Public Comment Summary

Comments Summarized through May 31, 2023

328 public hearing video views.
50 comments received.

Action 1: Modification of Gulf of Mexico (Gulf) Gag Status Determination Criteria (SDC)

- The Council should explore additional options in Action 1 which set catch at baseline levels and do not proceed with catch increases. A constant catch should be used.
- Support for Alternative 2
    - This is based on the best available scientific information.

Action 2: Gag Catch Limits, Sector Allocation, and Rebuilding Timeline

- Alternative 2
    - It is the only viable and legal alternative.
    - The Reef Fish AP unanimously supported this alternative.
    - Reallocating from an accountable sector to the sector that is responsible for 98% of the discards will not help the recovery of the stock.
    - Reallocation reduces the total amount of fish available for harvest.
    - Reallocation is not fair and equitable because it forces the commercial sector to subsidize dead discards in the recreational sector.
    - Reallocation fails to follow the Council's own Allocation Review Policy.
- Support for Alternative 3
    - The allocation shift makes sense because as Florida's population grows, the number of recreational anglers increases
    - This alternative uses the most recent, best scientific data to calculate allocations.
    - Since SRFS will be used to set catch limits and monitor the fishery, the allocations should be set using the same currency.
- Support for Option b.
- Support for Option c, a 22-year rebuilding timeline

Action 3.1: Recreational ACT

- Support for Alternative 3
    - Precaution should be taken because it will be difficult for NOAA to accurately predict the recreational season closure.

Action 4: Recreational Season and Accountability Measures

- Support for June 1 open date
    - Closing gag during the federal red snapper season is going to have a negative economic effect on charter businesses.
    - In the winter gag are in shallower water and it makes sense to discard them then, instead of in the summer when they'll die.
- Support Alternative 3, a September 1 season open date.
- Dissent for Alternative 3, a September 1 season open date.
    - It would open gag during peak hurricane season
    - It wouldn't solve the summer discard issue
- Support Alternative 4, an October 1 season open date.
    - The weather in September is too hot and requires long offshore runs to target gags. Opening later, when the fish are closer and shallower, will improve survival of discarded fish.
- Support for opening the season as late in the year as possible
    - Smaller boats will be able to target them as they move closer inshore
    - Discards will be reduced
- The gag stock is much healthier than the assessment reflects.
- Inshore gag fishing is the best it's ever been.
- There are more, large gag now then there have been historically.
- Hurricane Ian eliminated numerous boats, reduced access through ramp closures, and limited shrimping in the area protecting the fish and their food source.
- Gags are rebounding and managing with old data is a huge issue.
- The time lag between stock assessments and management actions result in fishing quotas that do not reflect what's happening on the water.
- Recreational landings information is not accurate.
    - A tag system should be considered to manage the recreational sector
    - Recreational reporting should be required
- The Council should obtain better discard data.
- The Council should initiate a process to monitor dead discards and track them against a predetermined annual mortality limit.
- A new assessment of gag should start now.
- Interim analysis should be performed for gag.
    - As soon as possible
    - Annually, for a minimum of 3-years
- Spearfishermen shoot all the keeper size fish, so hook and line fishermen should not be punished.
- Commercial harvest should be prohibited when a stock is overfished.
- There is no evidence to suggest that recreational fishermen have a greater impact than commercial fishing.

- Charter vessels should be limited to one trip a day.
- The Council should consider options which explore closed areas to protect males.
- A slot limit should be considered to protect spawning fish.
- The Council should cut the bag limit to increase the season.
- The rebuilding plan has a low probability of success.
- Proposed changes don't protect gag spawning.
- Consider increasing the gag size limit for both sectors. It's worked for gag in the past and for other species as well.
- There is a vast resource of potential fishermen/diver volunteers that will help gather gag data.

Other Comments

- Population growth in Florida is never addressed by fisheries management amendments.
- Allow harvest of large predatory sharks that are eating discards.
- When you preserve one species it causes effort shifting to other species.
- The Council needs to focus management on species that need rebuilding, like greater amberjack and king mackerel.
- Eliminate sector separation.