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Modification of Catch Limits for Gulf of Mexico Red Snapper

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

Including Environmental Assessment, Regulatory Impact Review, and Regulatory Flexibility Act Analysis

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Framework Action to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico: Modification of Annual Catch Limits for Gulf of Mexico Red Snapper, including Environmental Assessment, Regulatory Impact Review, and Regulatory Flexibility Act Analysis.

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( ) Administrative	( ) Legislative
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This Environmental Assessment is being prepared using the 2020 CEQ NEPA Regulations. The effective date of the 2020 CEQ NEPA Regulations was September 14, 2020, and reviews begun after this date are required to apply the 2020 regulations unless there is a clear and fundamental conflict with an applicable statute. 85 Fed. Reg. at 43372-73 (§§ 1506.13, 1507.3(a)). This Environmental Assessment began on May 16, 2022, and accordingly proceeds under the 2020 regulations.

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
AM	accountability measure
BEA	Bureau of Economic Analysis
BiOp	biological opinion
BLL	bottom long line
B_{msy}	biomass at the maximum sustainable yield
CEQ	Council on Environmental Quality
CFR	code of federal regulations
CHTS	Coastal Household Telephone Survey
CMP	coastal migratory pelagics
Council	Gulf of Mexico Fishery Management Council
CS	consumer surplus
CV	coefficient of variation
Data Calibration FA	Gulf of Mexico Red Snapper Recreational Data Calibration and Recreational Catch Limits Framework Action
DESCEND	Direct Enhancement of Snapper Conservation and the Economy through Novel Devices Act of 2020
DPS	distinct population segment
DWG	Deepwater grouper
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
FMP	Fishery Management Plan
GAMM	generalized additive mixed model
GRSC	Great Red Snapper Count
Gulf	Gulf of Mexico
gw	gutted weight
HAPC	habitat area of particular concern
HCR	harvest control rule
IFQ	individual fishing quota
IPCC	Intergovernmental Panel on Climate Change
KM	king mackerel
LDWF	Louisiana Department of Wildlife and Fisheries
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	maximum fishing mortality threshold

MMPA	Marine Mammal Protection Act
mp	million pounds
MRIP	Marine Recreational Information Program
MSST	minimum stock size threshold
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	overfishing limit
OY	optimum yield
PAH	polycyclic aromatic hydrocarbons
PS	producer surplus
Reef Fish FMP	Fishery Management Plan for Reef Fish Resources in the Gulf of Mexico
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future actions
RIR	regulatory impact review
RQ	regional quotient
Secretary	Secretary of Commerce
SEDAR	Southeast Data and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SPR	spawning potential ratio
SRHS	Southeast Region Headboat Survey
SRV	Submersible Rotating Video
SSB	spawning stock biomass
SSC	Scientific and Statistical Committee
TAC	total allowable catch
TL	total length
TPWD	Texas Parks and Wildlife Department
UCB	uncharacterized bottom
VOC	volatile organic compounds
ww	whole weight

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CHAPTER 1. INTRODUCTION

1.1 Background

A Southeast Data, Assessment, and Review (SEDAR) process was completed in 2018 for Gulf of Mexico (Gulf) red snapper. This stock assessment (SEDAR 52) was reviewed by the Gulf of Mexico (Gulf) Fishery Management Council's (Council) Scientific and Statistical Committee (SSC) in May 2018. Based on the SEDAR 52 assessment, the SSC determined that the Gulf red snapper stock is not overfished or undergoing overfishing, and is on schedule to rebuild to 26% spawning potential ratio (SPR), which is the proxy for biomass at the maximum sustainable yield (B_{MSY}), by the 2032 target date. The 2016 (terminal year of SEDAR 52) stock biomass was estimated to be 18% SPR Gulf-wide, an increase from the previous 14% SPR in 2014. The current overfished threshold, adopted in Amendment 44 to the Fishery Management Plan for the Reef Fish Resources in the Gulf of Mexico (GMFMC 2017), is 50% of the B_{MSY}.

Based on the review of SEDAR 52, the SSC recommended two possible choices for setting the overfishing limit (OFL) and acceptable biological catch (ABC) for 2019-2021: one, a declining yield stream and two, a constant catch approach using the average of the annual OFL and ABC values from 2019 through 2021. The SSC determined that the two methods of calculating OFL and ABC were equivalent within the considered 3-year period and the Council selected the constant catch approach for management (Table 1.1.1). The Council-approved OFL of 15.5 million pounds (mp) whole weight (ww) and ABC of 15.1 mp ww are based on the constant catch method and are still in effect as of September 2022.

Table 1.1.1. SSC recommendations for OFL and ABC from the SEDAR 52 stock assessment of Gulf red snapper (a) declining yield stream or (b) constant catch. The Council selected the constant catch approach for management. Values are in mp ww.

a. Declining Yield Stream		
Year	**OFL**	**ABC**
2019	16.6	16.0
2020	15.4	15.0
2021	14.6	14.3
b. Constant Catch		
Year	**OFL**	**ABC**
2019-2021	15.5	15.1

1.2 Great Red Snapper Count and SSC Review and Recommendations

At its March 2021 meeting, the SSC reviewed the results of the Great Red Snapper Count (GRSC),[1] which was a Gulf-wide collaborative research project to estimate absolute abundance of age-2 and older red snapper in the Gulf. Red snapper abundance sampling was stratified by habitat type, estimated using direct visual counts, acoustic surveys, depletion surveys, and a Gulf-wide tagging program. Absolute abundance estimates from the GRSC were derived for four regions and estimated in numbers of fish. Of the total 110,000,000 red snapper estimated to be present (11% coefficient of variation [CV]), approximately 52% were assessed to occur in the eastern Gulf (i.e., east of Mississippi River), and 48% in the western Gulf. Larger fish were found to be proportionately more abundant in the western Gulf. While no previous effort had been made to enumerate the absolute number of red snapper in the Gulf, the estimate from the GRSC was much larger than historical perceptions of abundance considered in previous stock assessments. The primary difference is that the GRSC surveyed uncharacterized bottom habitat (UCB) that was largely not considered in previous stock assessments. Uncharacterized bottom includes all habitats that fall outside the domains of known artificial and natural reefs. It is recognized that the bottom in many of these areas is made up of unconsolidated sediments of various types that hold low densities of red snapper. However, these areas are vast in extent and may include a significant number of red snapper. The UCB includes soft bottom, hard bottom, and artificial structures that haven't been surveyed, but also hard bottom or artificial structures that were previously unknown until surveyed, but function similar to other observed reefs. Some examples of UCB that were characterized and documented during the GRSC range from an unmarked cargo box that may have fallen off a tanker to low-relief natural limestone outcroppings. Full details of the peer-review of the GRSC by the SSC at its March 2021 meeting can be reviewed on the Council's website.[2]

The Southeast Fisheries Science Center (SEFSC) developed catch projections using GRSC estimates of abundance to scale projections that initially used abundance estimates from the last accepted Gulf red snapper stock assessment, SEDAR 52.[3] The SEFSC also developed an analytical process to provide an interim analysis that used a harvest control rule (HCR) to adjust the catch advice based on an index of relative abundance. Specifically, the HCR compared where the stock seems to be now (observed index value) with where the stock was in the terminal year of the last assessment (reference index value). The chosen HCR adjusted the ABC recommendation based on variation between reference and observed index values. For red snapper, the SEFSC recommended the fishery-independent National Marine Fisheries Service (NMFS) Bottom Longline (BLL) index for use in the HCR because of its widespread spatial coverage, consistent sampling design, long time-series, and prevalence of red snapper in the survey. The SEFSC prepared an interim analysis for red snapper based on a Gulf wide NMFS BLL index with data from 2000 – 2020. The SSC reviewed the results of the both analyses, which suggested that the stock might be able to support more removals than previously thought.

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[1] https://www.harte.org/snappercount
[2] https://gulfcouncil.org/wp-content/uploads/Gulf-SSC-Summary-March-April-2021-04092021.pdf
[3] https://sedarweb.org/sedar-52-gulf-mexico-red-snapper-final-stock-assessment-report

With respect to the projections from the GRSC analysis, the SSC noted that fish occupying UCB have historically faced lower fishing mortality than fish occupying known natural and high relief artificial reefs. Thus, basing harvest levels on the entire population may lead to localized depletion on reefs as the overwhelming majority of harvest would be expected to occur on this habitat. However, it is likely that some harvest does occur in the UCB and a subset of the abundance could be included into the "harvestable" population in terms of setting catch advice. Modeling runs estimated that 13% of the sampling sites in the UCB were considered highly suitable and this value was used in the spreadsheet projections. Thus, a catch recommendation scenario was developed based on the abundance of all red snapper over structure (artificial reef, natural reef, and pipeline) and 13% of the abundance estimated to occur on the UCB. Using an $F_{SPR\ 26\%}$ (i.e., maximum sustainable yield proxy for red snapper), the OFL recommendation was 25.6 mp ww in Marine Recreational Information Program (MRIP)-Coastal Household Telephone Survey (CHTS) units[4] based on the GRSC interim analysis using a three-year average of projected biomass.

To provide an ABC recommendation, the SSC determined that it was appropriate to use the NMFS BLL interim analysis. From the SEDAR 52 stock assessment, the SSC set the OFL at 15.5 mp ww, and the ABC at 15.1 mp ww, given constant catch projections for 2019 – 2021 and subsequent years. The NMFS BLL survey index (including 2020 or excluding 2020 due to reduced spatial sampling from COVID-19), shows that the highest Gulf-wide abundance of red snapper was in 2016 and has declined since. Similar trajectories in projected biomass in the eastern Gulf with reduced area sampled in 2020 indicate that reduced sampling had little effect on abundance estimates in the eastern Gulf. In the western Gulf, the decline in the 2020 index value was likely because no sampling was performed due to COVID-19.

The SSC considered two main decision points for selecting an ABC based on the NMFS BLL interim analysis: the selection of an index terminal year (2019 or 2020), and the selection of a 3 or 5-year average for the harvest control rule. An SSC member thought that 2020 data should not be used for this interim analysis, given the low sample size and high coefficient of variation (CV) for the data for that year. Moreover, the SSC recommended that the catch advice be derived from the 5-year average. Based on these selections the SSC provided an ABC recommendation of 15.4 mp ww for 2021 in MRIP-CHTS units. This recommendation reflects the SSC determination that the ABC should be considerably more conservative than the current difference between OFL and ABC (i.e., approximately 2.58%), reflecting the uncertainties in the advice based on the interim analysis catch advice derived from absolute abundance estimates from the GRSC and the declining trend in the NMFS BLL survey.

At its April 2021 meeting, the Council approved the adjustments to the red snapper catch limits. The Council chose to modify the red snapper OFL, ABC, annual catch limits (ACL), and recreational annual catch targets (ACT) based on the OFL and ABC recommendation of the

[4] The term "MRIP-CHTS units" is used to signify that the catch limits are based on an assessment that incorporated a historical time series of recreational landings estimates that are consistent with those produced using MRIP-CHTS, and to distinguish landings estimates produced using the more recent MRIP Fishing Effort Survey. Any changes to the red snapper historic time series of recreational landings estimates will be made through the next stock assessment, which is scheduled to be complete at the end of 2023.

SSC. The OFL choice was based on the interim analysis informed by the results of the GRSC. The ABC was based on the fishery-independent NMFS BLL survey-informed interim analysis. The Council chose to set the stock ACL equal to the ABC (Table 1.2.1), which is consistent with the Council's general practice when a stock is not overfished or experiencing overfishing.

Table 1.2.1. Council-approved OFL, ABC, and ACL (in pounds whole weight) based on the SSC-recommended OFL and ABC.

Year	OFL	ABC	Stock ACL
2021	25,600,000	15,400,000	15,400,000

1.3 Revised GRSC Estimates, LGL Study, and SSC Review and Recommendations

At its September 2021 meeting, the SSC reviewed the results of the LGL Ecological Associates, Inc. study to estimate the absolute abundance of red snapper in state and federal waters adjacent to the State of Louisiana (LGL study), which was commissioned by the Louisiana State Legislature and funded by the Louisiana Department of Wildlife and Fisheries (LDWF). The purpose of the study was to enhance the results from the GRSC (Stunz et al. 2021), and to better inform the state about its adjacent natural resources for improving fisheries management.

The Louisiana Red Snapper Management Area (study area) was divided into three regions (West, Central, and East) and each zone was divided into four depth zones (10 – 25 m, 25 – 45 m, 45 – 100 m, and 100 – 150 m). Sampling occurred during the summer and fall months of 2020. The study area was dominated by mud with much lesser amounts of sand and gravel substrate. Hydroacoustic sampling focused on target species assemblages (reef fish), and excluded sharks and non-target species. Fish density was measured as the number of fish per cubic meter, per each acoustic 20-meter by 10-meter cell. Fish density was calculated and converted to abundance using the volume of water investigated, with the proportioned abundance determined using camera data. Submersible Rotating Video sampling was deployed at discrete sites near structure at predetermined depths to match hydroacoustic sampling. Target drops with video gear were used to opportunistically capture fish assemblages at points of interest, with all fish identified to the lowest possible taxon. Vertical hook-and-line sampling was conducted at platforms, artificial reefs, and natural banks. All fish were processed for weight, length, and sex, and otoliths for red snapper were extracted. Mark-recapture sampling was performed at 6 sites (3 oil and gas platforms and 3 artificial reefs).

The study quantified total fish density and the proportional density of red snapper separately by stratum before being combined and extrapolated, which aided in minimizing the sampling error from magnification. Model outputs were then multiplied for each stratum and random error in red snapper estimates generated across sites before being multiplied by total fish density. A subsequent measure of red snapper by cubic meter was estimated as the product of the proportional red snapper and total fish density model outputs. Diagnostic results indicated that models tended to overpredict red snapper estimates, especially at deep depths.

The SSC noted that a direct comparison of the LGL study and the GRSC study was not appropriate due to differences in methods. An SSC member noted that the LGL study may be underestimating the number of small fish substantially, and may also be underestimating the number of large fish to some degree, especially when comparing stereo camera surveys to hook-and-line surveys. Smaller fish are expected to be more prevalent in shallower zones, which were not sampled as intensively as deeper zones in the LGL study. SSC members agreed that the best method of review and consideration of the universe of all these data would be through the SEDAR process. Several SSC members commented that the difference in estimates of absolute abundance was likely heavily influenced by the catch rates observed between the two studies. Bottom longline gear exhibits a dome-shaped selectivity, which may account for underestimation of red snapper at the extremes of the length distribution. Additionally, the presented comparisons between length distribution in the LGL study with those reported by the GRSC from Florida are not directly comparable since the Florida length distributions were obtained using stereo cameras.

The SSC discussed the limitations of interpreting the LGL studies results without fully understanding the rationale of the sampling design. The 106 sites used were proffered by staff from LDWF but no documentation for that decision had been made available. The SSC requested a written document from LDWF that would detail the rationale for the selection of these sites. The SSC also asked that the sampling allocation (e.g., the number of samples compared to the total number of samples taken) by strata be detailed in any synthesis of sample site selection. Specific to the LGL study, the SSC thought more information was needed before it could be considered for informing management.

At its March 2022 meeting, the SSC reviewed the study design and the revised results of the LGL study, a post-stratification analysis for the GRSC-derived absolute abundance estimate for Florida, and the revised SEFSC-generated catch analysis using these data. LGL presented their completed research to generate an estimate of absolute abundance of red snapper off Louisiana, noting that their study was designed for model-based inference of red snapper abundance through field surveys. In response to the SSC's previous request, LGL provided justification for their choice of sampling sites. The initial sites were chosen by LDWF and additional sites were included from a previous LGL study contracted by the Bureau of Energy Management. The primary objective of the site selection process was to choose samples representative of the population while reducing costs to within budgetary constraints. As such, the site selection process sacrificed randomness for some habitat types. Site selection was not informed or influenced by any prior assumptions of red snapper density. However, some sites were purposefully selected to ensure representation of certain habitat types. To address the reduced randomness of site selection inherent in the sampling design, and account for any autocorrelation associated with sampling a platform site using two survey methodologies, a model-based inference approach was implemented. This approach requires incorporation of all important explanatory variables and their interactions in the model.

A generalized additive mixed model[5] (GAMM) was used to account for the stratification of the sampling units (depth), and "sampling site" was included as a random effect to address any correlation within site samples. Five habitat types (artificial reefs, natural banks, UCB, and oil platforms; pipelines were ultimately reassigned to adjacent strata) were evaluated within depth strata across the Gulf (west, central, and east).

The SSC discussed the differences in the LGL and GRSC estimates for absolute abundance recorded for Louisiana, noting the limitations of the sampling design in the LGL study and the imputation of some Louisiana data from Texas in the GRSC. The comparability of the studies, due to these differences, remains difficult. However, the SSC thought that in general, the differences between the surveys highlights the uncertainty in both estimates, which is likely underestimated. The LGL study was designed to focus on the present habitats off Louisiana, and likely represented a better estimate for that area compared to the same for the GRSC (empirically collected versus partially imputed, respectively).

The SEFSC presented the results from the post-stratification analysis of red snapper absolute abundance estimates in the west Florida shelf from the GRSC, with the purpose being to assign fish to the depth strata where they are observed in other fishery-independent and -dependent surveys. This effort was driven by concerns of higher than expected estimated numbers of fish in the shallow water stratum off Florida. The data were post-stratified from 10 – 40 m to 10 – 25 m and 25 – 40 m. This was done for each Gulf state. In Florida, the analysis still estimated larger relative abundance in the Big Bend region, as well as a larger number of fish in the 25 – 40 m depth bin rather than at 10 – 25 m. Ultimately the SSC agreed that the post-stratification analysis was appropriate and should be included in the calculation of the overall estimate of age 2+ red snapper in the Gulf, informed by the finalized GRSC data and random forest design. The SSC also decided that the LGL study would be an improvement over using the Louisiana GRSC study data in the GRSC study for conducting subsequent catch analyses.

The SEFSC presented their revised catch advice for red snapper based on the estimates of absolute abundance derived from the GRSC for Florida, Alabama, Mississippi, Texas, and the LGL study for Louisiana. This catch analysis uses the post-stratified re-analysis of the GRSC-derived data for Florida. The terminal year of data for the analysis was 2019, with future yields projected forward from that point. After accounting for the inclusion of the LGL estimate and the post-stratification of the Florida estimate from the GRSC-derived estimate using the random forest approach, the revised combined estimate of absolute abundance of age-2+ red snapper was approximately 85.6 million fish Gulf-wide. The SEFSC took the revised absolute abundance estimate (85.6 million fish) and generated annual catch yields for both a three-year and a five-year average. Three scenarios for considering the abundance over the UCB were generated: assuming all structure (e.g., all natural and artificial habitats), all structure plus 10% of the UCB,

[5] A generalized additive model (GAM) is a linear model with a key difference when compared to generalized linear models such as linear regression. A GAM is allowed to learn non-linear features. GAMs relax the restriction that the relationship must be a simple weighted sum, and instead assume that the outcome can be modelled by a sum of arbitrary functions of each feature. To do this, beta coefficients from Linear Regression are replaced with a flexible function which allows nonlinear relationships (Towards Data Science, 2021). GAMMs are an extension of GAMs incorporating random effects. They are widely used to model correlated and clustered responses (Groll and Tutz, 2012).

and all structure plus 15% of the UCB. Age and length composition data were informed by SEDAR 52, using data through 2016. An additional option, which was an ensemble (all artificial and natural structures, plus ~8% UCB fished) approach estimated a grand mean and variance for the catch advice and provided a broader estimate of uncertainty across the three UCB scenarios.

The SEFSC also presented spatial analyses ("Gardner analysis") of commercial and recreational catch compared to biomass derived from the GRSC. The Gardner analysis relied on the spatial distribution of red snapper from the Karnauskas et al. (2017) study, which derived spatial abundance from data from 2010 and 2011. However, the GRSC abundance data by depth strata and zone are derived from observations made in 2018 – 2019. The Gardner analysis was updated to use the LGL study estimate for Louisiana, and to post-stratify the shallowest depth stratum in Florida. The Gardner analysis indicted that the majority of the stock (greater than 50%) experiences very low exploitation (less than 1%) by the directed fleets, with the greatest mean exploitation rates observed in Alabama, Mississippi, and Northwest Florida. The SEFSC verified that fishing mortality rates were lower than those estimated during SEDAR 52 because of the increased biomass estimated across all habitats, compared to the fleet-specific fishing mortality rates estimated by SEDAR 52, which were predominantly from high-relief areas. The SSC acknowledged that the density and distribution of red snapper in the Gulf had likely changed between the completion of the Karnauskas et al. 2017 study and the GRSC. The SSC also noted that other aspects of population dynamics, like recruitment, reproduction, updates to age and length compositions, and other information have not been updated with current information, as is customary from a stock assessment.

Some SSC members thought the issue of localized depletion should be considered by the Council, as evidenced by spatial effort estimation and mark-recapture studies, including those conducted as part of the GRSC. Further, some SSC members thought the average size of red snapper in the eastern Gulf was decreasing. The SSC thought it prudent to continually evaluate the condition of the red snapper stock to the extent practicable, adding that the previously unaccounted biomass of red snapper recently identified by the GRSC and LGL surveys may explain why a stock-recruit relationship was not previously able to be discerned, and why the stock appeared as resilient as it was to fishing pressure. The SSC ultimately determined that the catch analysis developed by the SEFSC and informed by age-2+ red snapper abundance from the GRSC for Texas, Alabama, Mississippi, and the post-stratified abundance data for Florida, and from the LGL study for Louisiana, is the best scientific information available for abundance information and useful for development of OFL and ABC recommendations. Subsequently, the SSC recommended an OFL based on the ensemble analysis using the 5-year average of 18.91 mp ww (Table 1.3.1).

In determining an appropriate ABC recommendation, the SSC noted the uncertainties in data used in the catch analysis, and the catch analysis itself. The SEFSC discussed the decreasing trend in the NMFS BLL survey in the eastern Gulf (since 2017) and the issue of possible localized depletion. The SSC noted that although the eastern and western Gulf NMFS BLL survey data appear scaled in the same manner, the catches in the western Gulf are much greater than in the eastern Gulf, and the western Gulf age and length compositions show older, larger fish. Thus, the eastern and western Gulf data were not comparable as presented. Council staff described the selectivity of the sampling gear, noting that the NMFS BLL survey tends to select

for larger, older fish, while the SEAMAP and Florida Fish and Wildlife Commission video surveys select for different age and length compositions dependent on their depth deployments (deeper water = larger, older fish, and vice versa). The combined Gulf-wide NMFS BLL index of relative abundance shows an increasing trend through the mid-2010s, and a leveling off thereafter. Council staff noted that the NMFS BLL survey selects for larger and older fish using 15/0 circle hooks and was not the most appropriate survey for catching all lengths of red snapper (especially the younger and smaller red snapper putatively more prominent in the eastern Gulf), as evidenced by its exclusion from the exploitation analysis in the Gardner analysis. The SSC recommended an ABC of 16.31 mp ww for red snapper, based on the 5-year average using the ensemble approach, and based on a P* value of 0.3 (Table 1.3.1).

Table 1.3.1. March 2022 SSC-recommended OFL and ABC (pounds whole weight) advice from the SSC for 2022 and subsequent years.

Year	OFL	ABC
2022	18,910,000	16,310,000

1.4 Current Gulf Red Snapper Management and Landings

The Gulf red snapper stock is currently under a rebuilding plan. Consistent with this rebuilding plan, both commercial and recreational catch limits have been allowed to increase as the stock has recovered. Red snapper landings for the commercial and recreational sectors in pounds (lbs) ww for the years 2001 through 2021 are given in Table 1.4.1. The 2021 recreational landings are considered provisional and have not yet been finalized. Recreational landings are in MRIP-CHTS units. The recreational sector ACL is further divided into component and state ACLs. In 2015, the recreational sector ACL was divided into a private angling component and a federal for-hire component (GMFMC 2014), which receive 57.7% and 42.3%, respectively. The federal for-hire component consists of fishermen fishing from vessels with a federal charter/headboat permit for Gulf reef fish. The private angling component consists of fishermen fishing from privately owned and rented vessels, and for-hire vessels (charter boats and headboats) without a federal permit (i.e., state-licensed for-hire vessels). For-hire vessels without federal permits may not fish for red snapper in federal waters. The private angling ACL is divided into five state ACLs for each of the Gulf states, and each state has been delegated the authority to manage its portion of the private angling ACL. The delegation provision specifies an accountability measure (AM) that requires any overage of a state's ACL be deducted in the following year contingent on the best scientific information available. The federal for-hire ACT is set 9% below the component ACL and used to determine the duration of the for-hire component season. The private angling ACT is set 20% below the ACL and remains in place as part of the default federal regulations that would apply in the event the state's delegation is no longer in effect.

Table 1.4.1. Red snapper landings for the commercial and recreational sectors (in MRIP-CHTS) in pounds whole weight for the years 2001 through 2021.

Year	Commercial	For-Hire	Private Angling	Recreational Total
2001	4,638,087	2,404,653	2,877,533	5,282,186
2002	4,797,144	3,503,625	3,051,803	6,555,428
2003	4,432,297	3,138,399	2,998,835	6,137,234
2004	4,671,302	3,206,803	3,228,439	6,435,242
2005	4,105,622	2,383,084	2,210,569	4,593,653
2006	4,679,893	2,480,471	1,709,911	4,190,382
2007	3,182,731	2,662,717	3,191,247	5,853,964
2008	2,483,603	1,627,797	2,478,110	4,105,907
2009	2,483,565	2,235,562	3,396,531	5,632,093
2010	3,392,209	786,197	1,822,384	2,608,581
2011	3,594,552	1,840,603	4,941,321	6,781,924
2012	4,036,398	2,246,868	5,369,594	7,616,462
2013	5,448,544	1,703,768	7,999,134	9,702,902
2014	5,567,822	599,154	3,085,813	3,684,967
2015	7,184,210	1,998,226	3,785,851	5,784,077
2016	6,723,823	2,139,008	5,047,118	7,186,126
2017	6,978,662	2,339,896	6,331,551	8,671,447
2018	6,977,131	2,441,612	4,849,727	7,291,339
2019	7,658,140	2,558,734	5,434,757	7,993,491
2020	7,625,612	2,376,677	3,886,220	6,262,897
2021*	6,937,838	2,651,883	4,286,449	6,938,332

Source: Commercial landings from the IFQ database (2007-2022) and the SEFSC Commercial ACL File (2001-2006). Recreational component landings (2001-2021) are from the SEFSC Recreational ACL File (September 14, 2020). Landings include data from MRIP CHTS, Southeast Region Headboat Survey (SRHS), LA Creel, and Texas Parks and Wildlife Department.
* 2021 landings are preliminary.

Beginning in 2007, the commercial sector's harvest of red snapper has been managed through an individual fishing quota (IFQ) program that distributes the commercial ACL as pounds of allocation to shareholders (GMFMC 2006). The IFQ program serves as an AM and a buffer below the ACL and is not used to constrain harvest.

Table 1.4.2 provides a breakdown of the catch limits for Gulf red snapper from the OFL to the state-specific ACLs. If the OFL and ABC are modified, the remaining catch limits would be determined through established calculations as shown in the table. The Council has set the stock ACL equal to the ABC. The stock ACL is divided between the commercial (51%) and recreational (49%) sectors. The recreational sector ACL is further subdivided between the for-hire component (42.3% of recreational ACL) and the private angling component (57.7%). The private angling ACL is divided into five state ACLs for each of the Gulf states, and each state has been delegated the authority to manage its portion of the private angling ACL (GMFMC

2019a). The delegation provision specifies an AM that requires any overage of a state's ACL be deducted in the following year contingent on the best scientific information available. The federal for-hire ACT is set 9% below the for-hire component ACL and is used to determine the duration of the for-hire component's fishing season. The private angling ACT is set 20% below the ACL and remains in place only as part of the default federal regulations that would apply in the event a state's delegation is no longer in effect.

Table 1.4.2. Current Gulf red snapper catch limits by type and sector in pounds whole weight.

Catch Limit Type	Current Catch Limits (lbs ww)	Calculation
OFL	15,500,000	N/A
ABC	15,100,000	2.581% less than OFL
Stock ACL	15,100,000	ACL = ABC
Commercial ACL	7,701,000	51% of ABC
Recreational ACL	7,399,000	49% of ABC
Federal For-Hire ACL	3,130,000	42.3% of Recreational ACL
Federal For-Hire ACT	2,848,000	9% less than For-Hire ACL
Private Angling ACL	4,269,000	57.7% of Recreational ACL
Private Angling ACT	*3,415,200*	*20% below Private Angling ACL*
Florida ACL	1,913,451	44.822% of Private Angling ACL
Alabama ACL	1,122,662	26.298% of Private Angling ACL
Mississippi ACL	151,550	3.55% of Private Angling ACL
Louisiana ACL	816,233	19.12% of Private Angling ACL
Texas ACL	265,105	6.21% of Private Angling ACL

Note: The private angling ACL is currently managed through individual ACLs for each of the five Gulf states. A private angling ACT is not currently used for management, but remains in place as part of the default federal regulations that would apply to a state in the event the state's delegation is no longer in effect.

1.5 Purpose and Need

The purpose is to modify the Gulf red snapper catch limits including the OFL, ABC and stock ACL, sector ACLs, and sector ACTs based on the 2022 catch analysis completed by the SEFSC and approved as the best scientific information available by the SSC.

The need for this action is to use the best scientific information available to prevent overfishing while achieving optimum yield, consistent with the red snapper rebuilding plan and the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

1.6 History of Management

The **Fishery Management Plan (FMP) for Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP)** was implemented in November 1984. The original list of species included in the management unit consisted of snappers, groupers, and sea basses. This summary focuses on

management actions pertinent to catch limits of red snapper. A complete history of management for the **Reef Fish FMP** is available on the Council's website[6] including other actions affecting red snapper management (GMFMC 1984).

In 1990, **Amendment 1** established the first red snapper rebuilding plan. From 1990 through 2009, red snapper harvest was managed using an annual total allowable catch (TAC), which was divided 51% to the commercial and 49% to the recreational based on the average of historical landings during 1979 through 1987. Amendment 1 also established a commercial red snapper quota of 3.1 mp ww. There was no recreational quota specified, only a bag limit of seven fish and a minimum size limit of 13 inches total length (TL) (GMFMC 1989). Based on the 51:49 commercial to recreational sector allocation, the commercial quota implied a TAC of approximately 6.1 mp ww in 1990, followed by explicit TACs of 4.0 mp ww in 1991 and 1992, 6.0 mp ww in 1993 through 1995, and 9.12 mp ww from 1996 through 2006. The TAC was reduced to 6.5 mp ww in 2007 and 5.0 mp ww in 2008 and 2009 (GMFMC 1990).

The **Generic Sustainable Fisheries Act Amendment** (GMFMC 1999) required the establishment of quotas for recreational and commercial fishing that, when reached, result in a prohibition on the retention of fish caught for each sector for the remainder of the fishing year. With the establishment of a recreational quota in 1997, the NMFS Southeast Regional Administrator was authorized to close the recreational season for each species when the quota is reached, as required by the Magnuson-Stevens Act.

In 2006, **Amendment 26** established a red snapper IFQ program for the commercial sector. Commercial fishermen received red snapper shares based on their catch history. Allocation of the annual commercial harvest of red snapper is awarded to IFQ shareholders each year based on the commercial ACL and how many shares they hold. They are then able to fish that allocation throughout the year until they run out of allocation. Both shares and allocation are transferable, so a fisherman may purchase either shares or allocation from another fisherman during the fishing year (GMFMC 2006).

From 2010 through 2012, the SSC recommended the red snapper ABC at 75% of the OFL and the Council set the ACL equal to the ABC (GMFMC 2012). In 2010, the total ACL was increased to 6.945 mp ww. This increased the commercial quota from 2.550 mp ww to 3.542 mp ww and the recreational quota from 2.450 mp ww to 3.403 mp ww. In 2011, the ACL was raised to 7.185 mp ww, resulting in a 3.664 mp ww commercial quota and a 3.525 mp ww recreational quota. On August 12, 2011, NMFS published an emergency rule that, in part, increased the recreational red snapper quota by 345,000 lbs for the 2011 fishing year.

In 2012, the SSC recommended that the ABC should be set at the yield corresponding to 75% of $F_{SPR26\%}$. The Council set the ACL equal to the ABC, which increased the ACL to 8.080 mp ww, resulting in a commercial quota of 4.121 mp ww and recreational quota of 3.96 mp ww (GMFMC 2012).

[6] https://gulfcouncil.org/fishery-management/implemented-plans/reef-fish/

The **Generic ACLs/AMs Amendment** (GMFMC 2011a) addressed a requirement in the Magnuson-Stevens Reauthorization Act of 2006 to establish ACLs and AMs for federally managed species.

A scheduled ACL increase in 2013 to 8.69 mp ww was cancelled due to an overharvest in 2012 by the recreational sector. After an analysis of the impacts of the overharvest on the red snapper rebuilding plan, the 2013 ACL was increased to 8.46 mp ww. In July 2013, the SSC reviewed a new benchmark assessment (SEDAR 31 2014), which showed that the red snapper stock was rebuilding faster than projected. The SSC used Tier 1 of the ABC and the rebuilding yield level was set as the yield that would rebuild the stock to 26% SPR by 2032 under a constant fishing mortality rate strategy ($F_{rebuild26\% SPR}$) (GMFMC 2013). This increased the ABC for 2013 to 13.50 mp ww, but the SSC warned that the catch levels would have to be reduced in future years if recruitment returned to average levels. To reduce the possibility of having to decrease the ACL later, the Council set the 2013 stock ACL to 11.00 mp ww and the commercial quota at 5.61 mp ww and the recreational quota at 5.39 mp ww. Beginning in 2014, the recreational season length was set using an ACT that is 20% below the recreational ACL. A post-season AM that required an overage adjustment if the recreational ACL was exceeded if the stock was overfished was also implemented in 2014. The total ACL was set at 10.40 mp ww in 2014, 14.30 mp ww in 2015, 13.96 mp ww in 2016, and 13.74 mp ww in 2017 and subsequent years.

Amendment 40 divided the recreational quota into a federal for-hire component quota (42.3%) and a private angling component quota (57.7%) (GMFMC 2014). In 2015, this resulted in an ACT of 2.371 mp ww for the federally permitted for-hire component and 3.234 mp ww for the private angling component. The amendment also included a 3-year sunset provision on the separation of the recreational sector into distinct components. **Amendment 45** extended the separate management of the federal for-hire and private angling components for an additional 5 years through the 2022 red snapper fishing season (GMFMC 2016). In 2018, the ACT and ACL were 2.278 mp ww and 2.848 mp ww for the federally permitted for-hire component, and 3.108 mp ww and 3.885 mp ww for the private angling component.

For 2018, NMFS established a 51-day red snapper fishing season for the federal for-hire component [83 FR 17623] based on the component's ACT. For the private angling component, the 2018 and 2019 red snapper fishing seasons were set by the individual states through exempted fishing permits (EFP) approved by NMFS. The EFPs allocated a portion of the private-angling ACL to each state for harvest during the 2018 and 2019 fishing years.[7]

Amendment 36A (GMFMC 2017) modified the commercial IFQ programs. It included a provision that allows NMFS to withhold a portion of IFQ allocation at the start of the year equal to an anticipated quota reduction, which became effective in 2018.

A 2018 Framework Action titled **Modification of the Recreational Red Snapper Annual Catch Target Buffers** reduced the federal for-hire buffer by setting the ACT at 9% below the component's ACL for the 2019 fishing season only.

[7] For more information: https://www.fisheries.noaa.gov/southeast/state-recreational-red-snapper-management-exempted-fishing-permits

Amendments 50A-F (GMFMC 2019a-f) became effective February 6, 2020, establishing a state management program in each Gulf state for the private angling component's harvest of red snapper. Under Amendments 50A-F, each Gulf state is responsible for managing its annual allocation of the private angling component ACL for red snapper using size limits, bag limits, and seasonal closures. If a state exceeds its allocation in a given fishing year, then the amount of the overage would be deducted from that state's quota for the following fishing year. The individual Gulf states are responsible for their own quota monitoring, and each has a data collection program in place to monitor that state's private angling landings. The individual states would determine if additional catch limit buffers (e.g., an ACT set lower than an ACL, with the fishing season based on the ACT) are necessary to successfully manage that state's allocated quota. A private angling ACT remains in place in the event a state's delegation is no longer effective. The federal for-hire component's harvest of red snapper will continue to be federally managed.

A Framework Action implemented in 2019 titled **Modify Red Snapper and Hogfish Catch Limits** increased the ACL for red snapper for 2019 and subsequent years. In 2019 another Framework Action titled **Modification to the Recreational For-hire Red Snapper ACT Buffer** established a federal for-hire ACT 9% below the component's ACL, extending the buffer reduction adopted through the 2018 Framework Action.

A 2021 Framework Action titled **Gulf of Mexico Red Snapper Recreational Data Calibration and Recreational Catch Limits** was transmitted in June 2021, and would modify recreational catch limits for the state-specific private angling ACLs beginning January 1, 2023. Another 2021 Framework Action titled **Modification of Annual Catch Limits for Gulf of Mexico Red Snapper** would increase the ACLs for red snapper after implementation. A proposed rule to implement these two framework actions was published on June 28, 2022. As of the date of this framework action, a final rule has not yet been published.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1: Modification of Gulf of Mexico (Gulf) Red Snapper Catch Limits

Alternative 1: No Action. The red snapper overfishing limit (OFL), acceptable biological catch (ABC), annual catch limits (ACL) and recreational annual catch targets (ACT) will remain at current levels (implemented in 2019), as shown in the table below:

Catch Limit Type	Current Catch Limits	Calculation
OFL	15,500,000	N/A
ABC	15,100,000	2.581% less than OFL
Total ACL	15,100,000	ACL = ABC
Commercial ACL	7,701,000	51% of ABC
Recreational ACL	7,399,000	49% of ABC
Federal For-Hire ACL	3,130,000	42.3% of Recreational ACL
Federal For-Hire ACT	2,848,000	9% less than For-Hire ACL
Private Angling ACL	4,269,000	57.7% of Recreational ACL
Private Angling ACT	*3,415,200*	*20% below Private Angling ACL*
Florida ACL	1,913,451	44.822% of Private Angling ACL
Alabama ACL	1,122,662	26.298% of Private Angling ACL
Mississippi ACL	151,550	3.55% of Private Angling ACL
Louisiana ACL	816,233	19.12% of Private Angling ACL
Texas ACL	265,105	6.21% of Private Angling ACL

Note: Values are in pounds whole weight. Recreational catch limits are in MRIP-CHTS units. A private angling ACT is not currently used for management, but remains in place as part of the default federal regulations that would apply to a state in the event the state's delegation is no longer in effect.

Preferred Alternative 2: Modify the red snapper OFL, ABC, ACLs, and recreational ACTs for 2022 and subsequent years based on the OFL and ABC recommendation of the Scientific and Statistical Committee (SSC) at the March 8 – 10, 2022, SSC meeting. These catch limits are based on data derived from the Great Red Snapper Count (GRSC), including a post-stratification analysis of the data for Florida, and on the LGL Ecological Associates, Inc. study (LGL study) of the absolute abundance of red snapper off Louisiana.

Catch Limit Type	Current Catch Limits	Calculation
OFL	18,910,000	N/A
ABC	16,310,000	13.7% less than OFL
Total ACL	16,310,000	ACL = ABC
Commercial ACL	8,318,100	51% of ABC
Recreational ACL	7,991,900	49% of ABC
Federal For-Hire ACL	3,380,574	42.3% of Recreational ACL
Federal For-Hire ACT	3,076,322	9% less than For-Hire ACL
Private Angling ACL	4,611,326	57.7% of Recreational ACL
Private Angling ACT	*3,689,061*	*20% below Private Angling ACL*
Florida ACL	2,066,889	44.822% of Private Angling ACL
Alabama ACL	1,212,687	26.298% of Private Angling ACL
Mississippi ACL	163,702	3.55% of Private Angling ACL
Louisiana ACL	881,686	19.12% of Private Angling ACL
Texas ACL	286,363	6.21% of Private Angling ACL

Note: Values are in pounds whole weight. Recreational catch limits are in MRIP-CHTS units. A private angling ACT is not currently used for management, but remains in place as part of the default federal regulations that would apply to a state in the event the state's delegation is no longer in effect. Changes in the respective Gulf states' ACLs are being considered in a June 2021 framework action to address issues related to calibration of recreational data among the various state data collection programs.

Discussion:

The SSC met March 8 – 10, 2022, to review the GRSC-derived estimate of absolute abundance of age-2+ red snapper, a post-stratification analysis of those data for Florida, and the LGL study of absolute abundance of age-2+ red snapper for Louisiana; these data were used to generate catch advice in a simulation produced by the Southeast Fisheries Science Center (SEFSC).

The SSC recommended the OFL for Gulf red snapper be 18.91 million pounds whole weight (mp ww), and the ABC be 16.31 mp ww, using recreational landings in Marine Recreational Information Program (MRIP) Coastal Household Telephone Survey (CHTS) units based on the amalgamated analyses developed by SESFC, and using a 5-year average at a fishing mortality rate corresponding to a 26% spawning potential ratio ($F_{SPR26\%}$).

Alternative 1 (No Action) would maintain the OFL equal to 15.5 mp ww. The ABC and stock ACL would remain at 15.1 mp ww. **Alternative 1** would maintain the current ACL for the

commercial sector at 7.701 mp ww, and the current recreational ACL at 7.399 mp ww. It would maintain the current ACL for the private angling component at 4.269 mp ww, and the current ACT and ACL for the federal for-hire component at 2.848 and 3.130 mp ww. The private angling ACL is currently managed through individual ACLs for each of the Gulf states. A private angling ACT is not currently used for management, but remains in place as part of the default federal regulations that would apply in the event a state's delegation is no longer in effect. The private angling ACT is currently set at 3.415 mp ww. **Alternative 1** does not incorporate the most recent SSC recommendations.

In June 2021, the Gulf of Mexico Fishery Management Council transmitted framework actions to modify recreational catch limits for the state-specific private angling ACLs beginning January 1, 2023[8] (Data Calibration FA), and to modify the ACLs for Gulf red snapper for 2021 and subsequent years[9] (Catch Limits FA) based on SSC recommendations from the SSC's March 30 – April 2, 2021, meeting. The Data Calibration FA would use calibration ratios to modify the state-specific private angling ACLs to a common data currency for quota monitoring and stock assessment purposes. The Catch Limits FA would increase the Gulf red snapper OFL to 25.6 mp ww based on the GRSC, and the ABC to 15.4 mp ww based on an SEFSC interim analysis using its National Marine Fishery Service's (NMFS) Bottom Longline survey. NMFS published a proposed rule to implement these two framework actions on June 28, 2022 (87 FR 38366). As of the date of this framework action, NMFS has not yet published a final rule.

Preferred Alternative 2 would incorporate the results of the GRSC-derived estimate, the post-stratification analysis of those data for Florida, and the LGL study as used in the catch analysis produced by the SEFSC and reviewed by the SSC. It would specify an OFL of 18.91 mp ww and an ABC of 16.31 mp ww for Gulf red snapper in 2022 and subsequent years, consistent with the SSC's recommendations. In comparison to **Alternative 1**, **Preferred Alternative 2** would increase the OFL by 3.41 mp ww and the ABC by 1.21 mp ww for 2022 (Table 2.1.1). Like **Alternative 1,** the sector and component allocations would remain unchanged and each sector and component would receive an increase in their respective ACLs. Although not used for management, a private angling component ACT of 3,689,061 pounds (lbs) ww would be specified as part of the default federal regulations that would apply in the event a state's delegation is no longer in effect.

[8] https://gulfcouncil.org/wp-content/uploads/B-8a-Red-Snapper-Data-Calibration-and-ACL-Modification-04072021.pdf

[9] https://gulfcouncil.org/wp-content/uploads/FINAL-DRAFT-Red-Snapper-and-Hogfish-ACL-Modification-101918.pdf

Table 2.1.1. Changes to the OFL, ABC, ACLs, and ACT for red snapper for **Preferred Alternative 2** relative to **Alternative 1**. Values are in pounds whole weight.

Catch Limit Type	Change Relative to Alternative 1
OFL	3,410,000
ABC	1,210,000
Total ACL	1,210,000
Commercial ACL	617,100
Recreational ACL	592,900
Federal For-Hire ACL	250,797
Federal For-Hire ACT	228,225
Private Angling ACL	342,103
Private Angling ACT	*273,861*
Florida ACL	153,338
Alabama ACL	89,966
Mississippi ACL	12,145
Louisiana ACL	65,410
Texas ACL	21,245

Note: A private angling ACT is not currently used for management, but remains in place as part of the default federal regulations that would apply to a state in the event the state's delegation is no longer in effect.

The state-specific ACL values are subject to the measures approved in the Data Calibration FA (if implemented). That framework action and final rule would codify the state ACLs in each state's data collection units. The state ACLs would be determined based on ratios developed by the NMFS Office of Science and Technology and the Gulf states, and convert each state's ACL in MRIP-CHTS currency to that state's ACL in its own survey units. The state-specific private recreational data calibrations from the Data Calibration FA are shown in Table 2.1.2. The states will monitor their private angling landings in their respective data currencies, which will then be converted back to the common MRIP-CHTS data currency, which will be used to monitor harvest at the federal level. Depending upon the outcome of the Data Calibration FA, the final state-specific ACL values may be different than the values presented in Alternative 1 and Alternative 2 (see Table 2.1.3 for what catch limits may be based on the pending framework actions).

Table 2.1.2. Gulf state-specific private recreational data calibration ratios for converting federal state-specific private angling ACLs in MRIP-CHTS data currency to state survey data currencies, as specified in the Data Calibration FA. These ratios are multiplied by the state-specific private angling ACL in MRIP-CHTS data currency to derive the ACL in that state's survey currency. These calibration ratios are unitless and are not additive.

State	Ratio
Alabama	0.4875
Florida	1.0602
Louisiana	1.06
Mississippi	0.3840
Texas	1.00

The Gulf states will set their private angling seasons and monitor landings in their own state survey data currencies, which will then be converted back to MRIP-CHTS units by NMFS to monitor the federal ACLs, ABC, and OFL. These calibrated values are shown in Table 2.1.3. This table contains the current catch limits as of this writing, which were implemented in 2019 as part of a Framework Action to the Reef Fish FMP (GMFMC 2018a). The proposed catch limits from the Catch Limits FA (set to be implemented in the same rulemaking as the Data Calibration FA), and, the proposed catch limits from this draft framework action with calibration.

Table 2.1.3. Catch limits for: Alternative 1 ("Catch Limit in CHTS: 2019"), the pending Catch Limits FA ("Catch Limit in CHTS: 2021"); and, Alternative 2 ("Catch Limit in CHTS: 2022"). All catch limits are in lbs ww. State-calibrated catch limits are not additive.

Catch Limit Type	Catch Limit in CHTS: 2019	Catch Limit in CHTS: 2021	State Calibrated Catch Limits: 2021	Catch Limit in CHTS: 2022	State Calibrated Catch Limits: 2022
OFL	15,500,000	25,600,000		18,910,000	
ABC	15,100,000	15,400,000		16,310,000	
Total ACL	15,100,000	15,400,000		16,310,000	
Commercial ACL	7,701,000	7,854,000		8,318,100	
Recreational ACL	7,399,000	7,546,000		7,991,900	
Federal For-Hire ACL	3,129,777	3,191,958		3,380,574	
Federal For-Hire ACT	2,848,097	2,904,682		3,076,322	
Private Angling ACL	4,269,223	4,354,042		4,611,326	
Private Angling ACT	*3,415,378*	*3,483,234*		*3,689,061*	
Florida ACL	1,913,551	1,951,569	2,069,053	2,066,889	2,191,315
Alabama ACL	1,122,720	1,145,026	558,200	1,212,687	591,185
Mississippi ACL	151,557	154,568	59,354	163,702	62,862
Louisiana ACL	816,275	832,493	882,442	881,686	934,587
Texas ACL	265,119	270,386	270,386	286,363	286,363

Council Conclusions:

The Council decided to recommend **Preferred Alternative 2**, based on the results of the SEFSC's catch analysis, the available data from the absolute abundance studies, and the apparent health of the Gulf red snapper stock. A stock assessment for red snapper is currently underway (SEDAR 74), which is expected to yield management advice in late 2023 or early 2024. The Council expects its SSC to review SEDAR 74 and will address SSC recommendations thereafter.

CHAPTER 3. AFFECTED ENVIRONMENT

The actions considered in this framework action with associated environmental assessment (EA) would affect fishing in federal waters of the Gulf of Mexico (Gulf). Descriptions of the physical, biological, economic, social, and administrative environments (affected environments) completed in the environmental impact statements (EIS) in the Generic Essential Fish Habitat (EFH) Amendment (GMFMC 2004a), and the Generic Annual Catch Limits/Accountability Measures (ACL/AM) Amendment (GMFMC 2011a) apply to the Fishery Management Plan (FMP) for Reef Fish Resources in the Gulf of Mexico (Reef Fish FMP). Descriptions of the affected environments for reef fish are further described in Reef Fish Amendments 30B (GMFMC 2008), 32 (GMFMC 2011b), 40 (GMFMC 2014), 28 (GMFMC 2015), and 50A (GMFMC 2019a). Below, information on each of these environments is summarized or updated, as appropriate.

3.1 Description of the Physical Environment

The Gulf has a total area of approximately 600,000 square miles (1.5 million km[10]), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.2.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). Gulf water temperatures range from 54º F to 84º F (12º C to 29º C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 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.[2] In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

[10] NODC 2012: http://accession.nodc.noaa.gov/0072888

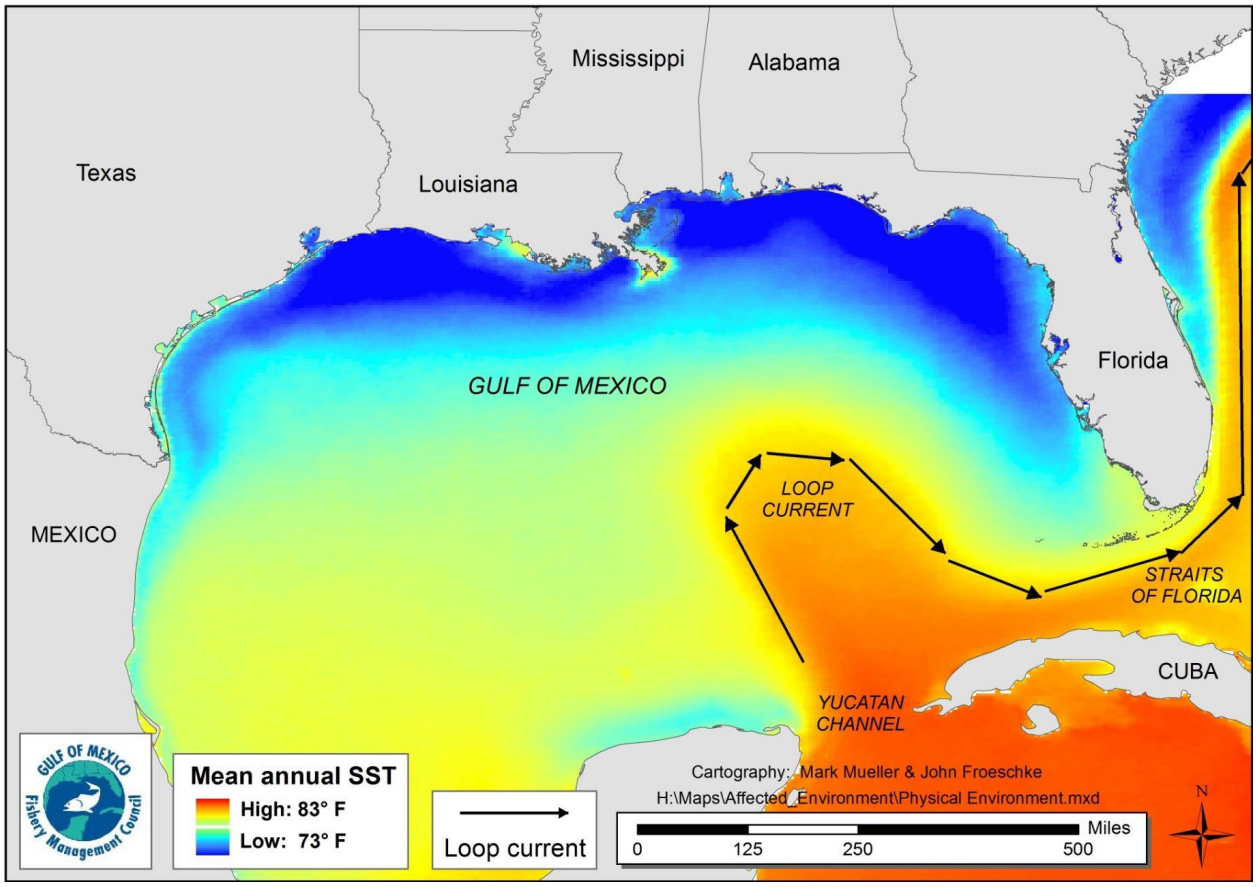

Figure 3.1.1. Physical environment of the Gulf including major feature names and mean annual sea surface temperature as derived from the Advanced Very High-Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://accession.nodc.noaa.gov/0072888).

The physical environment for Gulf reef fish, including red snapper, is also detailed in the Generic EFH Amendment, the Generic ACL/AM Amendment, and Reef Fish Amendment 40 (GMFMC 2004a, GMFMC 2011a, GMFMC 2014, respectively), and is incorporated by reference and further summarized below. In general, reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. A planktonic larval stage lives in the water column and feeds on zooplankton and phytoplankton (GMFMC 2004a). Juvenile and adult reef fish are typically demersal and usually associated with bottom topographies on the continental shelf (less than 100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. For example, juvenile red snapper is common on mud bottoms in the northern Gulf, particularly off Texas through Alabama.

In the Gulf, habitat for adult red snapper consists of submarine gullies and depressions, coral reefs, rock outcroppings, gravel bottoms, oil rigs, and other artificial structures (GMFMC 2004a); eggs and larvae are pelagic; and juveniles are found associated with bottom inter-shelf

habitat (Szedlmayer and Conti 1998) and prefer shell habitat to sand (Szedlmayer and Howe 1997).

Adult red snapper is closely associated with artificial structures in the northern Gulf (Szedlmayer and Shipp 1994; Shipp and Bortone 2009) and larger individuals have been found to use artificial habitats, but move further from the structure as they increase in size and based on the time of day (Topping and Szedlmayer 2011). Importantly, the Great Red Snapper Count (GRSC) estimates of the number of red snapper on the high-relief natural and artificial reefs where the fishery primarily operates are very similar to the estimates from Southeast Data, Assessment, and Review (SEDAR) 52. The higher total estimates from the GRSC are due to the finding that two-thirds of the red snapper population lives scattered across the vast plains of low relief bottom that characterize most of the Gulf, where the fishery seldom operates.

Detailed information pertaining to the Gulf area closures and marine reserves is provided in Amendment 32 (GMFMC 2011b). There are environmental sites of special interest that are discussed in the Generic EFH Amendment (GMFMC 2004a) that are relevant to red snapper management. These include the longline/buoy area closure, the Edges Marine Reserve, Tortugas North and South Marine Reserves, individual reef areas and bank habitat areas of particular concern (HAPC) of the northwestern Gulf, the Florida Middle Grounds HAPC, the Pulley Ridge HAPC, and Alabama Special Management Zone. These areas are managed with gear restrictions to protect habitat and specific reef fish species. These restrictions are detailed in the Generic EFH Amendment (GMFMC 2004a).

With respect to the National Register of Historic Places, there is one site listed in the Gulf. This is the wreck of the *U.S.S. Hatteras*, located in federal waters off Texas. Historical research indicates that over 2,000 ships sank on the Federal Outer Continental Shelf between 1625 and 1951; thousands more sank 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.[11]

Northern Gulf of Mexico Hypoxic Zone

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands by rivers to the Gulf, increasing nutrient inputs from the Mississippi River, and a seasonal layering of waters in the Gulf. The layering of the water is temperature and salinity dependent and prevents the mixing of higher oxygen content surface water with oxygen-poor bottom water. In 2018, the extent of the hypoxic area was estimated to be 2,720 square miles; the fourth smallest area mapped since 1985.[4] The hypoxic conditions in the northern Gulf directly affect less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009). However, more mobile macroinvertebrates and

[11] Further information can be found at http://www.boem.gov/EnvironmentalStewardship/Archaeology/Shipwrecks.aspx. [4] http://gulfhypoxia.net

demersal fishes (e.g., red snapper) are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Greenhouse Gases

The Intergovernmental Panel on Climate Change (IPCC) has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2014) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.1.1 with respect to total emissions and from fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (2.04% and 1.67%, respectively).

Table 3.1.1. Total Gulf greenhouse gas emissions estimates (tons per year) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions.* Data are for 2011 only.

Emission source	CO2	Greenhouse CH4	Gas N_2O	Total CO_{2e}**
Oil platform	5,940,330	225,667	98	11,611,272
Non-platform	14,017,962	1,999	2,646	14,856,307
Total	**19,958,292**	**227,665**	**2,743**	**26,467,578**
Commercial fishing	531,190	3	25	538,842
Recreational fishing	435,327	3	21	441,559
Percent commercial fishing	2.66%	>0.01%	0.91%	2.04%
Percent recreational fishing	2.18%	>0.01%	0.77%	1.67%

*Compiled from Tables 6-11, 6-12, and 6-13 in Wilson et al. (2014). **The CO_2 equivalent (CO_2e) emission estimates represent the number of tons of CO_2 emissions with the same global warming potential as one ton of another greenhouse gas (e.g., CH_4 and N_2O). Conversion factors to CO_{2e} are 21 for CH_4 and 310 for N_2O.

3.2 Description of the Biological and Ecological Environment

The biological environment of the Gulf is described in detail in the final environmental impact statement for the Generic EFH Amendment (GMFMC 2004a) and is incorporated herein by reference.

The National Ocean Service collaborated with the National Marine Fisheries Service (NMFS) and the Gulf of Mexico Fishery Management Council (Council) to develop distributions of reef fish (and other species) in the Gulf (SEA 1998).

3.2.1 Red Snapper

Red Snapper Life History and Biology

Red snapper demonstrates the typical reef fish life history pattern. Eggs and larvae are pelagic (Lyczkowski-Shultz and Hanisko 2007) while juveniles are found over mud bottom and oyster shell reef (Szedlmayer and Conti 1999; Rooker et al. 2004). Red snapper is associated with both natural and artificial habitats (Wilson and Nieland 2001; Szedlmayer and Lee 2004; Glenn 2014) but larger older fish occur over open habitat in deeper water (Gallaway et al. 2009). Spawning is protracted from April through September throughout the Gulf with peak spawning in June through August (Futch and Bruger 1976; Collins et al. 1996). Adult females mature as early as two years and most are mature by four years (Schirripa and Legault 1999). Red snapper has been aged up to 57 years (SEDAR 31 2013). Until 2013, most red snapper caught by the directed fishery were 2 to 4 years old, but the SEDAR 31 stock assessment suggested that the age and size of red snapper in the directed fishery has increased (SEDAR 31 2013). Adult red snapper is estimated to have high site fidelity (Szedlmayer and Shipp 1994; Strelcheck et al. 2007). However, other conventional tagging studies have suggested the occurrence of hurricanes greatly affect the distance of red snapper movement (Patterson et al. 2001).

Status of the Red Snapper Stock

Southeast Data, Assessment, and Review (SEDAR) 52 Assessment and Stock Status

The SEDAR 52 (2018) base model was similar to the 2014 SEDAR 31 Update, with select updates to model fitting procedures. The SEDAR 52 stock assessment found that the red snapper resource continues to rebuild from the severely overfished and depleted conditions during of the 1980s and 1990s. Under current conditions, it is expected that the resource will continue to rebuild. Biomass estimates show the western Gulf continues to rebuild, while the eastern Gulf has leveled off over the last few years. The number of older fish present has increased Gulf-wide, indicating rebuilding age structure.

The Council's Scientific and Statistical Committee (SSC) reported that based on the results from SEDAR 52, red snapper, although in a rebuilding plan, is not considered to be undergoing overfishing or to be overfished. The ratio of the current fishing mortality rate (F)/maximum fishing mortality threshold (MFMT) = 0.823, which is less than 1.0 indicating the stock is not undergoing overfishing. The Gulf red snapper stock is not considered to be overfished because the ratio of the spawning stock biomass (SSB)/minimum stock size threshold (MSST) = 1.41, which is greater than 1.0. The change in the MSST value to 50% of the SSB at the maximum sustainable yield (26% spawning potential ratio [SPR]) in Amendment 44 (GMFMC 2017) was the primary reason for the change in stock status from overfished to not overfished. The stock is still in a rebuilding plan, and fishing at $F_{Rebuild}$, the stock is not expected to be rebuilt until 2032.

Definition of Overfishing

In January 2012, the Generic ACL/AM Amendment (GMFMC 2011a) became effective. One of the provisions in this amendment was to redefine the criteria used to determine when a stock is undergoing overfishing. In years when there is a stock assessment, overfishing is defined as the fishing mortality rate exceeding the MFMT. In years when there is no stock assessment, overfishing is defined as the catch exceeding the overfishing limit (OFL). The SEDAR 31 update assessment indicates that, as of the terminal year of the assessment data, 2013, overfishing was not occurring. Note that, because the overfishing threshold is now re-evaluated each year instead of only in years when there is a stock assessment, this status could change on a year-to-year basis.

Impact of 2017 Extended Recreational Fishing Season

Due to an extension of the recreational fishing season in 2017, the estimated provisional landings for 2017 (15.36 million pounds[mp]) at that time exceeded both the acceptable biological catch (ABC) (13.74 mp) and OFL (14.79 mp) for Gulf red snapper as calculated based on the 2014 SEDAR 31 Update Assessment. However, based on the SEDAR 52 reference point projections, overfishing did not occur in 2017, but landings also indicate that overfishing did occur in 2020. In the interim years between the assessments (2015 and 2016), the projected recruitment to the fishery assumed in the 2014 SEDAR 31 Update projections was much lower than estimated in the SEDAR 52 assessment (Figure 3.2.1.1), whereas the projected harvests were much higher than realized (Figure 3.2.1.2). Therefore, in 2017, the Gulf-wide red snapper resource had rebuilt to a higher biomass and SPR than projected by the 2014 SEDAR 31 Update Assessment, which allowed it to undergo larger removals (i.e., a higher fishing pressure) without any major negative impacts to the rebuilding schedule. Although the result is beneficial for the future status of the red snapper resource, it cannot be expected that projections will always underestimate rebuilding success. It is possible that future recruitment may be below average, which, in combination with higher than predicted removals, would result in overestimation of rebuilding progress.

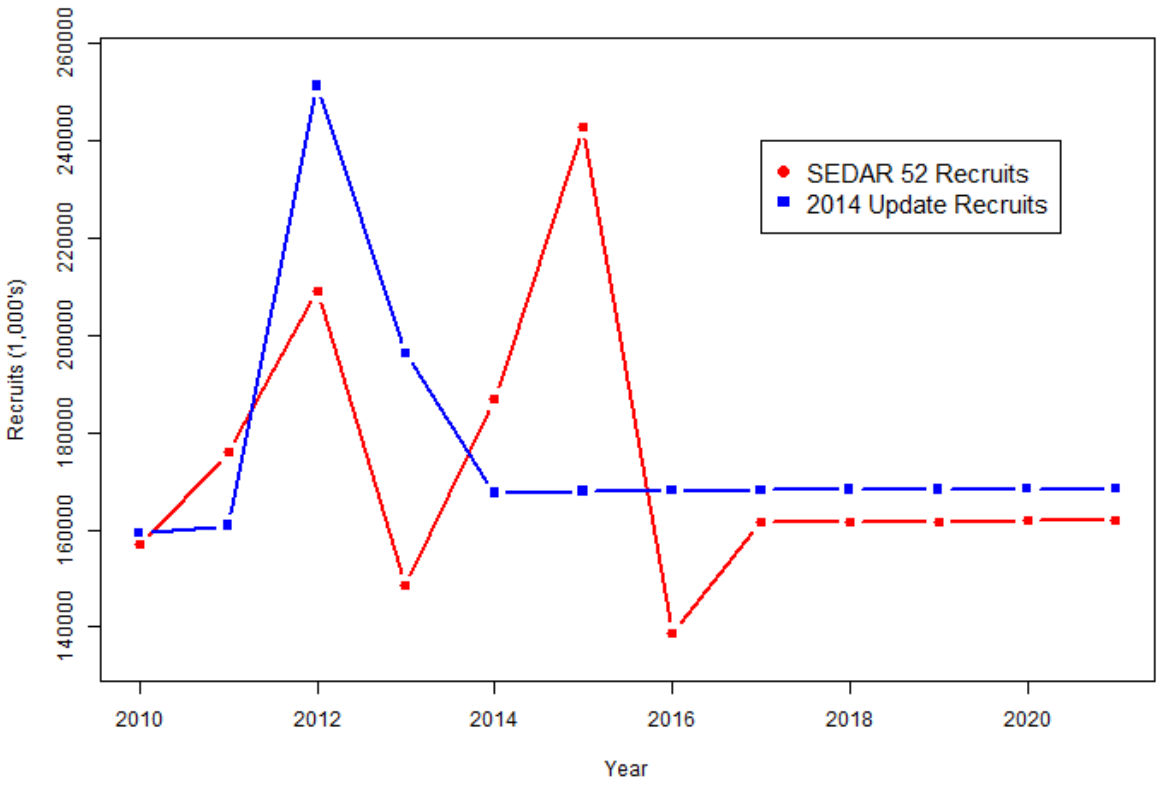

Figure 3.2.1.1. Recruitment (1000s of fish) estimated by the assessment model and projected for OFL forecasts (assuming 2017 provisional landings and 2018 ACLs for SEDAR 52 projections). The results from the 2014 SEDAR 31 Update Assessment (2014 terminal year; blue line) are compared with those from SEDAR 52 (2016 terminal year; red line).

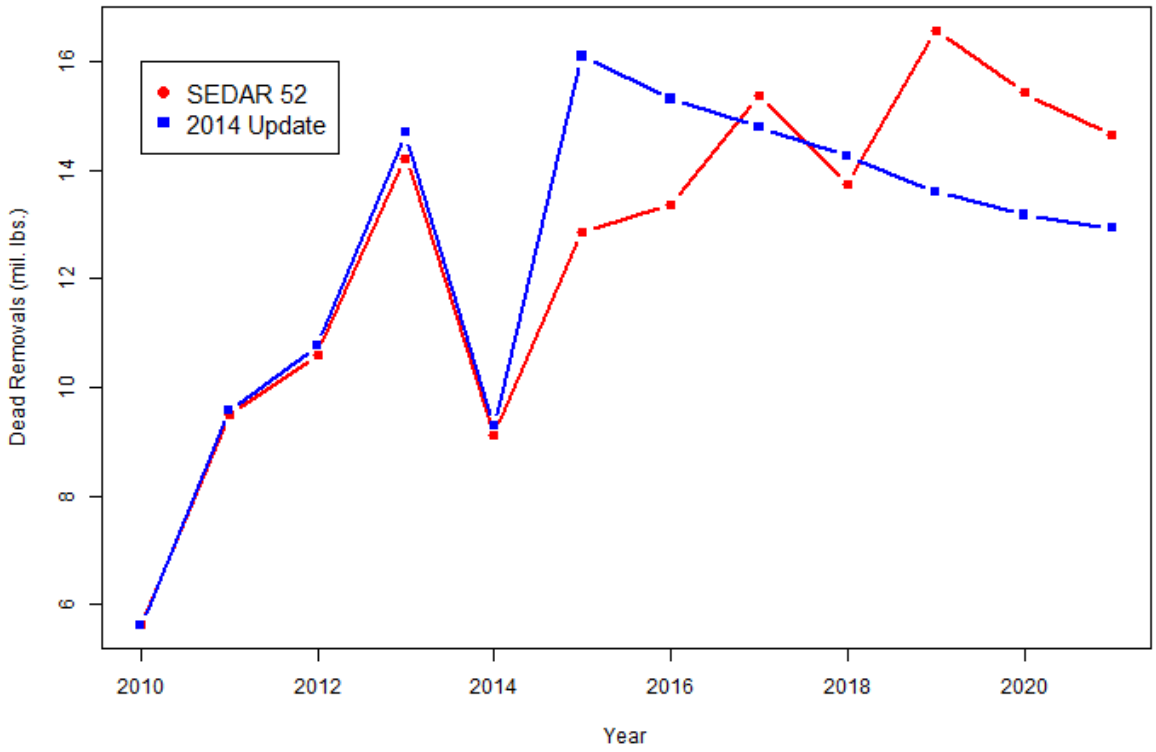

Figure 3.2.1.2. Harvest (millions of pounds, landings and dead discards) estimated by the assessment model and projected for OFL forecasts (assuming 2017 provisional landings and 2018 ACLs for SEDAR 52 projections). The results from the 2014 SEDAR 31 Update Assessment (2014 terminal year; blue line) are compared with those from SEDAR 52 (2016 terminal year; red line).

3.2.2 General Information on Reef Fish

Reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. In general, both eggs and larval stages are planktonic. Larval fish feed on zooplankton and phytoplankton. Gray triggerfish are exceptions to this generalization as they lay their eggs in nests on the sandy bottom (Simmons and Szedlmayer 2012), as are gray snapper whose larvae are found around submerged aquatic vegetation.

Status of Reef Fish Stocks

There currently are 31 species managed under the Reef Fish FMP. The NMFS Office of Sustainable Fisheries updates its Status of U.S. Fisheries Report to Congress on a quarterly basis

utilizing the most current stock assessment information.[12] Stock assessments and status determinations have been conducted and designated for 14 stocks and can be found on the Council[13] and SEDAR[14] websites. Of the 14 stocks for which stock assessments have been conducted and accepted by the SSC, the first quarter 2022 Update Summary of Stock Status for non- FSSI stocks classifies two stocks as overfished (greater amberjack and gag) and five stocks undergoing overfishing (cobia, lane snapper, greater amberjack, jacks complex, and gag). The status of both assessed and unassessed stocks, as of the writing of this amendment is provided on the status of the stocks webpage[15].

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, and excludes fish released alive under a recreational catch-and-release fishery management program. 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. Bycatch practicability analyses have been completed for red snapper (GMFMC 2004b, GMFMC 2007, GMFMC 2014, GMFMC 2015), grouper (GMFMC 2008a, GMFMC 2008c, GMFMC 2011a, GMFMC 2011c, GMFMC 2021), greater amberjack (GMFMC 2008b), gray triggerfish (GMFMC 2008b). In addition, a bycatch practicability analysis was conducted for the Generic ACL/AM Amendment (GMFMC 2011a) that covered the Reef Fish, Coastal Migratory Pelagics, Red Drum, and Coral FMPs. In general, these analyses 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 less forgone yield. However, in some cases, actions are approved that can increase bycatch through regulatory discards such as increased minimum sizes and closed seasons. In these cases, there is some biological benefit to the managed species that outweighs any increases in discards. Discard mortality rates for red snapper from the most recent stock assessment (SEDAR 52 2018) are shown in Table 3.2.2.1.

[12] https://www.fisheries.noaa.gov/national/population-assessments/fishery-stock-status-updates
[13] www.gulfcouncil.org
[14] http://sedarweb.org/

[15] https://www.fisheries.noaa.gov/national/sustainable-fisheries/status-stocks-2021

Table 3.2.2.1. Discard mortality rates for red snapper by fleet and season from the SEDAR 52 stock assessment. The discard mortality rate has been found to increase with depth and decrease with venting. "East" and "West" are defined as Gulf of Mexico waters east and west of the Mississippi River. Values from the mandatory venting period were maintained from 2013 – 2016.

Sector	Venting	Year	East	East	West	West
	Y/N	Pre/Post 2008	Closed	Open	Closed	Open
Recreational	N	Pre	0.21	0.21	0.22	0.22
Recreational	Y	Post	0.118	0.118	0.118	0.118
Commercial vertical line	N	Pre	0.74	0.75	0.87	0.78
Commercial vertical line	Y	Post	0.55	0.56	0.74	0.6
Commercial longline	N	Pre	0.74	0.81	0.87	0.91
Commercial longline	Y	Post	0.55	0.64	0.74	0.81

In January 2022, the requirements in section 3 of the Direct Enhancement of Snapper Conservation and the Economy through Novel Devices Act of 2020 (DESCEND Act) became effective. This section is effective until January 2026 and requires persons on commercial, for-hire, and private recreational vessels to have a venting tool or descending device rigged and ready to use when fishing for reef fish species in Gulf of Mexico federal waters. A descending device is an instrument capable of releasing a fish at the depth from which the fish was caught, and a venting tool must be a sharpened, hollow instrument that allows air to escape by penetrating the abdomen of a fish to release the excess gases accumulated in the body cavity when a fish is retrieved from depth. The purpose of the DESCEND Act is to promote the survival of released reef fish suffering from barotrauma. In February 2022, NMFS implemented regulations to clarify the statutory definitions of descending device and venting tool (87 FR 2355). These regulations are codified at 50 CFR 622.30(c).

Protected Species

The Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) provide special protections to some species that occur in the Gulf. A brief summary of these two laws and more information is available on the NMFS Office of Protected Resources website.[16] All 22 marine mammals in the Gulf 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

[16] https://www.fisheries.noaa.gov/protecting-marine-life

[17] The Gulf of Mexico Bryde's whale has recently been 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 to be named *Balaenoptera ricei* or Rice's whale.

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.

Other species protected under the ESA and occur in the Gulf include sea turtle species (Kemp's ridley, loggerhead (Northwest Atlantic Ocean distinct population segment [DPS]), green (South Atlantic and North Atlantic DPSs), leatherback, and hawksbill), fish species (Gulf sturgeon, smalltooth sawfish, Nassau grouper, giant manta ray, and oceanic whitetip shark), and coral species (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 also occurs in the Gulf, though only loggerhead critical habitat occurs in federal waters.

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

On April 6, 2016, NMFS and the U.S. Fish and Wildlife Service published a final rule (81 FR 20057) removing the range-wide and breeding population ESA-listings of the green sea turtle and listing eight DPSs as threatened and three DPSs as endangered, effective May 6, 2016. Two 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. Furthermore, on January 22, 2018, NMFS published a final rule (83 FR 2916) listing the giant manta ray as threatened under the ESA. On January 30, 2018, NMFS published a final rule (83 FR 4153) listing the oceanic whitetip shark as threatened under the ESA. In a memorandum dated March 6, 2018, NMFS revised the reinitiated consultation on the Reef Fish FMP to address the listings of the giant manta and oceanic whitetip and determined that fishing under the Reef Fish FMP during the revised re-initiation period is not likely to jeopardize the continued existence of listed sea turtle species, smalltooth sawfish, the green turtle DPSs, Nassau grouper, the giant manta, or the oceanic whitetip.

NMFS published a final rule on April 15, 2019, listing the Gulf Bryde's (now Rice's whale) whale 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 reef fish for food, and they are not generally caught by fishers harvesting reef fish. Primary gear types used in the Gulf reef fish fishery are classified in the Final List of Fisheries for 2021 (86 FR 3028) as Category III gear. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. Additionally, there is no evidence that the directed reef fish fishery is adversely affecting seabirds.

Climate Change

Climate change projections predict increases in sea-surface temperature and sea level; decreases in sea-ice cover; and changes in salinity, wave climate, and ocean circulation.[19] These changes are likely to affect plankton biomass and fish larvae abundance that could adversely impact fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The National Oceanic and Atmospheric Association (NOAA) Climate Change Web Portal[20] predicts the average sea surface temperature in the Gulf will increase by approximately 2ºC for 2006-2100 compared to the average over the years 1956-2005. For reef fishes, Burton (2008) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. It is unclear if reef fish distribution in the Gulf and South Atlantic has been affected. The smooth puffer and common snook are examples of species for which there has been a distributional trend to the north in the Gulf. For other species, such as red snapper and the dwarf sand perch, there has been a distributional trend towards deeper waters. For additional fish species, such as the dwarf goatfish, there has been a distributional trend both to the north and to deeper waters. These changes in distributions have been hypothesized as a response to environmental factors such as increases in temperature.

The distribution of native and exotic species may change with increased water temperature, as may the prevalence of disease in keystone animals such as corals and the occurrence and intensity of toxic algae blooms. Hollowed et al. (2013) provided a review of projected effects of climate change on the marine fisheries and dependent communities. Integrating the potential

[18] Any official change to the name of the species listed under the ESA as the Gulf of Mexico Bryde's whale 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.
[19] Intergovernmental Panel on Climate Change: http://www.ipcc.ch/
[20] https://www.esrl.noaa.gov/psd/ipcc/

effects of climate change into the fisheries assessment is currently difficult due to the time scale differences (Hollowed et al. 2013). The fisheries stock assessments rarely project through a time span that would include detectable climate change effects.

Deepwater Horizon MC252 Oil Spill

General Impacts on Fishery Resources

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

Increases in histopathological lesions were found in red snapper in the area affected by the oil, but Murawski et al. (2014) found that the incidence of lesions had declined between 2011 and 2012. The occurrence of such lesions in marine fish is not uncommon (Sindermann 1979; Haensly et al. 1982; Solangi and Overstreet 1982; Khan and Kiceniuk 1984, 1988; Kiceniuk and Khan 1987; Khan 1990). Subsequent work analyzing red snapper after the *Deepwater Horizon* MC252 oil spill showed liver damage from aromatic hydrocarbon (oil) exposure in the form of inflammation, lesions, and other damage (Pulster et al. 2021). These results may be signaling increased disease progression in Gulf red snapper from chronic environmental stressors, including elevated PAH exposures and concentrations. Red snapper diet was also affected after the spill. A decrease in zooplankton consumed, especially by adults (greater than 400 mm total length) over natural and artificial substrates may have contributed to an increase in the consumption of fish and invertebrate prey – more so at artificial reefs than natural reefs (Tarnecki and Patterson 2015).

In addition to the crude oil, over a million gallons of the dispersant, Corexit 9500A®, was applied to the ocean surface and an additional hundreds of thousands of gallons of dispersant was pumped to the mile-deep well head (National Commission 2010). No large-scale applications of dispersants in deep water had been conducted until the *Deepwater Horizon* MC252 oil spill. Thus, no data exist on the environmental fate of dispersants in deep water. The effect of oil, dispersants, and the combination of oil and dispersants on fishes of the Gulf remains an area of concern. Marine fish species typically concentrate PAHs in the digestive tract, making stomach bile an appropriate testing medium. A study by Synder et al. (2015) assessed bile samples from golden tilefish (*Lopholatilus chamaeleonticeps*), king snake eel (*Ophichthus rex*), and red snapper for PAH accumulation over time, and reported concentrations were highest in golden

tilefish during the same time period when compared to king snake eel and red snapper. These results suggest that the more highly associated an organism is with the sediment in an oil spill area, the higher the likelihood of toxic PAH accumulation. Twenty-first century dispersant applications are thought to be less harmful than their predecessors. However, the combination of oil and dispersants has proven to be more toxic to marine fishes than either dispersants or crude oil alone. Marine fish which are more active (e.g., a pelagic species versus a demersal species) appear to be more susceptible to negative effects from interactions with weathered oil/dispersant emulsions. These effects can include mobility impairment and inhibited respiration (Swedmark et al. 1973). Another study found that while Corexit 9500A® and oil are similar in their toxicity, when Corexit 9500A® and oil were mixed in lab tests, toxicity to microscopic rotifers increased up to 52-fold (Rico-Martínez et al. 2013). These studies suggest that the toxicity of the oil and dispersant combined may be greater than anticipated.

As reported by NOAA's Office of Response and Restoration (NOAA 2010), the oil from the *Deepwater Horizon* MC252 spill is relatively high in alkanes, which can readily be used by microorganisms as a food source. As a result, the oil from this spill is likely to biodegrade more readily than crude oil in general. The *Deepwater Horizon* MC252 oil is also much lower in PAH relative to crude oil in general, especially if the spilled oil penetrates into the substrate on beaches or shorelines. Like all crude oils, MC252 oil contains volatile organic compounds (VOC) such as benzene, toluene, and xylene. Some VOCs are acutely toxic but, because they evaporate readily, they are generally a concern only when oil is fresh.

Outstanding Effects

As a result of the *Deepwater Horizon* MC252 oil spill, NMFS reinitiated the ESA consultation on the Gulf reef fish fishery. As discussed above, on September 30, 2011, the Protected Resources Division released an opinion, which after analyzing best available data, the current status of the species, environmental baseline (including the impacts of the recent *Deepwater Horizon* MC252 oil spill in the northern Gulf), effects of the proposed action, and cumulative effects, concluded that the continued operation of the Gulf reef fish fishery is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, or loggerhead sea turtles, nor the continued existence of smalltooth sawfish (NMFS 2011). The most recent biological opinion addressing the coastal migratory pelagics (CMP) fishery also considered the impacts of the Deepwater Horizon MC252 oil spill in the northern Gulf and concluded that the fishing would not jeopardize continued existence of the species considered. Figure 3.2.2.1 shows the extent of the fishery closure resulting from the *Deepwater Horizon* MC252 oil spill. More information is available on the *Deepwater Horizon* MC252 oil spill and associated closures is available on the Southeast Regional Office (SERO) website.[21]

[21] http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm

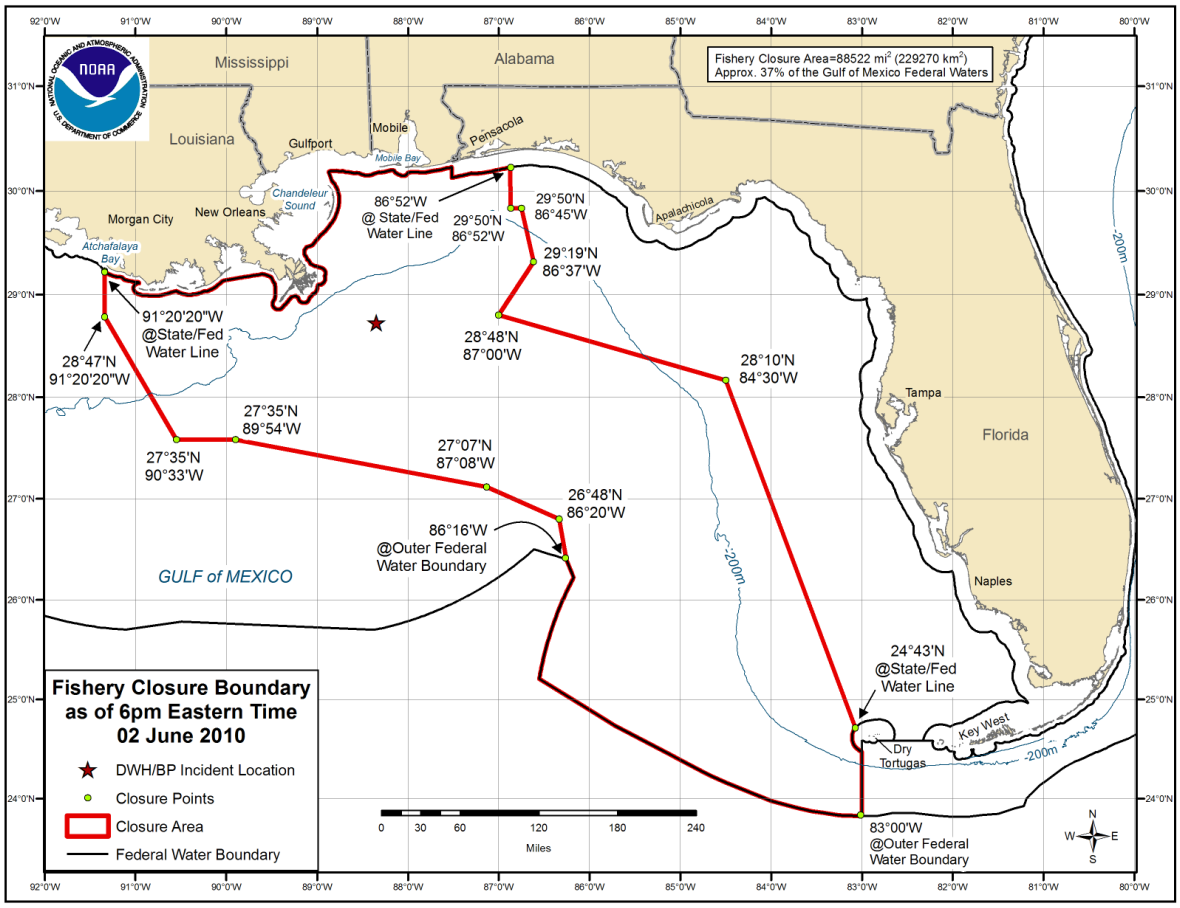

Figure 3.2.2.1. Fishery closure at the height of the *Deepwater Horizon* MC252 oil spill.

3.3 Description of the Economic Environment

Economic information pertaining to Gulf red snapper can be found in Amendment 28 (GMFMC 2015) and Amendment 50A (GMFMC 2019a) and is incorporated herein by reference. Recent performance information related to the Gulf red snapper individual fishing quota (IFQ) program, in particular, is included in the 2020 update to the Gulf of Mexico Red Snapper IFQ Report (NMFS 2021b) and is also incorporated herein by reference. The following section contains select updated information on the economic environment of the red snapper portion of the reef fish fishery, broken down by sector. Inflation adjusted revenues and prices are reported in 2021 dollars using the annual, non-seasonally adjusted Gross Domestic Product (GDP) implicit price deflator provided by the U.S. Bureau of Economic Analysis (BEA).

3.3.1 Commercial Sector

Permits

Any fishing vessel that harvests and sells any of the reef fish species managed under the Reef Fish FMP from the Gulf exclusive economic zone (EEZ) must have a valid Gulf reef fish permit.

As of July 8, 2021, there were 825 limited access valid or renewable[22] reef fish permits (SERO Permits Database, July 2022). In order to harvest red snapper, a vessel permit must also be linked to an IFQ account and possess sufficient allocation for this species. IFQ accounts can be opened and valid permits can be linked to IFQ accounts at any time during the year. Eligible vessels can receive red snapper allocation from other IFQ participants. On average from 2016 through 2020, there were 637 IFQ accounts that held red snapper allocation and 355 that held red snapper shares (NMFS 2021b).

Although many fishing businesses only own one permitted vessel, some hold or own multiple permits and vessels. Detailed discussions on the business composition of IFQ participants are provided in the description of the economic environment sections of Amendment 36B (GMFMC 2022) and Amendment 53 (GMFMC 2021) and are incorporated herein by reference.

Commercial harvest of reef fish in the EEZ may only be sold to dealers with a federal dealer permit. As of December 21, 2021, there were 341 entities with a federal Gulf and South Atlantic Dealers (GSAD) permit (J. Dudley, NMFS SERO, pers. comm. 2022).

In order to purchase IFQ species, including red snapper, dealers are also required to have a Gulf IFQ dealer endorsement. As of July 22, 2022, there were 166 eligible IFQ dealers; however, the total number of dealers can vary over the course of the year and from year to year.

Vessels, Landings, and Dockside Revenue

The information in Table 3.3.1.1 describes the landings and revenue for vessels that harvested red snapper each year from 2016 through 2020, including their revenue from other IFQ species, Gulf non-IFQ fisheries, and South Atlantic fisheries. Although not shown in the table, on average (2016 through 2020), vertical gear (bandit and handline) accounted for approximately 96% of red snapper commercial landings each year and bottom longline gear accounted for most of the remainder. There were minimal landings from other gear including spear, trolling, buoy, and powerhead gear. The number of vessels that harvested red snapper each year fluctuated modestly from 2016 through 2020 with a five-year low in 2019 (Table 3.3.1.1). On average, red snapper comprised approximately half of these vessels' total annual ex-vessel revenue, and IFQ species, in general, comprised 88%. Red snapper landings and ex-vessel revenue were fairly stable during 2016 through 2020; whereas, landings (not shown in table) and ex-vessel revenue from other IFQ species trended downward (Table 3.3.1.1). Although not shown in the table, the maximum annual gross revenue earned by a single vessel during the time period was approximately $3.3 million (2021 dollars) in 2020.

[22] 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. Landings and revenue statistics for vessels harvesting red snapper (2021 dollars).

Year	# of Vessels	Red Snapper landings in pounds (lbs) gutted weight (gw)	Red Snapper ex-vessel revenue	Other IFQ species ex-vessel revenue	Gulf Non-IFQ species ex-vessel revenue	South Atlantic all species ex-vessel revenue	Average ex-vessel revenue per vessel
2016	430	6,057,498	$ 31,322,809	$ 30,740,622	$ 8,941,800	$ 284,399	$ 165,790
2017	449	6,287,083	$ 32,417,021	$ 24,020,240	$ 8,411,260	$ 198,717	$ 144,871
2018	450	6,285,294	$ 32,113,622	$ 20,878,409	$ 7,451,386	$ 265,658	$ 134,909
2019	428	6,899,225	$ 34,876,921	$ 21,908,844	$ 7,089,261	$ 290,101	$ 149,919
2020	431	6,869,921	$ 32,995,772	$ 20,154,332	$ 5,470,677	$ 87,129	$ 136,213
Average	438	6,479,804	$ 32,745,229	$ 23,540,489	$ 7,472,877	$ 225,201	$ 146,340

Source: NMFS SERO IFQ database (accessed 1/25/2022) and Southeast Fisheries Science Center (SEFSC) Socioeconomic Panel (January 2022 version).

C. Liese (NMFS SEFSC, pers. comm. 2022) generated annual vessel-level estimates of costs (as a percentage of revenue) and net revenue from operations for vessels that harvested red snapper in the Gulf. Estimates of producer surplus (PS) can be calculated from the cost information. PS is total annual revenue minus the costs for fuel, other supplies, hired crew, and the opportunity cost of an owner's time as captain. Net revenue from operations, which most closely represents economic profits to the owner(s), 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. According to C. Liese (NMFS SEFSC, pers. comm. 2022), PS for commercial vessels that harvested Gulf red snapper was approximately 52% of their annual gross revenue, on average, from 2014 through 2018. Net revenue from operations was 34% of their annual gross revenue, on average, during this period. Applying these percentages to the results provided in Table 3.3.1.1 would result in an estimated per vessel average annual PS of $76,097 (2021 dollars) and an average annual net revenue from operations of $49,756 per year.

IFQ Share Transfer, IFQ Allocation Transfer, and Ex-vessel Prices

Price information is important for evaluating the performance of a catch share program. Theoretically, allocation prices should reflect the expected annual profit from harvesting one unit of quota; whereas, share prices should reflect the net present value of the expected profit from harvesting one unit of quota in the long-run. Dockside or ex-vessel price is the price the vessel receives at the first sale of harvest. Average share transfer[23] prices experienced an upward trend from 2016 through 2020; whereas, allocation transfer and ex-vessel prices remained relatively flat (Table 3.3.1.2). Share transfer price increased by 20% overall; allocation transfer price increased by 6%; and ex-vessel price decreased by 3%. Median values were reasonably close to

[23] Share transfer price refers to the price paid to purchase a share percentage that is equivalent to one pound of red snapper allocation at the time the transfer occurs (NMFS 2021b).

average values during this period, which suggests low skewness in the distributions of reported prices (Table 3.3.1.2 and Table 3.3.1.3).

Table 3.3.1.2. Average red snapper share transfer, allocation transfer, and ex-vessel prices per pound gutted weight in 2021 dollars.

Year	Share Transfer	Allocation Transfer	Ex-vessel
2016	$34.32	$3.59	$5.45
2017	$38.23	$3.65	$5.46
2018	$38.91	$3.65	$5.47
2019	$40.37	$3.89	$5.57
2020	$41.26	$3.80	$5.28
Average	$38.62	$3.72	$5.45

Source: NMFS (2021b).

Table 3.3.1.3. Median red snapper share transfer, allocation transfer, and ex-vessel prices per pound gutted weight in 2021 dollars.

Year	Share Transfer	Allocation Transfer	Ex-vessel
2016	$39.18	$3.64	$5.60
2017	$39.27	$3.68	$5.49
2018	$39.16	$3.76	$5.58
2019	$42.16	$3.95	$5.69
2020	$41.64	$3.91	$5.31
Average	$40.28	$3.79	$5.53

Source: NMFS (2021b).

Dealers

The information in Table 3.3.1.4 illustrates the purchasing activities of dealers that bought Gulf red snapper landings from vessels during 2016 through 2020.[24] Like vessels, dealer participation in the red snapper IFQ program is fluid, and not all dealers purchased red snapper in each year during this time. On average, from 2016 through 2020, IFQ purchases comprised 50% of all purchases made by these dealers, with red snapper, in particular, accounting for 29%. The average annual value of total purchases per red snapper dealer decreased by approximately 20% overall during the period, with fluctuations (Table 3.3.1.4). Although not shown in the table, the

[24] The estimates in this table are based on Accumulated Landings System data, which tends to produce slightly different estimates of ex-vessel landings and value for red snapper than the IFQ database due to waterbody code assignment issues in the Keys.

maximum annual value of all purchases made by a single dealer from 2016 through 2020 was $11.1 million (2021 dollars) in 2016.

Table 3.3.1.4. Purchase statistics for dealers that bought red snapper landings (2021 dollars).

Year	Number of Dealers	Red Snapper Purchases	Other IFQ Purchases	Gulf Non-IFQ Purchases	South Atlantic Purchases	Average total purchases per dealer
2016	101	$30,151,004	$31,556,580	$ 48,608,161	$ 7,842,924	$ 1,169,888
2017	113	$31,146,051	$23,866,168	$ 47,497,358	$ 7,581,032	$ 974,253
2018	117	$31,097,421	$20,359,027	$ 46,562,811	$ 8,192,961	$ 907,797
2019	113	$33,868,591	$21,676,290	$ 46,206,658	$ 9,746,333	$ 986,707
2020	111	$32,084,320	$20,962,286	$ 38,316,098	$ 12,169,628	$ 932,724
Average	111	$31,669,477	$23,684,070	$ 45,438,217	$ 9,106,576	$ 994,274

Source: SEFSC Fishing Communities Web Query Tool (Version May 29, 2022 Years: 2014-2021).

Imports

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

Imports[25] of fresh snapper ranged from 30.5 million pounds product weight (pw) to 32.8 million pounds pw during 2016 through 2020. Total revenue from fresh snapper imports ranged from $98.9 million (2021 dollars[26]) to $115.2 million during the period. Imports of fresh snappers primarily originated in Mexico, Central America, or South America, and entered the U.S. through the port of Miami, Florida. Imports of fresh snapper were highest on average (2016 through 2020) during the months of March through August.

Imports of frozen snapper were substantially less than imports of fresh snapper from 2016 through 2020. During this time, frozen snapper imports ranged from 11.4 million pounds pw to 15.9 million pounds pw, and the value of these imports ranged from $36.6 million (2021 dollars) to $48.4 million. Imports of frozen snapper primarily originated in South America (especially

[25] NOAA Fisheries Service purchases fisheries trade data from the Foreign Trade Division of the U.S. Census Bureau. Data are available for download at https://www.fisheries.noaa.gov/national/sustainable-fisheries/foreign-fishery-trade-data

[26] Converted to 2021 dollars using the annual, non-seasonally adjusted GDP implicit price deflator provided by the U.S. BEA.

Brazil), Indonesia, and Mexico. The majority of frozen snapper imports entered the U.S. through the ports of Miami, Florida and New York, New York. Imports of frozen snappers tended to be lowest during February through June when fresh snapper imports were strong.

Business Activity

The commercial harvest and subsequent sales and consumption of fish generate business activity as fishermen expend funds to harvest the fish and consumers spend money on goods and services, such as red snapper 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, such as other finfish or seafood products, and services, such as visits to different food service establishments. As a result, the analysis presented below represents a distributional analysis only; that is, it only shows how economic effects may be distributed through regional markets and should not be interpreted to represent the impacts if this species is not available for harvest or purchase.

Estimates of the U.S. average annual business activity associated with the commercial harvest of red snapper in the Gulf were derived using the model developed for and applied in NMFS (2021a) and are provided in Table 3.3.1.5.[27] This business activity is characterized as jobs (full- and part-time), output impacts (gross business sales), income impacts (wages, salaries, and self-employed income), and value-added impacts, which represent the contribution made to the U.S. GDP. These impacts should not be added together because this would result in double counting. It should be noted that the results provided should be interpreted with caution and demonstrate the limitations of these types of assessments. These results are based on average relationships developed through the analysis of many fishing operations that harvest many different species. Separate models to address individual species are not available. For example, the results provided here apply to a general "reef fish" category rather than just red snapper, and a harvester job is "generated" for approximately every $35,000 (2021 dollars) in ex-vessel revenue. These results contrast with the number of harvesters (vessels) with recorded landings of red snapper presented in Table 3.3.1.1.

[27]A detailed description of the input/output model is provided in NMFS (2011a).

Table 3.3.1.5. Average annual business activity (2016 through 2020) associated with the commercial harvest of red snapper in the Gulf. All monetary estimates are in 2021 dollars.

Species	Average Ex-vessel Value ($ thousands)	Total Jobs	Harvester Jobs	Output (Sales) Impacts ($ thousands)	Income Impacts ($ thousands)	Value Added ($ thousands)
Red Snapper	$32,745	3,915	929	$324,728	$119,252	$168,489

Source: Calculated by NMFS SERO using the model developed for and applied in NMFS (2021a).

3.3.2 Recreational Sector

The recreational sector is composed of the private and for-hire components. The private component includes anglers fishing from shore (all land-based structures) and private/rental boats. The for-hire component is composed of charter boats and headboats. 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 because larger concentrations of fish are required to satisfy larger groups of anglers.

Permits

For persons aboard for-hire vessels to fish for or possess reef fish species in the Gulf EEZ the for-hire vessels are required to have a Gulf charter/headboat permit for reef fish (for-hire permit). These are limited access permits. As of February 1, 2022, there were 1,289 valid (non-expired) or renewable[28] Gulf reef fish for-hire permits and 4 valid or renewable Gulf reef fish historical captain for-hire permits (J. Dudley, NMFS SERO, pers. comm. 2022). Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel, and vessels may operate in both capacities. However, only federally permitted headboats are required to submit harvest and effort information to the NMFS Southeast Region Headboat Survey (SRHS).[29] Participation in the SRHS is based on determination by the Southeast Fisheries Sciences Center (SEFSC) that the vessel primarily operates as a headboat. As of February 22, 2022, 69 Gulf headboats were

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

[29] All owners or operators of vessels issued Gulf federal charter/headboat permits are required to comply with the new Southeast For-Hire Electronic Reporting Program as of January 5, 2021. Under this program, these owners or operators must declare trips prior to departure and submit electronic fishing reports prior to offloading fish, or within 30 minutes after the end of a trip, if no fish are landed. Those vessels selected to report to the SRHS (i.e., federally permitted headboats) will continue to submit their reports under the new requirements directly to the SRHS program. For more information, see: https://www.fisheries.noaa.gov/southeast/recreational-fishing-data/southeast-hire-electronic-reporting-program?utm_medium=email&utm_source=govdelivery.

registered in the SRHS (K. Brennan, NMFS SEFSC, pers. comm. 2022). As a result, of the 1,293 vessels with Gulf reef fish for-hire permits (including historical captain permits), up to 69 may primarily operate as headboats and the remainder as charter vessels.

Information on Gulf charter vessel and headboat operating characteristics is included in Savolainen et al. (2012) and is incorporated herein by reference.

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

Angler Effort

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

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

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

Data from MRIP, the Louisiana Department of Wildlife and Fisheries (LDWF) Recreational Creel Survey, and the Texas Parks and Wildlife Department (TPWD) Marine Sport-Harvest Monitoring Program were used to estimate target trips for red snapper by state-permitted (and not federally permitted) for-hire vessels, federal for-hire vessels, and private/rental vessels. It is important to note that in 2018, MRIP transitioned from the Coastal Household Telephone Survey (CHTS) to a new mail-based fishing effort survey (FES). The MRIP-based estimates presented for FL, AL, and MS in Table 3.3.2.1 are calibrated to FES and may be greater than estimates that

are non-calibrated.[30] In addition, effort estimates from the LDWF Recreational Creel survey are not calibrated to MRIP and are therefore not directly comparable to the MRIP-based estimates.

Florida and Alabama recorded the most target trips for red snapper from 2016 through 2020, and the dominant mode of fishing in all Gulf states was the private/rental mode (Table 3.3.2.1). Across all modes, both Florida and Alabama experienced 5-year peaks in target effort in 2017. In Louisiana, red snapper target trips fluctuated throughout the period with a peak in 2019. Mississippi experienced an upward trend in red snapper target trips through 2019 and then a steep drop to a 5-year low in 2020. Finally, red snapper target trips in Texas increased steadily through 2019 and then dropped by approximately 39% in 2020 (Table 3.3.2.1).

[30] As of August 2018, all directed trip estimate information provided by MRIP (public use survey data and directed trip query results) for the entire time series were updated to account for both the Access Point Angler Intercept Survey (APAIS) design change in 2013, as well as the transition from the CHTS to the FES in 2018. Back-calibrated estimates of directed effort are not available. For more information, see: https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-estimate-updates.

Table 3.3.2.1. Gulf red snapper recreational target trips, by mode and state, 2016-2020.

	Alabama	Florida	Louisiana	Mississippi	Texas
	State Charter				
2016	11,031	10,217	2,933	492	1,864
2017	4,298	9,720	2,072	3	3,491
2018	0	490	1,364	62	927
2019	3	444	2,452	594	2,102
2020	154	5,955	561	0	618
Average	3,097	5,365	1,876	230	1,800
	Federal For-Hire Charter				
2016	21,860	41,398	7,492	935	1,020
2017	26,527	57,195	10,505	2,411	1,177
2018	27,826	81,560	6,740	264	3,168
2019	40,664	76,421	6,606	2,271	3,189
2020	33,937	81,194	4,523	1,657	2,634
Average	30,163	67,554	7,173	1,508	2,237
	Private/Rental Mode				
2016	330,506	570,887	54,837	69,729	8,468
2017	643,163	962,252	60,352	77,092	14,943
2018	364,538	836,260	54,665	91,733	17,496
2019	562,351	736,971	71,059	106,163	25,375
2020	383,835	709,558	64,115	41,149	15,510
Average	456,879	763,185	61,006	77,173	16,358
	All Modes				
2016	363,397	622,502	65,262	71,156	11,351
2017	673,988	1,029,167	72,929	79,506	19,610
2018	392,363	918,309	62,769	92,059	21,591
2019	603,018	813,836	80,117	109,029	30,665
2020	417,926	796,707	69,199	42,806	18,763
Average	490,139	836,104	70,055	78,911	20,396

Source: MRIP database, SERO, NMFS (August 2022) for AL, FL and MS. LDWF Recreational Creel Survey for LA. TPWD Marine Sport-Harvest Monitoring Program for TX.

Note 1: For AL, FL, and MS, charter effort from waves when the federal for-hire season was closed (typically waves 1, 2, 5, and 6) are all assigned to state charters regardless of area fished (e.g. state or federal waters). All charter effort from federal waters and a portion of charter effort from state waters are assigned to the federal for-hire fleet from waves when the for-hire season was open. If the federal season was open during a wave but a state season was open during days outside the federal season in that wave, federal season effort was considered to be effort from federal waters plus a portion of the effort in state waters computed from the ratio of the federal season length in the wave to the state season length in the wave. If the state season ended before the federal season in a wave, then all effort was assumed to come from the federal season. For LA, offshore charter trips captured by the LDWF Recreational Creel Survey are counted as federal for-hire charter trips and inshore trips are counted as state charter trips. For TX, data are presented as provided by TPWD.

Note 2: Headboat information is unavailable.

Similar analysis of recreational effort is not possible for the headboat mode because headboat data are not collected at the angler level. Estimates of effort by the headboat mode are provided in terms of angler days, or the total number of standardized full-day angler trips.[31] Headboat angler days were fairly stable across the Gulf states from 2016 through 2019 (Table 3.3.2.3). There was, however, a downward trend in reported angler days in Florida from 2016 on and a substantial dip in all states in 2020, likely due to the impacts of COVID-19 closures and disruptions. On average (2016 through 2020), Florida accounted for the majority of headboat angler days reported, followed by Texas and Alabama; whereas, Mississippi and Louisiana combined accounted for only a small percentage (Table 3.3.2.2). Headboat effort in terms of angler days for the entire Gulf tended to be concentrated most heavily during the summer months of June through August (Table 3.3.2.3).

Table 3.3.2.2. Gulf headboat angler days and percent distribution by state (2016 - 2020).

	Angler Days				Percent Distribution			
	FL	**AL**	**MS-LA***	**TX**	**FL**	**AL**	**MS-LA**	**TX**
2016	183,147	16,831	2,955	54,083	71.3%	6.5%	1.1%	21.0%
2017	178,816	17,841	3,189	51,575	71.1%	7.1%	1.3%	20.5%
2018	171,996	19,851	3,235	52,160	69.6%	8.0%	1.3%	21.1%
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%
Average	164,463	17,244	2,748	52,354	69.3%	7.3%	1.1%	22.3%

Source: NMFS SRHS (March 2022).
*Headboat data from Mississippi and Louisiana are combined for confidentiality purposes.
Note: 2020 estimates reflect closures and disruptions to service as a result of COVID-19.

[31] Headboat trip categories include half-, three-quarter-, full-, and 2-day trips. A full-day trip equals one angler day, a half-day trip equals .5 angler days, etc. Angler days are not standardized to an hourly measure of effort and actual trip durations may vary within each category.

Table 3.3.2.3. Gulf headboat angler days (in thousands) and percent distribution by month (2016 - 2020).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Headboat Angler Days (in thousands)											
2016	8.0	13.2	21.8	18.7	21.7	50.3	49.9	21.8	13.6	15.8	11.8	10.4
2017	9.0	14.0	21.0	19.4	19.2	47.7	54.0	23.0	10.3	11.1	11.3	11.5
2018	5.5	13.7	20.8	17.6	16.9	54.3	53.3	24.8	13.2	10.6	8.2	8.4
2019	2.3	12.8	21.8	16.3	18.3	46.0	47.6	24.2	11.4	13.7	10.4	10.4
2020	8.1	10.9	11.4	0.4	11.1	43.9	42.0	20.6	12.2	14.5	8.7	9.1
Avg	6.6	12.9	19.4	14.5	17.4	48.4	49.4	22.9	12.1	13.1	10.1	10.0
	Percent Distribution											
2016	3.1%	5.1%	8.5%	7.3%	8.4%	19.6%	19.4%	8.5%	5.3%	6.2%	4.6%	4.0%
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%
Avg	2.8%	5.5%	8.1%	5.8%	7.3%	20.6%	20.9%	9.7%	5.2%	5.6%	4.3%	4.2%

Source: NMFS SRHS (March 2022).
Note: 2020 estimates reflect closures and disruptions to service as a result of COVID-19.

Economic Value

Participation, effort, and harvest are indicators of the value of saltwater recreational fishing. However, a more specific indicator of value is the satisfaction that anglers experience over and above their costs of fishing. The monetary value of this satisfaction is referred to as consumer surplus (CS). The value or benefit derived from the recreational experience is dependent on several quality determinants, which include fish size, catch success rate, and the number of fish kept. These variables help determine the value of a fishing trip and influence total demand for recreational fishing trips. The estimated value of the CS for catching and keeping a second red snapper on an angler trip is $90.21 (values updated to 2021 dollars[32]), and decreases thereafter ($60.14 for a third red snapper, $44.33 for a fourth red snapper, and $34.94 for a fifth red snapper) (Carter and Liese 2012).

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

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

Estimates of average annual gross revenue for charter vessels and headboats in 2009 are provided in Savolainen, et al. (2012). In 2021 dollars, the average annual gross revenue for a Gulf headboat is approximately $286,000 while the average annual gross revenue for a Gulf charter vessel is approximately $94,000. More recent estimates of average annual gross revenue for Gulf headboats are provided in Abbott and Willard (2017) and D. Carter (pers. comm., March 15, 2018). Abbott and Willard (2017) suggest that Savolainen, et al.'s estimate of average annual gross revenue for headboats may be an underestimate as data in the former suggest that average gross revenue in 2009 for the vessels in their sample was approximately $506,000 (2021 dollars). Further, their data suggests average annual gross revenue per vessel had increased to approximately $611,000 (2021 dollars) by 2014. However, Abbott and Willard's estimates are based on a sample of 17 headboats that chose to participate in the Headboat Collaborative Program in 2014, while Savolainen, et al.'s are based on a random sample of 20 headboats. The headboats that participated in the Collaborative may be economic highliners, in which case Abbott and Willard's estimates would overestimate average annual gross revenue for Gulf headboats. D. Carter (pers. comm., March 15, 2018) recently estimated that average annual gross revenue for Gulf headboats was approximately $451,000 (2021 dollars) in 2017. This estimate is likely the best current estimate of annual gross revenue for Gulf headboats as it is based on a relatively large sample of 63 boats, or more than 90% of the active fleet, and is more recent.

However, gross revenues overstate the annual economic value and profits generated by for-hire vessels. Economic value for for-hire vessels can be measured by annual producer surplus (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 dollars, Savolainen, et al. (2012) estimated the annual PS for Gulf headboats and charter vessels was approximately $200,000 and $62,000, respectively. Their best estimates of economic profit were $84,000 and $28,000 (2021 dollars), respectively.[33] Estimates of PS and economic profit for headboats are not available from Abbott and Willard (2017) or D. Carter (pers. comm., March 15, 2018), as they did not collect comprehensive cost data at the vessel level.[34]

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 for trips taken by charter vessels and headboats in 2017 are available from Souza and Liese (2019). They also provide estimates of trip net cash flow per angler trip, which approximate PS per angler trip. According to Table 3.3.2.4, after accounting for transactions fees, supply costs, and labor costs, net revenue per trip was 42% of revenue for Gulf charter vessels and 55% of revenue for Gulf headboats, or $823 and $1,991 (2021 dollars), respectively. Given the respective average number of anglers per trip for each fleet, PS per angler trip is estimated to be $150 for Gulf charter vessels and $75 for

[33] 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.

[34] 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.

Gulf headboats.

Table 3.3.2.4. Trip-level economics for offshore trips by Gulf charter vessels and headboats in 2017 (2021 dollars).

	Gulf Charter Vessels	Gulf Headboats
Revenue	100%	100%
Transaction Fees (% of revenue)	3%	5%
Supply Costs (% of revenue)	27%	19%
Labor Costs (% of revenue)	27%	21%
Net Revenue per trip including Labor costs (% of revenue)	42%	55%
Net Revenue per Trip	$823	$1,991
Average # of Anglers per Trip	5.5	26.6
Trip Net Cash Flow per Angler Trip	$150	$75

Source: Souza and Liese (2019).

Business Activity

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

Estimates of the business activity (economic impacts) associated with recreational angling for red snapper in the Gulf were calculated using average trip-level impact coefficients derived from the 2017 Fisheries Economics of the U.S. report (NMFS 2021a) and underlying data provided by the NOAA Office of Science and Technology. Economic impact estimates in 2017 dollars were adjusted to 2021 dollars using the annual, not seasonally adjusted GDP implicit price deflator provided by the U.S. Bureau of Economic Analysis.

Business activity (economic impacts) for the recreational sector is characterized in the form of value-added impacts (contribution to the GDP in a state or region), output impacts (gross business sales), income impacts (wages, salaries, and self-employed income), and jobs (full- and part-time). Estimates of the average annual economic impacts (2016-2020) resulting from Gulf red snapper target trips are provided in Table 3.3.2.5. The average impact coefficients, or multipliers, used in the model are invariant to the "type" of effort (e.g., target or catch) and can therefore be directly used to measure the impact of other effort measures such as red snapper

catch trips. To calculate the multipliers from Table 3.3.2.5, simply divide the desired impact measure (value-added impact, sales impact, income impact, or employment) associated with a given state and mode by the number of target trips for that state and mode.

The estimates provided in Table 3.3.2.5 only apply at the state-level. 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. It is also important to note that these economic impacts estimates are based on trip expenditures only and do not account for durable expenditures. Durable expenditures cannot be reasonably apportioned to individual species. As such, the estimates provided in Table 3.3.2.5 may be considered a lower bound on the economic activity associated with those trips that targeted red snapper.

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

Table 3.3.2.5. Estimated annual average economic impacts (2016-2020) from recreational trips that targeted Gulf red snapper, by state and mode, using state-level multipliers. All monetary estimates are in 2021 dollars in thousands.

	FL	AL	MS	LA	TX
	Charter Mode				
Target Trips	72,919	33,260	1,738	9,050	4,038
Value Added Impacts	$26,572	$14,429	$811	$4,471	$1,702
Sales Impacts	$44,621	$26,240	$1,532	$8,398	$2,827
Income Impacts	$15,528	$8,230	$467	$2,635	$954
Employment (Jobs)	394	274	17	94	23
	Private/Rental Mode				
Target Trips	763,185	456,879	77,173	61,006	16,358
Value Added Impacts	$28,657	$21,512	$1,755	$9,480	$2,916
Sales Impacts	$44,416	$33,287	$2,913	$16,229	$4,806
Income Impacts	$15,037	$8,373	$923	$5,122	$1,491
Employment (Jobs)	390	295	28	122	32
	All Modes				
Target Trips	836,104	490,139	78,911	70,055	20,396
Value Added Impacts	$55,228	$35,941	$2,566	$13,951	$4,619
Sales Impacts	$89,037	$59,526	$4,444	$24,628	$7,633
Income Impacts	$30,565	$16,602	$1,390	$7,757	$2,445
Employment (Jobs)	784	570	45	216	55

Source: Effort data from MRIP, LDWF Recreational Creel Survey, and TPWD Marine Sport-Harvest Monitoring Program; economic impacts results calculated by NMFS SERO using NMFS (2021) and underlying data provided by the NOAA Office of Science and Technology.
Note1: Includes state charter and federal for-hire charter trips.
Note2: Headboat information is unavailable.

3.4 Description of the Social Environment

This framework action affects commercial and recreational management of red snapper in the Gulf. A description of the permits related to the commercial and recreational reef fish fishing is included 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 RS-IFQ accounts with shares, RS-IFQ accounts with allocation but without shares, and RS-IFQ dealers are included at the state and community level. The top fishing communities involved in red snapper fishing in the Gulf are identified. Descriptions of the top communities based on recreational engagement are included. Community level data are presented in order to meet the requirements of National Standard 8 of the Magnuson-Stevens Act, which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented to assess the potential for environmental justice concerns.

Additional detailed information about communities in the following analysis can be found on the SERO Community Snapshots website.[35]

3.4.1 Commercial Sector

Permits

Gulf reef fish permits are issued to individuals in Florida (80.7% of Gulf reef fish vessels), Texas (7.6%), Alabama (4.7%), Louisiana (4%), and Mississippi (0.9%) (SERO permit office, July 8, 2021). Residents of other states (Arkansas, Connecticut, Georgia, Illinois, Maryland, Missouri, North Carolina, New York, Oklahoma, South Carolina, and Wisconsin) 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 251 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 (8.9% of reef fish permits), Key West, Florida (4.6%), and St. Petersburg, Florida (3.2%).

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

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

State	Community	Reef Fish Permits (RR)
FL	Panama City	92
FL	Key West	47
FL	St. Petersburg	33
FL	Largo	29
TX	Galveston	25
FL	Destin	24
FL	Cortez	23
FL	Pensacola	23
FL	Seminole	23
FL	Clearwater	18
FL	Tampa	17
FL	Lynn Haven	14
FL	Steinhatchee	14
FL	Naples	13
FL	Tarpon Springs	13
FL	Apalachicola	12
FL	Lecanto	12
FL	Madeira Beach	12
TX	Houston	12

Source: SERO permit office, July 8, 2021.

Landings

The greatest proportions of the commercial red snapper catch are landed along the west coast of Florida (average of 38% from 2016-2020, Table 3.4.1.2) and in Texas (36.4%). Louisiana (average of 18%) also includes a sizable amount of the commercial red snapper catch. Other Gulf states are also involved in commercial red snapper fishing, but these states represent a much smaller percentage of the total commercial landings.

Table 3.4.1.2. Percentage of total commercial red snapper landings by state for 2016-2020.

Year	AL/MS	FL	LA	TX
2016	7.2%	35.4%	16.7%	40.6%
2017	9.2%	37.1%	18.1%	35.6%
2018	7.6%	37.4%	20.1%	34.9%
2019	7.6%	38.8%	18.7%	34.9%
2020	6.0%	41.4%	16.5%	36.2%

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

IFQ Accounts

To land IFQ-managed species, such as red snapper, 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 we don't always know who is behind the account, and whether the holders of an account 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 equates to the primary individual listed on the account, if the account is held by more than one individual.

Also called shareholder accounts, an IFQ account is required to hold shares and allocation. The number of accounts is used here as a proxy to represent the number of participants.

Shareholders

As of July 8, 2021, a total of 336 IFQ accounts held shares in the RS-IFQ program (IFQ database; includes active and suspended accounts). The majority of accounts with shares in the RS-IFQ program have a mailing address in Florida (68.8% of accounts with RS-IFQ shares, Table 3.4.1.3), followed by Texas (15.2%), Louisiana (5.4%), and Alabama (5.1%). Accounts with mailing addresses in Mississippi and in other states (Georgia, Iowa, Michigan, North Carolina, New York, South Carolina, and Tennessee) also hold RS-IFQ shares, but these states represent a smaller percentage of the total number of accounts with shares.

The greatest proportion of RS-IFQ shares are held in accounts with mailing addresses in Florida, followed by Texas, Louisiana, and Alabama (Table 3.4.1.3). Accounts in Mississippi and other states also hold RS-IFQ shares, but these states represent a smaller percentage of shares.

Table 3.4.1.3. Number of IFQ accounts with red snapper shares by state, including the percentage of shares by state by share category.

State	Accounts	RS Shares (%)
AL	17	3.877
FL	231	46.450
LA	18	7.845
MS	9	2.414
TX	51	35.358
Other	10	2.389
Total	**336**	**98.334**

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

Accounts with RS-IFQ shares are held by people with mailing addresses in a total of 156 communities (IFQ database accessed 7/8/21). Communities with the most accounts with RS-IFQ shares are located in Florida and Texas (Table 3.4.1.4). The community with the most accounts with RS-IFQ shares is Panama City, Florida (8.3% of accounts with shares), followed by Destin, Florida (4.2%), Cortez, Florida (3.6%), and Galveston, Texas (3.6%).

Table 3.4.1.4. Top communities by number of IFQ accounts with red snapper shares, including the percentage of shares by community by share category.

State	Community	Accounts	RS Shares (%)
FL	Panama City	28	11.872
FL	Destin	14	6.290
FL	Cortez	12	0.024
TX	Galveston	12	14.894
TX	Houston	11	4.761
FL	Lynn Haven	10	12.517
FL	Pensacola	9	2.795
FL	Largo	7	0.045
FL	St. Petersburg	6	0.101
FL	Apalachicola	5	0.558
FL	Gulf Breeze	5	1.034
FL	Seminole	5	0.024
FL	Steinhatchee	5	0.577
FL	Tallahassee	5	1.151

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

The largest or maximum percent of RS-IFQ shares held in a community is 14.894% in Galveston, Texas (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 3.4.1.4). 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 2020, a total of 305 IFQ accounts held RS-IFQ allocation without RS-IFQ shares (IFQ database accessed 2/25/22). However, these accounts may be related to accounts with red snapper shares. Many accounts are related and industry representatives have indicated that some fishermen purposely separate their shares from the account landing the allocation (NMFS 2021b). The number of allocation holders without shares may also be influenced by quota changes, the ability for shareholders to obtain shares, changes in harvesting behavior, or influences from the GT-IFQ program (NMFS 2022). The majority of accounts with RS-IFQ

allocation, but without RS-IFQ shares have mailing addresses in Florida (80% of accounts with red snapper allocation, but without red snapper shares, Table 3.4.1.5), followed by Alabama (6.6%) Texas (5.6%), and Louisiana (3.9%). Account holders with allocation, but without shares also have mailing addresses in Mississippi and other states (Georgia, Illinois, North Carolina, New York, Ohio, and South Carolina), but these states represent a smaller percentage of the total number of accounts with allocation, but without shares.

Table 3.4.1.5. Number of IFQ accounts with red snapper allocation, but without red snapper shares by state, 2020.

State	Accounts
AL	20
FL	244
LA	12
MS	3
TX	17
Other	9
Total	**305**

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

IFQ accounts with RS-IFQ allocation, but without RS-IFQ shares have mailing addresses in a total of 132 communities (IFQ database accessed 2/25/22). Communities with the most accounts with allocation, but without shares are located in Florida and Texas (Table 3.4.1.6). The community with the most accounts with allocation, but without shares is Panama City, Florida (7.5% of accounts with allocation, but without shares, Table 3.4.1.6), followed by St. Petersburg, Florida (4.9%), and Largo, Florida (4.6%).

Table 3.4.1.6. Top communities by number of IFQ accounts with red snapper allocation, but without red snapper shares, 2020.

State	Community	Accounts
FL	Panama City	23
FL	St. Petersburg	15
FL	Largo	14
TX	Galveston	10
FL	Clearwater	9
FL	Madeira Beach	9
FL	Seminole	9
FL	Pensacola	6

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

Dealers

The majority of RS-IFQ dealers are located in Florida (average of 72.3% of Gulf RS-IFQ dealers for 2016-2020, Table 3.4.1.7), followed by Alabama and Mississippi (9.7%), Louisiana (9.5%), and Texas (8.4%).

Table 3.4.1.7. Number of Gulf RS-IFQ dealers by state for 2016-2020.

Year	AL/MS	FL	LA	TX
2016	8	72	8	8
2017	9	76	13	11
2018	13	79	10	9
2019	13	82	10	9
2020	10	86	11	9

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

Gulf RS-IFQ dealer facilities are located in a total 85 communities (IFQ database accessed 7/7/21, includes Gulf RS-IFQ dealers with red snapper landings 2016-2020). Communities with the most Gulf RS-IFQ dealer facilities are located in Florida, Alabama, Louisiana, and Texas (Table 3.4.1.8). The community with the most Gulf RS-IFQ dealer facilities is Key West, Florida (4.3% of Gulf RS-IFQ dealer facilities, Table 3.4.1.8), followed by Destin, Florida and Madeira Beach, Florida (each with 3.7% of Gulf RS-IFQ dealer facilities).

Table 3.4.1.8. Top communities by number of Gulf RS-IFQ dealer facilities with red snapper landings during 2016-2020.

State	Community	*Dealer Facilities
FL	Key West	7
FL	Destin	6
FL	Madeira Beach	6
AL	Bayou La Batre	5
FL	Panacea	5
FL	Panama City	5
AL	Gulf Shores	4
FL	Bokeelia	4
FL	Crystal River	4
FL	Hudson	4
FL	Pensacola	4
FL	St. Petersburg	4
LA	Venice	4
TX	Galveston	4

Source: NMFS SERO IFQ database accessed 7/7/21.
*Multiple dealers can use the same facility and a dealer can operate at multiple facilities.

Regional Quotient

Regional Quotient (RQ) is the proportion of IFQ red snapper landed within a community out of the total amount of IFQ red snapper landed within the Southeast region. It is an indicator of the percent contribution in pounds or value of IFQ red snapper 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 2016 through 2020. All other communities that landed IFQ red snapper are grouped as "Other Communities." Figure 3.4.1.1 shows the RQ in pounds from 2016 to 2020. The dominant communities for IFQ red snapper pounds landed included the communities of Galveston, Texas; Destin, Florida; and Panama City, Florida (Figure 3.4.1.1).

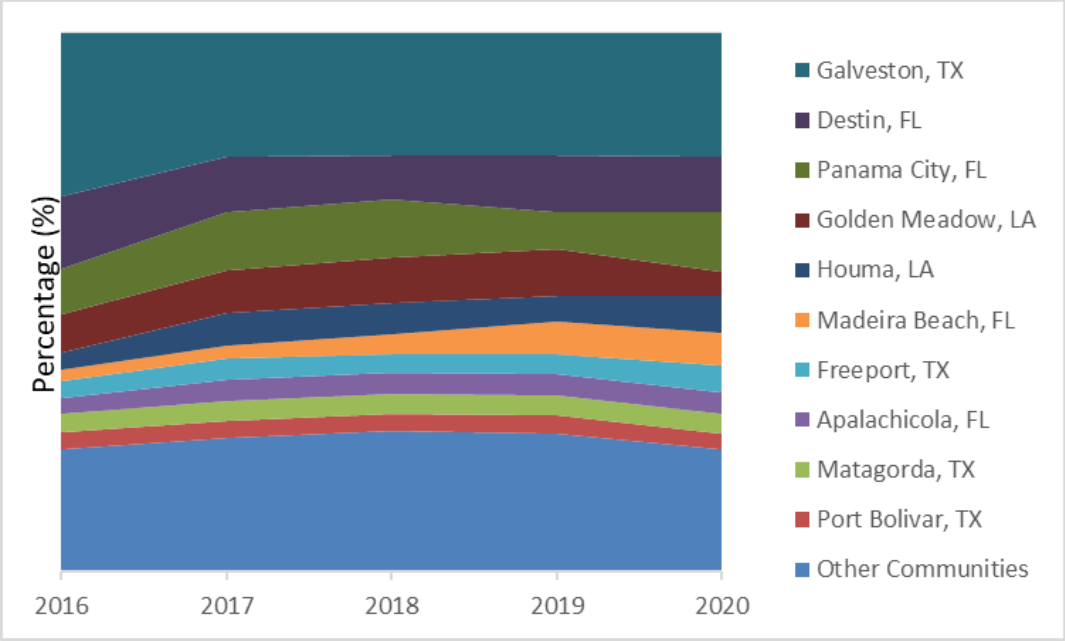

Figure 3.4.1.1. Regional Quotient (pounds) for top communities by landings in the Gulf of Mexico RS-IFQ Program from 2016 through 2020.
Source: IFQ database accessed 7/7/21.

3.4.2 Recreational Sector

Permits

Charter/headboat for reef fish permits are issued to individuals in Florida (61.4% of charter/headboat for reef fish vessels), Texas (17.2%), Alabama (11.5%), Louisiana (8.5%), and Mississippi (3.4%, SERO permit office, July 8, 2021). Residents of other states (Alaska, 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 for reef fish permits are held by individuals with mailing addresses in 394 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 Destin, Florida (5.2% of charter/headboat permits), Panama City, Florida (4.7%), and Orange Beach, Alabama (4.5%).

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	Destin	67
FL	Panama City	60
AL	Orange Beach	58
FL	Naples	49
FL	Key West	41
FL	Pensacola	30
FL	St. Petersburg	28
FL	Sarasota	26
TX	Corpus Christi	24
TX	Galveston	24
FL	Clearwater	21
FL	Panama City Beach	21
FL	Cape Coral	20
FL	Fort Myers	17
AL	Dauphin Island	14
FL	Bradenton	14
FL	Crystal River	14
FL	Gulf Breeze	14
FL	Tampa	14

Source: SERO permit office, July 8, 2021.

Landings

The greatest proportion of recreational landings of red snapper are from waters adjacent to Alabama (average of 38.9%% from 2016-2020), followed by Florida (34.2%), Louisiana (13.1%), Texas (9.1%), and Mississippi (4.8%, Table 3.4.2.2).

Table 3.4.2.2. Percentage of total recreational red snapper landings by state for 2016-2020.

Year	AL	FL	LA	MS	TX
2016	36.5%	33.0%	17.0%	6.6%	7.0%
2017	44.4%	34.6%	11.0%	3.0%	7.0%
2018	36.8%	36.8%	12.0%	4.8%	9.6%
2019	37.5%	32.7%	12.0%	6.9%	11.0%
2020	39.1%	33.8%	13.7%	2.7%	10.8%

Source: MRIP SEFSC Recreational ACL Data (June 2021).

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 red snapper. 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 top Gulf communities that are engaged and reliant 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 20 included communities demonstrate high levels of recreational engagement, although this is not specific to fishing for red snapper. 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 20 list, suggesting a greater importance for recreational fishing in that area.

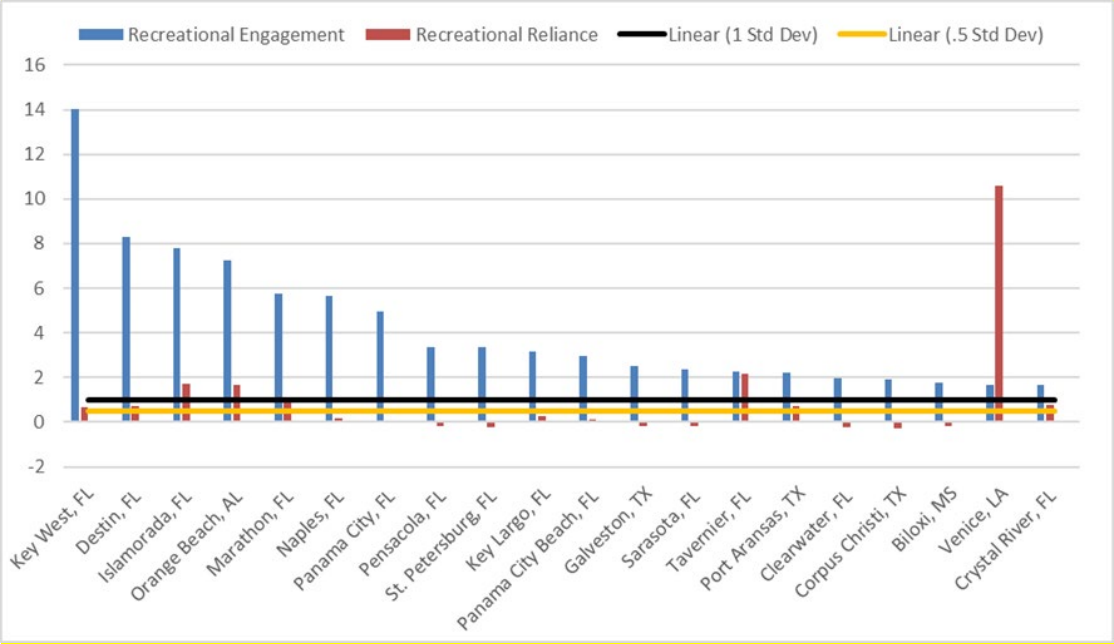

Figure 3.4.2.1. Top 20 communities by recreational engagement and reliance.
Source: SERO, Community Social Vulnerability Indicators Database 2019.

The description of fishing activities presented here highlights which communities may be most involved in Gulf red snapper fishing. It is expected that the impacts from the regulatory action in this framework amendment, whether positive or negative, will most likely affect those communities identified above.

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 Fishery Conservation and Management Act (Magnuson-Stevens Act), to also include communities that share a particular characteristic (e.g., crew of commercial king mackerel 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.’’

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 was 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 red snapper

specifically or fishing for reef fish in general. One community exceeds the threshold of one standard deviation above the mean for all three indices; Freeport, Texas. Several communities exceed the threshold of one standard deviation above the mean for at least one of the indices (Bayou La Batre, Alabama; Bokeelia, Florida; Crystal River, Florida; Panacea, Florida; Houma, Louisiana; Venice, Louisiana; Houston, Texas; and Matagorda, Texas). These communities would be the most likely to exhibit vulnerabilities to social or economic disruption resulting from regulatory change.

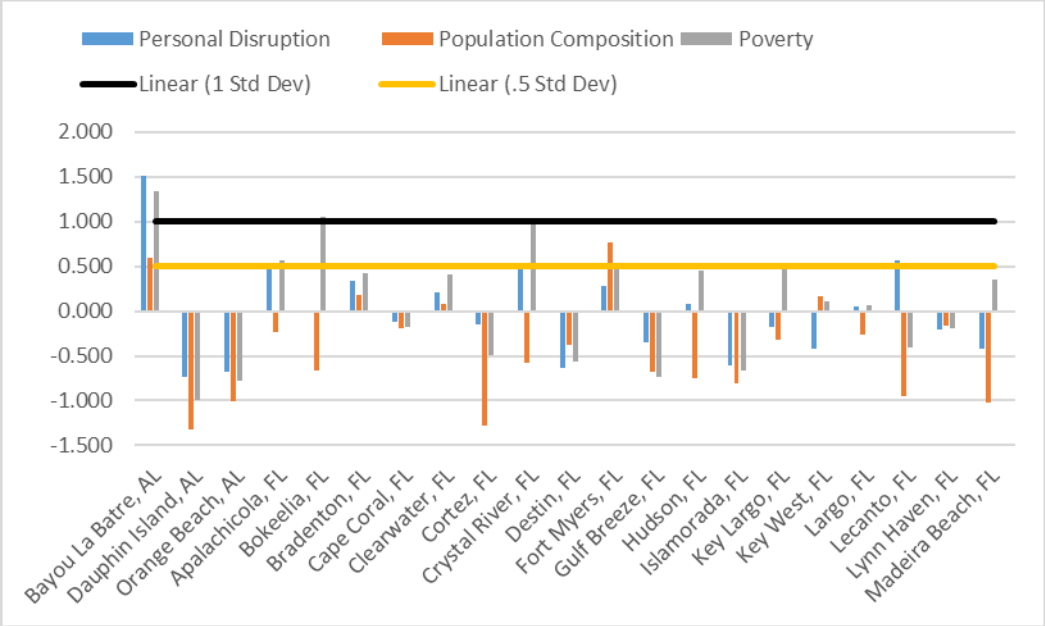

Figure 3.4.3.1. Social vulnerability indices for top commercial and recreational reef fish and red snapper communities.
Source: SERO, Community Social Vulnerability Indicators Database 2019.

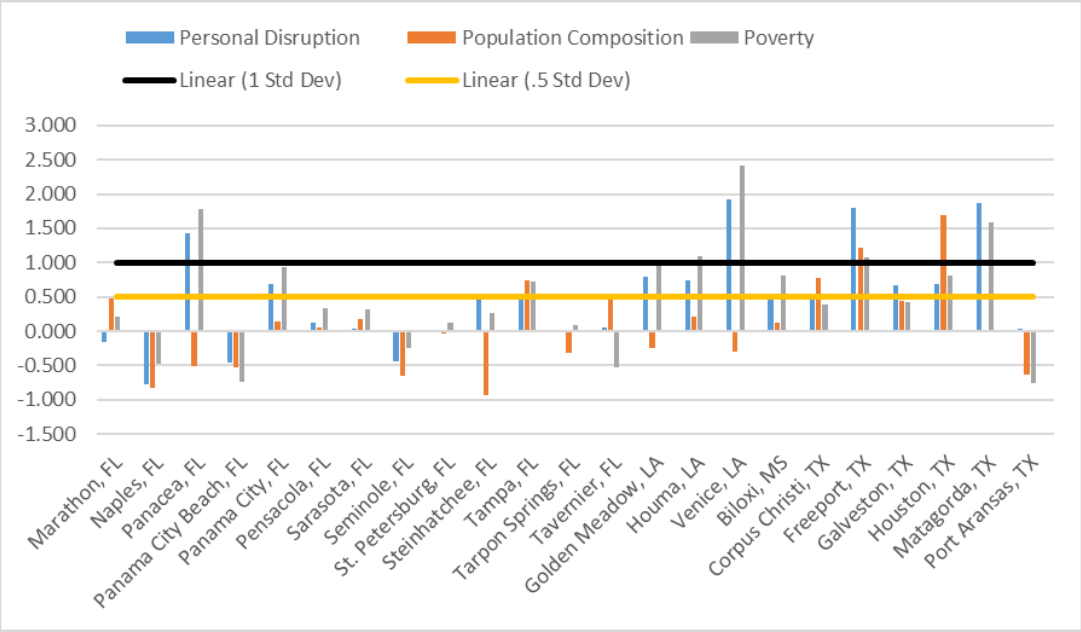

Figure 3.4.3.2. Social vulnerability indices for top commercial and recreational reef fish and red snapper communities continued.
Source: SERO, Community Social Vulnerability Indicators Database 2019.

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 red snapper specifically (participation). The potential effects of the actions on non-place based communities, such as commercial fishermen and recreational stakeholders are discussed in Sections 4.1.4. There are no known populations that rely on the consumption of red snapper 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, an area extending 200 nautical miles from the seaward boundary of each of the coastal states, and authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management is shared by the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and

interests of constituent states. Regional Councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-Stevens Act and with other applicable laws summarized in Appendix A. In most cases, the Secretary has delegated this authority to NMFS.

The Council is responsible for fishery resources in federal waters of the Gulf. These waters extend to 200 nautical miles offshore from the seaward boundaries of Alabama, Florida, Louisiana, Mississippi, and Texas, as those boundaries have been defined by law. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline of 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

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

Regulations contained within FMPs are enforced through actions of NOAA's Office of Law Enforcement, the U.S. Coast Guard, and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. These activities are being coordinated by the Council's Law Enforcement Advisory Panel and the Gulf States Marine Fisheries Commission's Law Enforcement Committee, which have developed joint enforcement agreements and cooperative enforcement programs.[36]

3.5.2 State Fishery Management

The purpose of state representation at the Council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf States exercises legislative and regulatory authority over their respective state's natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states' natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided in Amendment 22 (GMFMC

[36] www.gsmfc.org

2004b). Descriptions of individual state management and data collection programs can be found at the Web Pages shown in Table 3.5.2.1.

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

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

3.5.2.1 Red Snapper Management

Recreational Sector

The private angling component's fishing seasons for red snapper were set by the states under exempted fishing permits in 2018 and 2019, a permit type issued by NMFS. The states are now responsible for establishing some management measures (i.e., fishing seasons, bag limits, size limits; these may vary by state and year) for the private angling component's harvest of red snapper (Amendment 50A; GMFMC 2019a) for 2020 and subsequent years. In-season quota monitoring for the private angling component is performed by the states, with the states being responsible for closing the waters adjacent to their state once the state's ACL has been projected to be met. Private recreational fishing vessels are not required to have a federal permit to harvest individual species or species complexes in the reef fish fishery from the Gulf EEZ. However, anglers aboard these vessels must either be federally registered or licensed in states that have a system to provide complete information on the states' saltwater anglers to the national registry.

The federal for-hire component of the recreational sector in the Gulf is managed by NMFS. In 2015, the for-hire component was given a separate quota from the private angling component (GMFMC 2014); consequently, the duration of the for-hire fishing season may vary from the season durations for the private angling component as specified by each Gulf state. Presently, the for-hire component's fishing season begins on June 1 and closes when the component's annual catch target is predicted to be harvested (see Section 1.3 for more information on for-hire quota monitoring). Any for-hire fishing vessel that takes anglers into the Gulf EEZ where anglers harvest species or complexes in the reef fish fishery must have a limited-access charter vessel/headboat (for-hire) permit for reef fish that is specifically assigned to that vessel. Since 2003, there has been a moratorium on the issuance of new federal reef fish for-hire permits. This means that participation in the federal for-hire component is capped; no additional federal permits are available. Although the for-hire permit application collects information on the primary method of operation, the permit itself does not identify the permitted vessel as either a headboat or a charter vessel, and vessels may operate in both capacities. However, only federally permitted headboats are required to submit harvest and effort information to NMFS SRHS. Participation in the SRHS is based on determination by the SEFSC that the vessel primarily operates as a headboat. Most charter vessel trips occur in the EEZ and target rig-reef species (i.e., snappers and groupers; Savolainen et al. 2012).

Commercial Sector

The commercial sector for red snapper in the Gulf is managed under an IFQ program administered through NOAA SERO. Primary commercial gear types in the fishery are vertical lines (handlines and bandit gear) and bottom longlines. Commercial operators harvesting reef fish from the Gulf EEZ must have a Gulf reef fish permit, which is a limited access permit. Only vessels with a valid Gulf reef fish permit can harvest reef fish in the Gulf EEZ, and those that use bottom longline gear in the Gulf EEZ east of 85º30'W. longitude must also have a valid Eastern Gulf longline endorsement. In addition to these restrictions, operators of reef fish fishing vessels who want to harvest red snapper must participate in the red snapper IFQ program. To harvest IFQ species, a vessel permit must be linked to an IFQ account and possess sufficient allocation for the species to be harvested. IFQ accounts can be opened and valid permits can be linked to IFQ accounts at any time during the year. Eligible vessels can receive allocation from other IFQ participants.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1: Modification of Gulf of Mexico (Gulf) Red Snapper Catch Limits

4.1.1 Direct and Indirect Effects on the Physical Environment

Modifying the red snapper catch limits may affect the physical environment by allowing an increase in harvest. Effects on the physical environment from fishing are associated with gear coming into contact with bottom. Different gear types have different levels of impact. Recreational red snapper fishing almost exclusively uses vertical line gear, most frequently rod-and-reel that can interact with and affect bottom habitat. Anchor damage is also associated with handline fishing vessels, particularly by the recreational sector where anglers may repeatedly visit well-marked fishing locations. Preferred fishing sites, like reefs, are targeted and revisited multiple times (Bohnsack 2000). In terms of commercial red snapper fishing, most use handlines (mostly bandit rigs and electric reels, or rod-and-reel) with a small percentage caught with bottom longlines. Effects from fishing on the physical environment are generally correlated to fishing effort. The greater the fishing effort, the more gear interacts with the bottom.

Alternative 1 (No Action) would not change the current catch limits, and therefore would not result in change in effects to the physical environment. **Preferred Alternative 2** would increase allowable catch by 1,210,000 pounds whole weight (lbs ww) and therefore increase the amount of fishing activity, resulting in possible negative effects to the physical environment. However, any negative effects under **Preferred Alternative 2** are expected to be minimal because no significant change in overall fishing effort is expected. Fishing for reef fish species in the Gulf is historically a multi-species endeavor for both commercial and recreational fishermen, and especially so for the latter. Therefore, minor changes in effort targeting a specific species are not expected to change the overall universe of fishing effort in general for reef fish species in the Gulf.

4.1.2 Direct and Indirect Effects on the Biological Environment

Alternative 1 (No Action) would maintain lower catch limits than those recommended by the Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC), and would therefore result in direct positive effects to the red snapper stock. **Preferred Alternative 2** would provide a higher harvest limit (16.31 million pounds [mp] ww) compared to **Alternative 1** (15.1 mp ww). This higher limit would allow for increased removals of red snapper from the stock relative **Alternative 1**. Thus, **Preferred Alternative 2** is expected to have a greater adverse effect on the red snapper stock compared to **Alternative 1** through allowing greater removals. These effects are not expected to be significant because the increase in harvest specified in **Preferred Alternative 2** is consistent with the recommendations by the Council's SSC, which are based on the most recent analyses of the sustainable level of removals.

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

4.1.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain the current reference points (overfishing limit [OFL] and acceptable biological catch [ABC]) and the total, sector and intra-sector annual catch limits (ACL) for red snapper. Therefore, **Alternative 1** would not be expected to change fishing practices or recreational and commercial red snapper harvests and would not be expected to result in economic effects. **Alternative 1** would also not be consistent with the SSC's latest recommendations.

Preferred Alternative 2 would adjust the OFL and increase the ABC and the total, sector and intra-sector ACLs for red snapper. Increases in recreational and commercial ACLs that would result from **Preferred Alternative 2** are provided in Table 4.1.3.1. **Preferred Alternative 2** would increase the total red snapper ACL by 1.21 mp ww; with 51% and 49% of increase allotted to the commercial and recreational sector, respectively.

Table 4.1.3.1. Recreational and commercial ACLs, and increases in ACLs relative to the status quo (Alternative 1).

	Alternative 1 (lbs ww)	Preferred Alternative 2 (lbs ww)	Increase (Preferred Alt 2 minus Alt 1) (lbs ww)
Recreational ACL	7,399,000	7,991,900	592,900
Commercial ACL	7,701,000	8,318,100	617,100
Total	15,100,000	16,310,000	1,210,000

For the commercial sector, because red snapper is currently managed under an individual fishing quota (IFQ) program, short term economic effects expected to result from changes to the commercial ACL can be measured by changes in the value of annual allocation and changes in ex-vessel value. Between 2016 and 2020, annual allocation transfer and ex-vessel prices per pound (lb) gutted weight (gw) averaged $3.72 and $5.45 ($2021), respectively (Table 3.3.1.2). Short term economic effects provided in this section also include a change in economic value as measure by a change in producer surplus (PS). As discussed in Section 3.3.1, PS for commercial vessels that harvested Gulf red snapper was approximately 52% of ex-vessel value. Because IFQ share values represent the net present value of the expected profit from harvesting one unit of quota in the long-run, longer term economic effects expected to result from ACL changes can be

evaluated based on changes in the value of IFQ shares. Between 2016 and 2020, IFQ share transfer prices averaged $38.62 per pound gw ($2021) (Table 3.3.1.2).

The increase in the commercial ACL expected to result from **Preferred Alternative 2** as well as associated short and long-term economic effects are provided in Table 4.1.3.2. **Preferred Alternative 2**, which would increase the red snapper commercial quota by 617,100 lbs ww or 555,946 lbs gw (based on a conversion rate of 1.11 1bs ww to 1 lb gw; M. Larkin, NMFS-SERO pers. comm, 2022), is expected to result in an increase in ex-vessel value and annual allocation value of $3,029,905 and $2,068,119, respectively.

Table 4.1.3.2. Increases in commercial red snapper ACL, annual allocation, ex-vessel, economic, and IFQ share values relative to the status quo (Alternative 1).

Increase in Commercial ACL		Annual Allocation Value	Ex-Vessel Value	Economic Value (PS)	IFQ Share Value
lbs ww	lbs gw				
617,100	555,946	$2,068,119	$3,029,905	$1,575,551	$21,470,632

Note: All monetary values are in $2021. The conversion factor from gw to ww is 1.11 (M. Larkin, pers. comm. 2022)

Changes to consumer surplus (CS) for the commercial sector (i.e., the economic effects to retail seafood consumers) that would result from an increased supply of red snapper would be calculated using an own-price flexibility estimate for red snapper. Asche (2020) determined that estimate to be negative but statistically insignificant. Therefore, any increase in CS for retail seafood consumers as a result of **Preferred Alternative 2** would likely be very small (if any). The expected increase in ex-vessel value in Table 4.3.1.2 also translates into an expected increase in red snapper purchases by dealers. As indicated in Table 3.3.1.4, the 2016-2020 average of total red snapper purchases is $31,669,477 ($2021). Therefore, relative to **Alternative 1**, **Preferred Alternative 2** would be expected to result in an approximate annual increase of 9.6% of the average total red snapper purchases.

For the recreational sector, the economic effects expected to result from **Preferred Alternative 2** were measured in changes in economic value, i.e., changes in CS for anglers. Increases in economic value expected to result from **Preferred Alternative 2** to the for-hire sector, which would be measured by increases in producer surplus associated with additional for-hire red snapper target trips are not included in this analysis due to lack of information relative to the responsiveness of red snapper target trips to changes in the for-hire component's red snapper ACL. Therefore, estimated increases in recreational economic value provided in this section are lower bound estimates. 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. The expected increase in CS was based on an estimated CS per red snapper and on the increase in recreational red snapper ACL relative to the status quo alternative (**Alternative 1**). Based on information provided in Section 3.3.2, a CS of $90.21 per red snapper ($2021) is used. The conversion of the increase in recreational red snapper ACL from lbs ww into a number of fish is based on a 2016-20 average weight of 6.73 lbs ww per red snapper (M. Larkin, NMFS SERO

pers. comm., 2022). The increase in the recreational red snapper ACL expected to result from **Preferred Alternative 2** as well as the expected economic effects are provided in Table 4.1.3.3.

Table 4.1.3.3. Increases in recreational red snapper ACL (in lbs and number of fish) and in economic value relative to the status quo (Alternative 1).

Preferred Alternative 2 Increase in Recreational ACL		Economic Value
lbs ww	Number of fish	
592,900	88,098	$7,947,327

Note: Economic values are in $2021

Preferred Alternative 2 is expected to increase the recreational red snapper ACL by 88,098 fish. In terms of economic value to the recreational sector, **Preferred Alternative 2** is expected to add $7.95 million, approximately. This section presents Gulf-wide economic effects to the recreational sector but does not address state-specific effects of the proposed increase in the recreational ACL for two reasons. First, CS measures by state are not available. Second, changes in the respective Gulf states' ACLs are considered in a June 2021 framework action (pending approval) to address issues related to calibration of recreational data among the various state data collection programs.

Net benefits expected to result from **Preferred Alternative 2**, can be determined by combining commercial and recreational economic values provided in Tables 4.1.3.2 and 4.1.3.3, respectively. Therefore, **Preferred Alternative 2** is expected to increase net benefits by approximately $9.52 million.

4.1.4 Direct and Indirect Effects on the Social Environment

Additional effects would not be expected from retaining **Alternative 1** (No Action) as the catch limits from red snapper would remain at current levels and fishing activity would not be affected. Given the time necessary to implement an action approved by the Council, this analysis assumes that, if approved, the increase in the catch levels would not become effective until sometime in early 2023. Positive effects would be expected from an increase to the ACL (**Preferred Alternative 2**), as more fish are provided for harvest for all sectors and components according to the respective allocations provided in Table 2.1.1.

Compared to **Alternative 1**, positive effects would be expected for the commercial sector from **Preferred Alternative 2** as additional red snapper allocation would be available to IFQ program participants. Specifically, an additional 617,100 lbs ww of red snapper IFQ allocation would be distributed among shareholders based on red snapper shareholdings. Positive effects would be expected for shareholders who receive additional allocation and are able to use it for fishing or transfer it to someone else who is then able to fish it before the end of the year.

The increase to the catch limits under **Preferred Alternative 2** would provide additional fishing opportunities to recreational fishermen, resulting in positive effects compared to **Alternative 1**. The federal for-hire component's ACL increase under **Preferred Alternative 2** could potentially extend the fishing season by a few days resulting in positive effects from the increase in fishing opportunities. The individual states establish the fishing season and some other regulations (e.g., bag limit) for private anglers fishing in their state, and it remains unknown how each state would distribute the additional fishing opportunities, based on the respective state's ACL increase under **Preferred Alternative 2**. Positive effects would be expected for the private angling component, as the states would be able to plan their fishing seasons with the respective state-specific ACL increase under **Preferred Alternative 2**.

The Council approved two framework actions in 2021 that have not been implemented. One framework action (Red Snapper ACLs 2021 FA) would increase the red snapper ACL by 300,000 lbs ww, and the remaining catch levels according to their respective allocations. It is assumed that this action (Red Snapper ACLs 2022 FA) would supersede the Red Snapper ACLs 2021 FA for implementation. The other framework action addresses the issue of using state data collection programs (i.e., state "currencies") to monitor ACLs that were set in Marine Recreational Information Program (MRIP) Coastal Household Telephone Survey (CHTS) units (Data Calibration FA). The preferred alternative selected by the Council in the Data Calibration FA would retain the current state-specific ACLs set in MRIP-CHTS units until 2023, and the states would continue to monitor landings in their state currencies. If the Data Calibration FA is implemented as expected for 2023, the state-specific ACLs proposed through this framework action (**Preferred Alternative 2**) would be modified to reflect those shown in Table 2.1.3, consistent with the application of the calibration ratios to the applicable red snapper catch levels established through this action.

4.1.5 Direct and Indirect Effects on the Administrative Environment

Setting catch levels is an administrative action and would have direct effects on the administrative environment through additional rulemaking. Specifically, for red snapper, this includes setting fishing seasons, quota monitoring, and enforcing fishing regulations. These activities already occur and would not constitute an additional impact or benefit. Indirect effects of setting ACLs and annual catch targets (ACT) include actions required if the recreational sector ACL is exceeded. Although red snapper is not considered overfished at this time, and so no payback is required if the recreational ACL is exceeded, further action adjusting fishing season duration or ACTs could result if the ACLs were regularly exceeded.

Once these catch limits are implemented, the type of regulations needed to manage the red snapper fishery would remain unchanged regardless of the choice of harvest levels. The National Marine Fisheries Service (NMFS) Southeast Regional Office monitors both the recreational and commercial landings in cooperation with the Southeast Fisheries Science Center (SEFSC) and Gulf states to determine where landings are relative to the specified catch limits. Some administrative burden is anticipated with respect to outreach as it relates to notifying stakeholders of the changes to harvest levels. Additionally, if a state's reported private angling component landings exceed the respective state ACL, there is a payback the following year and

NMFS would need to adjust that ACL accordingly. Further action adjusting a fishing season or ACTs by NMFS or a state could result if the respective ACL were regularly exceeded.

In comparison to no action **Alternative 1**, **Preferred Alternative 2** would increase the ACL and ABC, as well as the commercial and recreational sector ACLs. It would also increase the OFL. Thus, retaining the lower ACL and ACT in **Alternative 1** in the recreational sector may slightly increase the chances of exceeding the recreational and overall ACL (and potentially the OFL), but given that the increase is relatively minor compared to overall catch limits, the difference between the two alternatives is expected to be negligible.

The two red snapper frameworks (Catch Limits FA; Calibration FA) dealing with catch limits that are likely to be implemented prior to this framework. The Preferred Alternative in the Catch Limits FA would increase the ABC and ACL identified in no action **Alternative 1** to 15.4 mp ww, and would increase the OFL to 25.6 mp ww. **Preferred Alternative 2** of this document would increase that ABC/ACL to 16.31 mp ww, and would decrease the OFL from 25.6 mp ww to 18.91 mp ww. This change is unlikely to affect how the fishery is prosecuted, and is thus unlikely to substantively affect the administrative environment. However, this change could increase the likelihood of exceeding the OFL because of the reduction in the buffer between the ABC and OFL.

The Data Calibration FA, which is also likely to be implemented prior to this framework action, would adjust state ACLs such that they are equivalent to the federal ACLs generated by MRIP's Fishing Effort Survey. The increased catch limits proposed in this document would proportionally increase the catch levels for each Gulf state, but this increase would be relatively small and is not expected to result in any changes on the administrative environment.

4.2 Cumulative Effects Analysis

While this environmental assessment (EA) is being prepared using the 2020 Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) Regulations, the cumulative effects discussed in this section meet the two-part standard for "reasonable foreseeability" and "reasonably close causal connection" required by the 2020 definition of effects or impacts. Below is a five-step cumulative effects analysis that identifies criteria that must be considered in an EA.

1. **The area in which the effects of the proposed action will occur.**
   The affected area of this proposed action encompasses the state and federal waters of the Gulf as well as Gulf communities that are dependent on reef fish fishing. Most relevant to this proposed action is red snapper 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 and other relevant features of the human environment.

2. **The impacts that are expected in that area from the proposed action.**

The proposed action would increase the catch levels based on the results of both the Great Red Snapper Count and the LGL Ecological Associates, Inc. study to estimate the absolute abundance of red snapper adjacent to the State of Louisiana, as recommended by the Council's SSC. The environmental consequences of the proposed action are analyzed in detail in Section 4.1. This action is not expected to have significant beneficial or adverse cumulative effects on the physical and biological/ecological environments because the action is not expected to alter the manner in which the reef fish fishery as a whole is prosecuted (Sections 4.1.1 and 4.1.2). This actions would likely have some positive direct and indirect effects on the social and economic environments, due to expected increases in allowable catch (Sections 4.1.3 and 4.1.4). The reef fish fishery is a multispecies fishery where fishermen can target other species on a trip. Thus, changing fishing practices for one stock does not generally change overall fishing effort or fishing practices. The action is also not expected to have substantial adverse or beneficial effects on the administrative environment (Section 4.1.5).

3. **Other past, present and Reasonably Foreseeable Future Actions (RFFA) that have or are expected to have impacts in the area.**
There are numerous actions taken in the Gulf annually. Many of these activities are expected to have impacts associated with them. Below is a discussion those actions that have the potential to combine with the proposed action to result in cumulative effects.

Other fishery related actions – The cumulative effects of establishing state management of the private angling component of the red snapper fishery was analyzed in the environmental impact statements (EIS) for Amendment 50 (A-F). In addition, cumulative effects relative to changes in red snapper management have been analyzed in the EISs for Amendments 22 (GMFMC 2004b), 26 (GMFMC 2006), and 27/14 (GMFMC 2007), and relative to the reef fish fishery in Amendment 29 (GMFMC 2008c), Amendment 30A (GMFMC 2008a), Amendment 30B (GMFMC 2008b), Amendment 31 (GMFMC 2009), and Amendment 32 (GMFMC 2011b). These cumulative effects analyses are incorporated here by reference. Other pertinent actions are summarized in the history of management (Section 1.5). Currently, there are several present and RFFAs that are being considered by the Council for the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) or implemented by NMFS, which could affect reef fish stocks. These include: Amendments 36B and 36C, which would further revise the red snapper and grouper-tilefish commercial IFQ programs; Amendment 54 to modify greater amberjack sector allocations and catch limits based on a recent stock assessment; Amendment 55 to modify yellowtail snapper allocations and catch limits based on a recent stock assessment; and Amendment 56, which would establish a rebuilding plan and implement new catch limits for Gulf gag. Descriptions of these actions can be found on the Council's website.[37]

[37] https://gulfcouncil.org

At its April 2021 meeting, the Council took final action on the Modification of Annual Catch Limits for Gulf of Mexico Red Snapper framework action which would adjust red snapper catch limits. The Council chose to modify the red snapper OFL, ABC, ACLs, and recreational ACTs for 2021 based on the OFL and ABC recommendation of the SSC. The OFL choice was based on the interim analysis informed by the results of the Great Red Snapper Count. The ABC was based on the fishery-independent NMFS Bottom Longline survey-informed interim analysis. The Council chose to set the stock ACL equal to the ABC (Table 1.2.1). If implemented in 2023 as requested by the Council, the OFL would be set 10.1 mp ww higher than the ABC/ACL, which would make it unlikely that allowable harvest would exceed the OFL.

Also, at its April 2021 meeting, the Council took final action on the Gulf of Mexico Red Snapper Recreational Data Calibration Framework Action, which is based upon best available science and would adjust the state catch limits to account for the monitoring programs used by each Gulf state. The action is intended to adjust the state catch limits to account for the different methodologies used by each state to determine harvest levels and is expected to reduce the likelihood that harvest by private anglers will exceed the federal private angling ACL.

Non-fishery related actions - Forces affecting the reef fish fishery have been described in previous cumulative effect analyses (e.g., Amendment 40 [GMFMC 2014]). Three important examples include impacts of the *Deepwater Horizon* MC252 oil spill, the Northern Gulf Hypoxic Zone, and climate change (See Sections 3.1 and 3.2). Reef fish species are mobile and are able to avoid hypoxic conditions, so any effects from the Northern Gulf Hypoxic Zone on reef fish species are likely minimal regardless of this action. 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.

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 Intergovernmental Panel on Climate Change has numerous reports addressing their assessments of climate change. Global climate changes could affect the Gulf fisheries as discussed in Section 3.2. However, the extent of these effects cannot be quantified at this time. The proposed action is not expected to significantly contribute to climate change through the increase or decrease in the carbon footprint from fishing, as these actions should not change how the fishery is prosecuted. As described in Section 3.1, 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 other actions as listed in part three of this section. They include detailed analysis of the reef fish fishery, cumulative effects on non-target species, protected species, and habitats in the Gulf. In general, the effects of these actions are positive as they ultimately act to restore/maintain the stocks at a level that will allow the maximum benefits in yield and commercial and recreational fishing opportunities to be achieved. None of the present and reasonably foreseeable future actions (RFFA) under the Reef Fish Fishery management Plan (FMP), identified above, are expected to affect how the reef fish fishery as a whole is prosecuted.

5. **The overall impact that can be expected if the individual impacts are allowed to accumulate**
   This action, combined with other past actions, present actions, and RFFAs, is not expected to have significant beneficial or adverse effects on the physical and biological/ecological environments because this action would only minimally affect current fishing practices (Sections 4.1.1 and 4.1.2). For the social and economic environments, effects should be positive (Sections 4.1.3 and 4.1.4). Most effects are likely minimal as the proposed action, along with other past actions, present actions, and RFFAs, are not expected to alter the manner in which the fishery is prosecuted. Because it is unlikely there would be any changes in how the fishery is prosecuted, this action, combined with past actions, present actions, and RFFAs, is not expected to have significant adverse effects on public health or safety.

6. **Summary**
   The proposed action is not expected to have individual significant effects to the biological, physical, social, or economic environment. Any effects of the proposed action, when combined with other past actions, present actions, and RFFAs are not expected to be significant. The effects of the proposed action are, and will continue to be, monitored through collection of landings data by NMFS, stock assessments and stock assessment updates, life history studies, economic and social analyses, and other scientific observations. Landings data for the recreational sector in the Gulf are collected through Marine Recreational Information Program (MRIP), the Southeast Region Headboat Survey, the Texas Marine Recreational Fishing Survey, and the Louisiana Department of Wildlife and Fisheries Creel Survey. In addition, the Alabama Department of Conservation and Natural Resources, Mississippi Department of Marine Resources, and Florida Fish and Wildlife Conservation Commission have instituted programs to collect information on reef fish, and in particular, red snapper recreational landings information. Landings data for the commercial sector are collected through trip ticket programs, port samplers, and logbook programs, as well as dealer reporting through the red snapper individual fishing quote (IFQ) program.

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 red snapper 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 Gulf reef fish fishery is provided in Section 3.4.

5.4 Impacts of Management Measures

5.4.1 Action 1: Modification of Gulf of Mexico Red Snapper Catch Limits

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.

Relative to **Alternative 1**, **Preferred Alternative 2** would increase the red snapper commercial quota by 555,946 pounds gutted weight. **Preferred Alternative 2** is expected to result in an increase in commercial ex-vessel value and annual allocation value of $3,029,905 and $2,068,119, respectively. **Preferred Alternative 2** is expected to result in an increase in commercial economic value estimated at $1.58 million, approximately. **Preferred Alternative 2** would also be expected to result in a marginal increase in consumer surplus for retail seafood consumers. **Preferred Alternative 2** is expected to increase the recreational red snapper annual catch limit by 88,098 fish. In terms of economic value to the recreational sector, **Preferred Alternative 2** is expected to add $7.95 million, approximately. The increase in net benefits expected to result from **Preferred Alternative 2**, i.e., the sum of commercial and recreational economic values, is approximately estimated at $9.52 million.

5.5 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……$22,000

NMFS administrative costs of document preparation, meetings and review ….....$17,000

TOTAL ….....$39,000

5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in: 1) an annual effect of $100 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 novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this E.O. 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. 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 assure 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 impacts of various alternatives contained in the fishery management plan (FMP) or amendment (including framework management measures and other regulatory actions) and to ensure the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

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 impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An IRFA is primarily conducted to determine whether the proposed action would have a significant economic impact on a substantial number of small entities. 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 rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a 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 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; 6) a description and estimate of the expected economic impacts on small entities; and 7) a description of the significant alternatives to the proposed rule and discussion of how the alternatives attempt to minimize economic impacts on small entities.

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

The need for and objective of this proposed action are provided in Chapter 1. In summary, there is a need to use the best scientific information available to prevent overfishing while achieving optimum yield, consistent with the red snapper rebuilding plan and the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The objective of this proposed action is to modify the Gulf of Mexico (Gulf) red snapper catch limits, including the overfishing limit (OFL), acceptable biological catch (ABC), stock annual catch limit (ACL), sector ACLs, and sector annual catch targets (ACT) based on the 2022 catch analysis completed by the Southeast Fisheries Science Center (SEFSC) and approved by the Gulf

of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC). The Magnuson-Stevens Act provides the statutory basis for this proposed action.

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

This proposed action would apply to all federally-permitted commercial vessels, federally-permitted charter vessels and headboats (for-hire vessels), and recreational anglers that fish for or harvest red snapper in federal waters of the Gulf. It would also apply to red snapper individual fishing quota (IFQ) shareholders. It would not directly apply to federally-permitted dealers. Any change in the supply of red snapper available for purchase by dealers as a result of the proposed action, and associated economic effects, would be an indirect effect of the proposed rule and would therefore fall outside the scope of the RFA. Although it would apply to for-hire vessels, it would not be expected to have any direct effects on these entities. For-hire vessels sell fishing services to recreational anglers. The proposed changes to the red snapper management measures would not directly alter the services sold by these vessels. Any change in demand for these fishing services, and associated economic effects, as a result of the proposed action would be a consequence of behavioral change by anglers, secondary to any direct effect on anglers and, therefore, an indirect effect of the proposed rule. Because the effects on for-hire vessels would be indirect, they fall outside the scope of the RFA. Furthermore, for-hire captains and crew are not permitted to retain red snapper under the recreational bag limit, so only recreational anglers would be directly affected by the proposed changes to the red snapper recreational ACLs and ACTs. The RFA does not consider recreational anglers to be small entities, so they are outside the scope of this analysis and only the impacts on commercial vessels and IFQ shareholders will be discussed.

As of July 8, 2021, there were 825 limited access valid or renewable[38] reef fish permits (SERO Permits Database, July 2022). In order to harvest red snapper, a vessel permit must also be linked to an IFQ account and possess sufficient allocation for this species. IFQ accounts can be opened and valid permits can be linked to IFQ accounts at any time during the year. Eligible vessels can receive red snapper allocation from other IFQ participants. On average from 2016 through 2020, there were 637 IFQ accounts that held red snapper allocation and 355 that held red snapper shares (NMFS 2021b). During the same time period, there were 438 federally permitted commercial vessels, on average each year, with reported landings of red snapper in the Gulf. Their average annual vessel-level gross revenue from all species for 2016 through 2020 was approximately $146,000 (2021 dollars) and red snapper accounted for approximately half of this revenue. For commercial vessels that harvested Gulf red snapper, the National Marine Fisheries Service (NMFS) estimates that economic profits are approximately 34% of annual gross revenue, on average. The maximum annual revenue from all species reported by a single one of the commercial vessels that landed Gulf red snapper from 2016 through 2020 was approximately $3.3 million (2021 dollars).

[38] 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.

For RFA purposes only, National Marine Fisheries Service (NMFS) has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing (see 50 CFR § 200.2). A business primarily engaged in commercial fishing (NAICS code 11411) 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 combined annual receipts not in excess of $11 million for all its affiliated operations worldwide. All of the commercial fishing businesses directly regulated by this proposed action are believed to be small entities based on the NMFS size standard. No other small entities that would be directly affected by this action have been identified.

6.4 Description of the projected reporting, record-keeping and other compliance requirements of the proposed action, 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 action would not establish any new reporting, record-keeping, or other compliance requirements.

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

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

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

Substantial number criterion

There are 825 federally permitted vessels eligible to commercially fish for or harvest reef fish species in the Gulf. However, it is expected that those vessels that historically landed red snapper would be the most likely to be affected. From 2016 through 2020, there were 438 federally permitted commercial vessels, on average, that harvested and sold red snapper each year. Because all of these vessels are believed to be small entities, it is assumed that this action would affect a substantial number of small entities.

Significant economic impacts

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 likely to be affected by this action are believed to be small entities and thus the issue of disproportionality does not arise.

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

A detailed analysis of the economic effects associated with this proposed action can be found in Chapter 4. The following information summarizes the expected effects of this proposed action.

This proposed action would modify the red snapper OFL, ABC, ACLs, and recreational ACTs for 2022 and subsequent years based on the OFL and ABC recommendations of the Gulf Council's SSC. Under the proposed action, the commercial ACL (quota) would increase by 617,000 pounds (lbs) whole weight (ww), which if harvested in full, would correspond to an estimated increase in annual ex-vessel revenue of approximately $3.03 million (2021 dollars). Divided by the average number of commercial vessels with reported landings of red snapper from 2016 through 2020, this would be an increase of approximately $6,918 (2021 dollars) per vessel (5% of average annual gross revenue). In addition to the expected increase in ex-vessel revenue, the proposed increase in the commercial red snapper quota would be expected to result in an annual increase in allocation value of approximately $2.07 million (2021 dollars). Finally, total red snapper IFQ share value would be expected to increase by approximately $21.47 million (2021 dollars). These estimates rely on average ex-vessel, IFQ allocation, and IFQ share price estimates from 2016 through 2020. Actual future prices could increase or decrease relative to this average as a result of market forces. NMFS expects that any negative price effects induced by the proposed action, should they occur, would be outweighed by the benefits of the increased quota.

In summary, this proposed action would not be expected to have a significant economic impact on a substantial number of small entities.

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

This proposed action, if implemented, would not be expected to have a significant adverse economic effect on a substantial number of small entities. As a result, the issue of significant alternatives is not relevant.

CHAPTER 7. LIST OF PREPARERS

PREPARERS

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REVIEWERS

Name	Expertise	Responsibility	Agency
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Scott Sandorf	Technical writer and editor	Regulatory writer	SERO
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Mike Travis	Branch Chief	Review	SERO
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GMFMC = Gulf of Mexico Fishery Management Council; NOAA GC = National Oceanic and Atmospheric Administration General Counsel; SEFSC = Southeast Fisheries Science Center; SERO = Southeast Regional Office of the National Marine Fisheries Service

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

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

NOAA General Counsel
U.S. Coast Guard
Alabama Department of Conservation and Natural Resources/Marine Resources Division
Florida Fish and Wildlife Conservation Commission
Louisiana Department of Wildlife and Fisheries
Mississippi Department of Marine Resources
Texas Parks and Wildlife Department

CHAPTER 9. REFERENCES

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APPENDIX A. OTHER APPLICABLE LAW

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for management of stocks included in fishery management plans (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 3.2.2), E.O. 12866 (Regulatory Planning and Review, Chapter 5) and E.O. 12898 (Environmental Justice, Section 3.4.3). Other applicable laws are summarized below.

Administrative Procedure Act

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

Coastal Zone Management Act

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

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

Data Quality Act

The Data Quality Act (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by

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

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

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

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, (Public Law 89-665; 16 U.S.C. 470 *et seq.*) is intended to preserve historical and archaeological sites in the United States of America. Section 106 of the NHPA requires federal agencies to evaluate the impact of all federally funded or permitted projects for sites 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.[39]

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

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

Register of Historic Places.[40] 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 a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. The NOAA Office of General Counsel will determine whether a Taking Implication Assessment is necessary for this amendment.

E.O. 12962: Recreational Fisheries

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

[40] Further information can be found at http://www.boem.gov/Environmental-Stewardship/Archaeology/Shipwrecks.aspx.

definition, a U.S. coral reef ecosystem means those species, habitats, and other national resources associated with coral reefs in all maritime areas and zones subject to the jurisdiction or control of the United States (e.g., federal, state, territorial, or commonwealth waters).

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

E.O. 13132: Federalism

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

No Federalism issues were identified relative to this action to modify the red snapper catch levels. Therefore, consultation with state officials under E.O. 12612 was not necessary.

E.O. 13158: Marine Protected Areas

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

References

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APPENDIX B. PUBLIC COMMENTS RECEIVED

1,057 Public Hearing Video Views
18 comments written received

Support for Alternative 1: No Action

- The inshore snapper fishery is not productive
- The stock has been locally depleted in the last few years
- The quota should be decreased slightly
- The stock is healthy and doesn't need to be overfished
- An increase will harm the fishery more than it will help it

Support for Alternative 2

- Red snapper [is] abundant
- It's impossible to catch anything but snapper
- Raise catch limits so the recreational season can be lengthened
- The states are managing well and should be given more quota to work with
- Snapper are everywhere and management resulting from incorporation of the Great Red Snapper Count doesn't raise catch limits enough

Other Comments

- The Council should consider reginal management based on biomass
- It's too expensive to go offshore only to bring home two red snapper
- The snapper bag limit should be raised to 3-per person
- The snapper bag limit should be raised to 4-per person
- The minimum size limit should be raised to 18-inches
- Consider a slot limit for red snapper to allow larger breeders to survive
- The season should be set on weekends May-November
- The season should also be open in the fall
- A fall mini-season should be created