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Establish Gray Snapper Status Determination Criteria and Modify Annual Catch Limits

Draft Amendment 51

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

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ENVIRONMENTAL ASSESSMENT COVER SHEET

Establish Gray Snapper Status Determination Criteria and Modify Annual Catch Limits

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Type of Action

( ) Administrative	( ) Legislative
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Summary/Abstract

ABBREVIATIONS USED IN THIS DOCUMENT

ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
AM	accountability measures
Council	Gulf of Mexico Fishery Management Council
EA	environmental assessment
F	fishing mortality rate
FMP	Fishery Management Plan
FMU	fishery management unit
Gulf	Gulf of Mexico
M	natural mortality
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	maximum fishing mortality threshold
mp	million pounds
MRIP	Marine Recreational Information Program
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NMFS	National Marine Fisheries Service
NS1	National Standard 1
OFL	overfishing limit
OY	optimum yield
SDC	status determination criteria
SEFSC	Southeast Fisheries Science Center
SSB	spawning stock biomass
SSBR	spawning stock biomass per recruit
SSC	Scientific and Statistical Committee
SPR	spawning potential ratio
TL	total length
ww	whole weight

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CHAPTER 1. INTRODUCTION

1.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires the National Marine Fisheries Service (NMFS) and the Regional Fishery Management Councils to end overfishing, rebuild overfished stocks, and achieve, on a continuing basis, the optimum yield (OY) from federally managed fish stocks. These mandates are intended to ensure fishery resources are managed for the greatest overall benefit to the nation, particularly with respect to providing food production, recreational opportunities, and protecting marine ecosystems.

Gulf of Mexico Fishery Management Council

- Responsible for conservation and management of fish stocks
- Consist of 17 voting members: 11 appointed by the Secretary of Commerce; 1 representative from each of the 5 Gulf states, the Southeast Regional Director of NMFS; and 4 non-voting members
- Develops fishery management plans and amendments; and recommends actions to NMFS for implementation

National Marine Fisheries Service

- Responsible for preventing overfishing while achieving optimum yield
- Approves, disapproves, or partially approves Council recommendations
- Implements regulations

Status Determination Criteria and Biological Reference Points

The National Standard 1 (NS1) guidelines require that each Fishery Management Plan (FMP) describe objective and measurable criteria to determine overfishing and overfished status, such as a minimum stock size threshold (MSST), and a maximum fishing mortality threshold (MFMT), or an overfishing limit (OFL), collectively known as status determination criteria (SDC). These thresholds represent the point at which a stock is determined to be overfished (i.e., biomass below MSST) or experiencing overfishing (i.e., fishing mortality above MFMT or annual landings exceed OFL). Consistent with the requirements of the Magnuson-Stevens Act, the NS1 guidelines also require that the FMP specify the maximum sustainable yield (MSY) (or appropriate proxy), and OY for managed stocks.

Catch Level Reference Points

MSY is a long-term average catch level corresponding to the largest average amount of fish that can be caught each year on a continuing basis without depleting the stock. OY is a long-term average catch level that is based on MSY as reduced by relevant economic, social, or ecological factors.

Stock Biomass Reference Points

Stock biomass refers to the size of the unharvested population that is capable of reproduction. It can be measured in terms of biomass (e.g., pounds left in the water), numbers of fish remaining in the water, or the expected egg production from the spawning stock biomass (SSB) of the adult stock in the water. The stock level that results from catching the MSY level is called the biomass at MSY (B_{MSY}). If the stock size falls below B_{MSY}, it can no longer sustain the MSY catch without further depletion and requires a temporary reduction in harvest to rebuild the stock. However, biomass can be expected to fluctuate over time, due to changes in environmental conditions, recruitment, or other variables. To account for these fluctuations, a stock is not considered to be overfished until it drops to some specified level below B_{MSY}, which is defined by the MSST.

The Gulf of Mexico Fishery Management Council (Council) has broad latitude in deciding how far the MSST can be set below B_{MSY}, but it cannot be less than 50% of B_{MSY}. The wider the gap between B_{MSY} and MSST, the less likely a stock is to be declared overfished, but the more difficult it may be to rebuild the stock back to $B_{MSY.}$ The narrower the gap between B_{MSY} and MSST, the more likely a stock is to be declared overfished, but the less difficult it may be to rebuild the stock. If MSST is set too close to B_{MSY}, natural fluctuations may cause the stock to enter an overfished condition even if it is well-managed.

Minimum Stock Size Threshold (overfished)

Minimum stock size threshold (MSST) is the biomass level that a stock can decline to before being declared overfished (stock abundance is too low), requiring a rebuilding plan. MSST is usually expressed as a percentage of the biomass level at MSY or MSY proxy.

A narrower buffer is more likely to trigger an overfished determination, but if triggered, less restrictive regulations would be needed during the rebuilding plan.

Narrower buffer

$0.75*B_{MSY}$

$0.50*B_{MSY}$

Wider buffer

A wider buffer is less likely to trigger an overfished determination, but if triggered, more restrictive regulations would likely be required during the rebuilding plan.

Fishing Mortality Rate Reference Points

The fishing mortality rate that results in catching the MSY level on an annual basis is called F_{MSY} and is the maximum fishing mortality rate that is likely to be sustainable. The MFMT is the rate of fishing mortality above which a stock is declared to be experiencing overfishing (fish are being removed at too rapid a rate). MFMT is often set equal to F_{MSY}, but under some conditions it may be desirable to set below F_{MSY}, for example, if the stock size is below B_{MSY}. The MFMT is also the fishing mortality rate that results in catching the OFL level on an annual basis. An annual harvest that exceeds the OFL is considered overfishing as well as the case where a stock assessment shows that the current fishing mortality rate (F) exceeds the MFMT.

Gray Snapper

Gray snapper, also called mangrove snapper or "mangoes," are found throughout the Gulf of Mexico (Gulf). Gray snapper occur in tropical, subtropical and warm temperate waters from Brazil to Bermuda, and throughout the Gulf and Caribbean Sea. Spawning occurs primarily in the summer months, between May and September. Gray snapper spend their first month of life in a larval phase, floating as plankton. As juveniles, gray snapper settle nearshore in estuaries, seagrass beds or shallow reefs, and gradually move offshore as they grow larger. Adults are often reef- or structure-associated.

Gray snapper are targeted inshore and offshore on natural and artificial reefs. The federal minimum size limit is 12 inches total length (TL), the fishing season is year-round, and there is no sector allocation. Recreational anglers can keep 10 fish per person within the 20 fish per person reef fish aggregate bag limit. Gray snapper are primarily harvested by hook-and-line gear by the recreational sector with some spearfishing. There are no commercial trip limits for Gulf gray snapper.

Recruitment to the fishery begins at age four, and the species has a maximum age of 28. Spawning occurs year-round in south Florida and during the summer throughout the rest of the Gulf on reef and hard bottom habitats at depths from 0-180 m. Male gray snapper mature at 185 mm TL and females mature at 200 mm TL.

Gray Snapper Landings

Total annual landings of gray snapper have ranged from 0.921 million pounds (mp) whole weight (ww) in 2010 to 2.36 mp ww in 2016 (Table 1.1.1). From 2012 through 2017, landings have averaged 2.03 mp ww without trend over this time period. The landings in 2010 may have been unusually low because of reduced fishing effort following the *Deepwater Horizon* MC252 oil spill that occurred in 2010. The majority of landings are from the recreational sector and gray snapper are frequently harvested by anglers in both inshore and offshore waters off Florida. The other Gulf states have low landings. Since the implementation of an annual catch limit (ACL) and annual catch target (ACT) in 2012, total landings have not exceeded the ACL. If the ACL is exceeded for gray snapper, the accountability measure (AM)(GMFMC 2011a) requires in-season monitoring of the stock in the following year. If the stock ACL is reached or projected to be reached within the fishing year, the Assistant Administrator for Fisheries shall file a notification with the Office of the Federal Register to close the harvest of gray snapper for the remainder of the fishing year.

Table 1.1.1. Commercial and recreational landings of gray snapper by sector from 2001 through 2017. Recreational data includes all modes.

Year	Recreational Landings (lbs ww)	Commercial Landings (lbs ww)	Total Landings (lbs ww)
2001	1,491,820	198,411	1,690,231
2002	1,397,892	231,700	1,629,592
2003	1,960,368	197,496	2,157,864
2004	2,127,147	230,778	2,357,925
2005	2,052,385	234,513	2,286,898
2006	2,048,373	203,097	2,251,470
2007	1,558,548	150,456	1,709,004
2008	2,131,636	150,979	2,282,615
2009	1,732,390	179,479	1,911,869
2010	809,190	112,307	921,497
2011	979,572	192,906	1,172,478
2012	1,321,777	179,006	1,500,783
2013	1,836,573	143,644	1,980,217
2014	2,136,482	199,025	2,335,507
2015	1,889,586	163,321	2,052,907
2016	2,202,620	156,337	2,358,957
2017	1,822,026	136,927	1,958,953

Source: SEFSC Recreational MRFSS ACL Data (Nov 29, 2018); Commercial ACL Data (Oct 23, 2018)
Note: Gulf recreational landings reported to the Marine Recreational Information Program (MRIP) exclude Monroe County.

Gray Snapper Stock Assessment (SEDAR 51)

Prior to 2018, the stock condition of gray snapper had not been evaluated in a stock assessment. In 2018, the gray snapper benchmark stock assessment was completed (SEDAR 51 2018) and reviewed by the Council's Scientific and Statistical Committee (SSC) at its May 2018 meeting. The SSC accepted the gray snapper assessment as the best scientific information available and determined that the stock is experiencing overfishing as of 2015 (Table 1.1.2).

The actions in this amendment are intended to establish stock status reference points where they do not currently exist, and in some cases to consider modifying existing reference points. As part of the SSC review of the gray snapper stock assessment, the SSC also provided OFL and acceptable biological catch (ABC) recommendations for 2019 through 2021. This amendment also considers alternatives that would modify the ACLs and ACTs for gray snapper from 2019 through 2021 based on the revised OFL and ABC recommendations.

Table 1.1.2. Status determination criteria and stock status of gray snapper based on the SEDAR 51 (2018) stock assessment.

Criteria	Definitions	SEDAR 51 Values	Status
M		0.15	
Steepness		1.0	
Virgin Recruitment	1,000s	10,683	
SSB Unfished	metric tons	22,200	
Mortality Rate Criteria			
F_{MSY} or proxy	$F_{SPR30\%}$	0.115	
MFMT	$F_{SPR30\%}$	0.115	
$F_{CURRENT}$	geometric mean ($F_{2013-2015}$)	0.138	
$F_{CURRENT}$/MFMT		**1.2**	**Overfishing**
Biomass Criteria			
SSB_{MSY} or proxy (metric tons)	$SSB_{SPR30\%}$	6,621	
MSST (metric tons) @ (1-M)	(1-M)*$SSB_{SPR30\%}$	5,627	
MSST (metric tons) @ 50%	0.50*$SSB_{SPR30\%}$	3,310	
$SSB_{CURRENT}$ (metric tons)	SSB_{2015}	4,660	
$SSB_{CURRENT}$/$SSB_{SPR30\%}$	SSB_{2015}	0.704	
$SSB_{CURRENT}$/MSST @ (1-M)	MSST = (1-M)* $SSB_{SPR30\%}$	**0.827**	**Overfished**
$SSB_{CURRENT}$/MSST @ 50%	MSST = 0.50* $SSB_{SPR30\%}$	**1.408**	**Not Overfished**

1.2 Purpose and Need

The purpose of this proposed action is to establish status determination criteria for gray snapper, including an estimate of MSY (or proxy), MSST, and OY, as well as modify the MFMT, consistent with the current NS1 guidelines and the Reef Fish FMP. In addition, the purpose is to modify the gray snapper ACL and ACT consistent with a recent stock assessment and the SSC's OFL and ABC recommendations.

The need is to have biological reference points that can be used for setting gray snapper management targets and for determining overfished and overfishing status, to adjust gray snapper ACL and ACT consistent with the best available science, and to achieve OY consistent with the requirements of the Magnuson-Stevens Act.

1.3 History of Management

The following summary describes management actions that affect the gray snapper component of the reef fish fishery in the Gulf. More information on the Reef Fish FMP and other Council FMPs can be obtained from the Council website.[1]

Fishery management unit: Gray snapper was included in the 33 species (15 snappers, 15 groupers, and 3 sea basses) that comprised the original fishery management unit (FMU) of the Reef Fish FMP (GMFMC 1981). Species have been added and subtracted through **Amendments 1** and **15** (GMFMC 1989, 1997b) and the **Generic ACL/AM Amendment**[2] (GMFMC 2011a). These changes did not affect gray snapper, which has always been in the FMU.

Stock status determination criteria: **Amendment 1** (GMFMC 1989) established an OY goal for all reef fish of 20% spawning stock biomass per recruit (SSBR) relative to the SSBR that would occur with no fishing, and an overfished stock was defined as a stock biomass below 20% SSBR. Overfishing was defined, for a stock that is not overfished, as fishing at a rate that would not allow harvest of OY on a continuing basis, and for a stock that is overfished, as fishing at a rate that is not consistent with rebuilding the stock to 20% SSBR. The SSBR terminology was later replaced with spawning potential ratio (SPR). The **Generic Sustainable Fisheries Act Amendment** (GMFMC 1999b), partially approved and measures implemented in November 1999, set MFMT for gray snapper at $F_{30\%\ SPR}$. Estimates of MSY, MSST, and OY were disapproved because they were based on SPR proxies rather than biomass-based estimates. The **Generic ACL/AM Amendment** (GMFMC 2011a), established a gray snapper OFL of 2.88.mp ww, ACL of 2.42 mp ww, ACT of 2.08 mp ww, and AMs.

Other management measures: A 12-inch total length minimum size limit was established for gray snapper in **Amendment 1** (GMFMC 1989) for the commercial and recreational sectors. Gray snapper was also included in the 10-snapper recreational aggregate bag limit established through that amendment.

[1] http://www.gulfcouncil.org/fishery_management_plans/index.php
[2] Generic Annual Catch Limits/Accountability Measures Amendment for the Gulf of Mexico Fishery Management Council's Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs Fishery Management Plans

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1 – Maximum Sustainable Yield Proxy for Gulf of Mexico Gray Snapper

Alternative 1. No Action. Do not establish a maximum sustainable yield (MSY) proxy for gray snapper.

Alternative 2. For gray snapper, the MSY proxy is the yield when fishing at 30% spawning potential ratio ($F_{30\%\ SPR}$).

Alternative 3. For gray snapper, the MSY proxy is the yield when fishing at 40% spawning potential ratio ($F_{40\%\ SPR}$).

Alternative 4. For future assessments of gray snapper, the MSY proxy equals the yield produced by $F_{MSY\ or\ PROXY}$ recommended by the Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC), and subject to approval by the Council through in a plan amendment.

Note: Alternative 4 can be selected with **Alternative 2** or **Alternative 3** as preferred.

<u>Discussion</u>:

Stocks require an estimate of MSY (or proxy) and the fishing mortality rate (F) associated with catching MSY (F_{MSY}) in order to determine whether a stock is undergoing overfishing. The actual MSY can rarely be estimated with certainty and could not be estimated for gray snapper in SEDAR 51 (2018), because a stock-recruitment relationship could not be identified given the available data. Proxies that are easier to measure are usually used for species in the Gulf of Mexico (Gulf) including gray snapper. The MSY proxies are often, but not always, based on some percentage of spawning potential ratio (SPR), and are expressed as the yield when fishing at a fishing mortality associated with the SPR proxy. The SPR is a ratio equal to the production of eggs in a fished population divided by the production of eggs in an unfished population. Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), it is the responsibility of the SSC to provide ongoing scientific advice including recommendations for MSY. It is the responsibility of the Council to specify MSY for each managed stock in a fishery management plan (FMP).

After reviewing the SEDAR 51 assessment, the SSC recommended that the MSY proxy be set at the yield when fishing at $F_{30\%\ SPR}$, which is consistent with the current gray snapper maximum fishing mortality threshold (MFMT). However, the Council questioned if the yield when fishing at $F_{30\%\ SPR}$ is the correct proxy, noting that the red snapper proxy is set at $F_{26\%\ SPR}$ which allows for a larger yield at a given stock size. The Council requested that the Southeast Fisheries Science Center (SEFSC) provide an analysis of MSY proxies ranging from the yield at $F_{23\%\ SPR}$ (corresponding to SPR at maximum yield per recruit) to the yield at $F_{40\%\ SPR}$ (the SPR level recommended by Harford et al. (in review) for gonochoristic (do not change sex) stocks.

Generally, fish species with a lower SPR, such as 20-25%, typically have a high resilience to fishing mortality whereas a species with an SPR of 40-50% has a low resilience to fishing mortality (Mace and Sissenwine 1993). The analyses conducted by the SEFSC were presented at the SSC's August 2018 meeting. The SSC was unable to reach a consensus on a recommendation for a specific MSY proxy; however, all SSC members agreed that the proxy should not be any lower than $F_{30\%\ SPR}$. Therefore, no proxies below $F_{30\%\ SPR}$ are considered in this action.

Alternative 1 would leave the gray snapper stock without an MSY or MSY proxy. This is inconsistent with the requirements of the Magnuson-Stevens Act and National Standard 1 (NS1) Guidelines.

Alternative 2 proposes to adopt the MSY proxy of the yield when fishing at $F_{30\%\ SPR}$ that was recommended by the SSC. This MSY proxy is consistent with the current MFMT.

Alternative 3 proposes to adopt the MSY proxy of the yield when fishing at $F_{40\%\ SPR}$. This proxy was recommended by Harford et al. (in review) for species that do not change sex, because it has a lower risk of driving the stock below the true stock biomass level capable of producing an equilibrium yield of MSY (B_{MSY}). Because the SPR value here is greater than the SPR used in **Alternative 2**, the MSY proxy yield value would be lower.

Alternative 4 can be adopted along with either **Alternative 2** or **Alternative 3**. It would provide a streamlined process for modifying the gray snapper MSY. Sometimes, the SSC changes its recommendation of an MSY proxy based on new scientific information. This alternative would allow the Council to adopt the SSC recommendation for a new MSY proxy by noting the change in a plan amendment rather than by analyzing the recommendation along with a range of alternatives that the SSC does not consider appropriate. If the SSC identifies more than one possible proxy, or as occurred here, identified the lowest proxy it determined to be acceptable, a plan amendment action with alternatives would be required.

2.2 Action 2 – Maximum Fishing Mortality Threshold

Alternative 1. No Action. The current definition for the gray snapper maximum fishing mortality threshold (MFMT) will be retained and is equal to $F_{30\%\ SPR}$

Alternative 2. The definition for the gray snapper MFMT equal to $F_{40\%\ SPR}$.

Discussion:

The Generic Annual Catch Limit/Accountability Measure Amendment (GMFMC 2011a) established two methods for determining if overfishing is occurring.

1. The MFMT in years where there is a stock assessment: The NS1 guidelines define MFMT as the level of fishing mortality above which overfishing is occurring. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate), or as a function of spawning biomass or other measure of reproductive potential. Overfishing is occurring if the stock assessment's estimate of the current fishing mortality rate is above MFMT.
2. The overfishing limit (OFL) in years when there is not a stock assessment, or for stocks that do not have assessments that provide estimates of fishing mortality: The OFL is a yield that corresponds to fishing at MFMT. Overfishing is occurring if the annual harvest exceeds the OFL.

To date, landings have not exceeded the OFL of 2.88 million pounds (mp) since it was implemented in 2012 (Table 1.1.1).

Alternative 1 (No Action) would leave MFMT unchanged. The Generic Sustainable Fisheries Act Amendment (GMFMC 1999b) set MFMT equal to $F_{30\%\ SPR}$ for reef fish species with the exception of red snapper, Nassau grouper, and goliath grouper. Thus, the current MFMT for gray snapper is $F_{30\%\ SPR}$.

Alternative 2 would set MFMT equal to the fishing mortality rate based on an SPR of 40% and would be consistent with Alternative 3 of Action 1. This would result in a lower F value that would more likely result in an overfishing determination in future assessments compared to **Alternative 1**. The stock is currently experiencing overfishing based on the definition in both alternatives.

2.3 Action 3 – Establish a Minimum Stock Size Threshold for Gray Snapper

Alternative 1. No Action. Do not establish a minimum stock size threshold (MSST) for gray snapper.

Alternative 2. The minimum stock size threshold for gray snapper = (1-M)* B_{MSY} (or proxy) where M is the natural mortality rate.

Alternative 3. The minimum stock size threshold for gray snapper = 0.75*B_{MSY} (or proxy).

Alternative 4. The minimum stock size threshold for gray snapper = 0.50*B_{MSY} (or proxy).

Discussion:

The minimum stock size threshold (MSST) is a stock biomass level set at or below the biomass level capable of producing MSY or the MSY proxy. It is used to determine when a stock is overfished. Currently, gray snapper does not have a defined MSST, which has led to an indeterminate finding of whether or not the stock is overfished based on the recently completed stock assessment.

The NS1 guidelines allow MSST to be set at a level below B_{MSY} (or proxy) but not lower than 0.50* B_{MSY} (or proxy). If the fishing mortality can be kept below the overfishing threshold in non-assessment years, stock biomass is unlikely to drop below the overfished level (MSST). However, stock biomass can fluctuate due to environmental variability, or due to management being unsuccessful in constraining fishing mortality. In such cases, there are concerns with setting MSST either too close to or too far from B_{MSY} (or proxy).

Under **Alternative 1** (No Action), MSST is undefined and this is inconsistent with the requirements of the Magnuson-Stevens Act and the NS1 guidelines, which require that managed stocks have objective and measurable criteria for determining when those stocks are overfished.

Alternative 2 sets MSST at (1-M)*B_{MSY} (or proxy) for gray snapper where M is the natural mortality estimate and equal to 0.15 for gray snapper (SEDAR 2016). Natural mortality (M) includes dying from old age, diseases, and predation. Stock assessments typically calculate an M value for stocks using the age classes that have fully recruited to the fishery (meaning they can be caught and kept). When MSST is defined as equal to (1-M)*B_{MSY} (or proxy), stocks with a low M can end up with an MSST that is only slightly below the B_{MSY} (or proxy) spawning stock biomass level. In such situations it can be difficult to determine if a stock is actually below MSST due to imprecision and accuracy of the data. In addition, natural fluctuations in stock biomass levels around the B_{MSY} level may temporarily drop the spawning stock biomass below MSST, although analysis from the SEFSC suggests that this is unlikely, except at very low natural mortality rates. Given M for gray snapper is currently estimated at 0.15, this alternative's MSST would be equal to 0.85* B_{MSY} and would be the more conservative than **Alternatives 3** and **4**.

Alternative 3 sets the gray snapper MSST at 0.75*B_{MSY} (or proxy). Setting a wider buffer between B_{MSY} (or proxy) and MSST can avoid false declarations of overfished status due to natural fluctuations in the stock biomass. In addition, setting a wider buffer can allow a greater opportunity for management to end a decline in a stock that is approaching an overfished condition, without the constraints imposed by a rebuilding plan that is required if the stock drops below MSST and is declared overfished. However, if a stock does drop below MSST and is declared overfished, a more restrictive rebuilding plan may be needed than if there were a narrower buffer between B_{MSY} and MSST. This alternative does not require an estimate of M because it sets the MSST at a fixed percentage of the B_{MSY} (or proxy). For gray snapper, it is intermediate to MSST values of **Alternatives 2** and **4**.

Alternative 4 sets gray snapper MSST at 0.50*B_{MSY} (or proxy) for all reef fish stocks. Reef Fish Amendment 44 (GMFMC 2017f) recently revised the MSST for seven reef fish stocks for which it was previously defined (gag, red grouper, red snapper, vermilion snapper, gray triggerfish, greater amberjack, and hogfish). For these seven stocks, Amendment 44 set MSST equal to 0.50*B_{MSY} (or proxy). Therefore, this alternative would match the MSST level established for those seven stocks. This is the widest buffer allowed under the NS1 guidelines and is the least conservative alternative, by allowing for the most harvest in the short term.

2.4 Action 4 – Establish Optimum Yield for Gray Snapper

Alternative 1. No Action. Do not establish an optimum yield (OY) for gray snapper.

Alternative 2. Set an OY for gray snapper that is the long-term yield that implicitly accounts for relevant economic, social, or ecological factors by fishing at:

> **Option 2a**. 50% of $F_{MSY\ Proxy}$.
> **Option 2b**. 75% of $F_{MSY\ Proxy}$.
> **Option 2c**. 90% of $F_{MSY\ Proxy}$.

Discussion:

The Magnuson-Stevens Act and NS1 guidelines state that optimum yield (OY) should be based on MSY as reduced by relevant economic, social, or ecological factors. The NS1 guidelines provide additional detail in considering such factors. The NS1 guidelines also state that OY should include some consideration of uncertainty. The NS1 guidelines state that if the estimates of MFMT and current biomass are known with a high level of certainty and management controls can accurately limit catch, then OY could be set very close to MSY, assuming no other reductions are necessary for social, economic, or ecological factors. To the degree that such MSY estimates and management controls are lacking or unavailable, OY should be set farther from MSY.

Alternative 1 (No Action) would leave OY undefined for gray snapper. Leaving stocks with OY undefined is inconsistent with the NS1 guidelines.

Alternative 2 would specify a long-term OY based on fixed percentages fishing at the yield between 50% and 90% of $F_{MSY\ Proxy}$. The long-term OY is an equilibrium yield around which the yield may fluctuate. Under this alternative, OY is considered to implicitly account for relevant economic, social, or ecological factors when specifying OY. Setting OY as the yield of fishing at 50% of $F_{MSY\ Proxy}$ (**Option 2a**) is the most conservative of the options as the yield would be the furthest below MSY of the alternative being considered. This option would provide the greatest protection to the stock; however, setting the OY this low may have negative social and economic costs from fewer gray snapper being available to the reef fish fishery. Fishing at 90% of $F_{MSY\ Proxy}$ (**Option 2c**) would be the least conservative as OY would be closest to MSY. This option would provide the least protection to the stock, but would provide more fish to the fishery and likely have greater social and economic benefits. **Option 2b** (75% of $F_{MSY\ Proxy}$) is intermediate to **Options 2a** and **2c** and is consistent with OYs set for other reef fish stocks (Table 2.4.1).

Table 2.4.1. Current OY definitions as implemented in plan amendments.

Stock	OY	Source
Gag	Yield at 75% of F_{MAX}	Amendment 30B (GMFMC 2008c)
Red grouper	Yield at 75% of F_{MSY}	Secretarial Amendment 1 (GMFMC 2004c)
Red snapper	Yield at 75% of F_{MSY}	Amendment 22 (GMFMC 2004d)
Vermilion snapper	Yield at 75% of $F_{MSY\ proxy}$	Amendment 47 (GMFMC 2017e)
Gray triggerfish	Yield at 75% of $F_{MSY\ proxy}$	Amendment 30A (GMFMC 2008b)
Greater amberjack	Yield at $F_{40\%\ SPR}$	Secretarial Amendment 2 (GMFMC 2002b)

2.5 Action 5 – Modify the Gray Snapper Overfishing Limit (OFL), Acceptable Biological Catch (ABC), Annual Catch Limit (ACL), and Annual Catch Target (ACT)

Alternative 1. No Action. The ACL for gray snapper will remain at 2.42 million pounds (mp) whole weight (ww) and the ACT will remain at 2.08 mp ww (86.0% of ACL).

Alternative 2. The ACL for gray snapper for the years 2019 through 2021 and beyond will be equal to the ABC yield stream using the MSY proxy of $F_{30\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	2.31	2.27	2.27
2020	2.33	2.29	2.29
2021+	2.36	2.32	2.32

Alternative 3. The ACL for gray snapper for the years 2019 through 2021 and beyond will be equal to the ABC yield stream using the MSY proxy $F_{40\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	1.83	1.80	1.80
2020	1.90	1.86	1.86
2021+	1.95	1.92	1.92

Alternative 4. Apply the ACL/ACT Control Rule (landings from 2014 through 2017) to establish an 11% buffer between the ABC and the ACL. The ACL for gray snapper for the years 2019 through 2021 will be reduced from the ABC yield by 11% using the MSY proxy $F_{30\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	2.31	2.27	2.03
2020	2.33	2.29	2.04
2021+	2.36	2.32	2.07

Alternative 5. Apply the ACL/ACT Control Rule (landings from 2014 through 2017) to establish an 11% buffer between the ABC and the ACL. The ACL for gray snapper for the years 2019 through 2021 will be reduced from the ABC yield by 11% using the MSY proxy $F_{40\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	1.83	1.80	1.61
2020	1.90	1.86	1.66
2021+	1.95	1.92	1.71

Discussion:

Action 5 includes alternatives to modify the OFL, ABC, and ACL for gray snapper based on the results of the SEDAR 51 (2018) stock assessment and subsequent SSC review and recommendations. The Council has established an ACT for gray snapper; however, the accountability measure (AM) is associated with the ACL (GMFMC 2011a). The ACT does not serve any management purpose. Therefore, the alternatives do not include an ACT. A similar action was taken for hogfish in Amendment 43 (GMFMC 2016a).

The current OFL (2.88 mp ww) and ABC (2.42 mp ww) for gray snapper were established in the Generic ACL/AM Amendment (GMFMC 2011a) using tier 3a of the ABC control rule. Using this control rule, OFL is equal to the mean plus 2.0 standard deviations of the annual landings between 1998 through 2008. The ABC is equal to the mean plus 1.0 standard deviation of the annual landings from 1998 through 2008. The ACL was set equal to the ABC and the ACT was established using the ACL/ACT control rule where the ACT was reduced 14% from the ACL and equal to 2.08 mp ww.

At its May 2018 meeting, the SSC determined that gray snapper was experiencing overfishing as of 2015, the terminal year of data in the assessment. The SSC did not determine if the stock is overfished, as this is dependent upon the definition of MSY (Action 1) and MSST (Action 3). However, the SSC determined that the stock assessment represented the best scientific information available and was suitable as the basis for management advice. Based on this determination, the SSC provided OFLs and ABCs for the years 2019 through 2021 based on either $F_{30\%SPR}$ or $F_{40\%SPR}$. In general, yields are higher at lower MSY proxy values. Higher MSY proxy values are biologically more conservative and have less risk of stock depletion, but may result in forgone yield. If the SSC does not provide an updated OFL and ABC recommendation for 2022 and beyond, the OFL and ABC will remain at the level established for 2021 based on the preferred alternative selected in this action.

Alternative 1 (No Action) would retain the current OFL (2.88 mp ww), ABC (2.42 mp ww), ACL (2.42 mp ww), and ACT (2.08 mp ww) that were established in the Generic ACL/AM Amendment (GMFMC 2011a) using tier 3a from the ABC control rule. This would preserve the status quo and offers yields greater than under **Alternatives 2-5** based on the most recent stock assessment. However, the current ACL exceeds the SSC's ABC recommendation for 2019 through 2021 and does not use the best scientific information available as the basis for management.

Alternative 2 establishes an ACL equal to the annual ABC for each year from 2019 through 2021, based on the annual yield projections recommended by the SSC when fishing at a constant fishing mortality rate of $F_{30\%SPR}$. **Alternative 3** would set the ACL equal to the annual ABC for each year from 2019 through 2021, based on the annual yield projections recommended by the SSC when fishing at a constant fishing mortality rate of $F_{40\%SPR}$. In all years, the allowable harvest for **Alternative 2** exceeds **Alternative 3** because it is based on a higher fishing mortality rate, however the allowable harvest for both alternatives are a modest reduction relative to **Alternative 1**. The allowable harvest increases each year under **Alternative 2** and **Alternative 3** as the stock biomass is expected to increase each year.

Alternative 4 establishes an ACL by applying the ACL/ACT control rule that results in an 11% buffer between the ABC and ACL for each year from 2019 through 2021, which in turn is based on the annual yield projections recommended by the SSC when fishing at a constant $F_{30\%SPR}$

fishing mortality rate. **Alternative 5** is identical to **Alternative 4**, but is based on a more conservative fishing mortality rate ($F_{40\%SPR}$). The ACLs in **Alternative 2** and **Alternative 4** are based on the same fishing mortality rate; however, the lower allowable harvest in **Alternative 4** accounts for management uncertainty related to constraining harvest below the OFL. In **Alternative 2**, there is only a 0.04 mp buffer between the OFL and ABC/ACL. If the OFL is exceeded, this would indicate that the stock is experiencing overfishing and would require immediate action to end overfishing. **Alternative 3** also has a very small (0.03 mp ww) buffer between the OFL and the ABC/ACL. This increases the likelihood of exceeding the OFL and leading to an overfished condition. **Alternative 3** is a larger reduction in allowable harvest from the current levels than **Alternative 2** and without additional management measures to constrain harvest, landings are more likely to exceed the OFL in **Alternative 3** compared with **Alternative 2** (see Table 1.1.1). **Alternatives 4** and **5** provide an 11% buffer between the ABC and ACL. This would allow the stock to be managed to the ACL but with a larger buffer between the ACL and the ABC or OFL. This may be desirable as the current AMs for gray snapper do not require in-season monitoring of landings unless the ACL was exceeded in the previous fishing year. Since implementation of ACLs and AMs in 2012 (GMFMC 2011a), gray snapper landings have not exceeded the current 2.42 mp ww ACL. **Alternatives 2-5** would reduce the ACL relative to **Alternative 1** and in absence of additional management measures to constrain harvest, it is likely that harvest (and catch rates) could increase as the stock rebuilds. This could increase the likelihood of exceeding the ACL both because of an expected increase in stock size and catch rates as well as a reduction in allowable harvest compared to current catch limits.

The intent of in-season monitoring is to provide timely information about when the ACL is expected to be met so that further harvest can be closed for the remainder of the year prior to exceeding the ACL. However, this process is complicated by lags in availability of harvest data and often imprecise estimates of harvest. Gray snapper is harvested primarily by the recreational sector and in-season landings estimates are often delayed by 45 days or more. Moreover, a substantial proportion of landings come from shore-based recreational anglers in Florida and with the current recreational data programs, it is difficult to precisely estimate landings (i.e., large PSE) further complicating the process of in-season monitoring of this stock. **Alternatives 4** and **5** would account for this by including an 11% buffer between the ACL and ABC. This approach is more likely to prevent an overage of the ABC and OFL than **Alternatives 2** or **3** where the ACL is equal to the ABC and is only modestly reduced from the OFL. In years in between stock assessments, the stock is considered to be experiencing overfishing if the landings exceed the OFL, which would require management action to end overfishing.

As mentioned above, the ABC recommendations are identical for **Alternative 2** and **Alternative 4** and also for **Alternatives 3** and **5**. All of these alternatives reduce harvest compared to **Alternative 1**. Based on the SSC recommendation, the ABC increases modestly each year (~ 0.03-0.04 mp ww) from 2019 to 2021 for **Alternatives 2-5** and would remain at the 2021 levels until a new ABC recommendation is provided from the SSC. This occurs because the stock biomass is expected to increase each year and is expected to be at or above the B_{MSY} by 2024.

CHAPTER 3. AFFECTED ENVIRONMENT

3.1 Description of the Fishery

Gray snapper is one of the 31 stocks managed in the reef fish fishery. From 2013 through 2017, the stock annual catch limit (ACL) for gray snapper was 2.42 million pounds (mp) whole weight (ww) and total landings (recreational and commercial) did not exceed the stock ACL during this period (Table 1.1.1). There is a post-season accountability measure (AM) for gray snapper that would be triggered in the event total landings exceed the stock ACL in a year. Then, during the following fishing year, if the total landings reach or are projected to reach the stock ACL, the gray snapper season for both sectors is closed for the remainder of the fishing year. There is no sector allocation for gray snapper. Over 90% of gray snapper landings in the Gulf of Mexico (Gulf) are made by the recreational sector, and the majority of gray snapper landings are in Florida. Additional information on the reef fish fishery can be found in previous amendments, including the Generic ACL/AM Amendment (GMFMC 2011a) and on the Gulf of Mexico Fishery Management Council's (Council) website.[3]

3.1.1 Recreational Sector

Permits

Angler-owned or leased vessels do not require a federal permit to harvest reef fish in federal waters. 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.

Any for-hire fishing vessel that takes anglers to harvest any species in the reef fish fishery from federal waters must have a charter/headboat permit for reef fish, which is a limited access permit specifically assigned to that vessel. Limited access permits may be renewed or transferred, but no additional permits may be issued. From 2012 through 2017, the number of vessels with the permit declined, in part due to the moratorium on the issuance of new permits since 2003. Table 3.1.1.1 provides the number of vessels with a charter/headboat permit for reef fish by state and

Table 3.1.1.1. Number of vessels with charter/headboat permit for reef fish by homeport state of vessel, 2012-2017.

Number of Vessels with Charter/Headboat Reef Fish Permit									
Year	**AL**	**FL**	**LA**	**MS**	**TX**	**Gulf**	**Other**	**Total**	**% Gulf**
2012	153	790	116	46	214	1,319	17	1,336	98.7%
2013	155	782	113	45	213	1,308	15	1,323	98.9%
2014	149	768	111	40	226	1,294	16	1,310	98.8%
2015	138	761	115	36	228	1,278	16	1,294	98.8%
2016	130	759	113	33	228	1,263	19	1,282	98.5%
2017	137	773	112	31	210	1,263	17	1,280	98.7%

Source: NMFS SERO.

[3] http://gulfcouncil.org/fishery-management/implemented-plans/reef-fish/

The distribution of charter/headboat permits for reef fish by hailing port state changed little from 2012 through 2016 (Table 3.1.1.2). The largest relative change was an increase in Texas's share, which rose from 16.0% to 17.7%.

Table 3.1.1.2. Percentage of for-hire reef fish permits by state of hailing port of vessel, and the percent change in permits for each state relative to total number of permits.

Year	Percentage of Charter/Headboat Reef Fish Permits						
	2012	**2013**	**2014**	**2015**	**2016**	***Average***	**Change 2012-2016**
AL	11.4%	11.7%	11.4%	10.8%	10.2%	*11.1%*	-1.2%
FL	58.9%	58.9%	58.5%	58.6%	59.1%	*58.8%*	0.2%
LA	8.9%	8.8%	8.7%	9.1%	9.1%	*8.9%*	0.2%
MS	3.5%	3.5%	3.1%	2.9%	2.7%	*3.1%*	-0.8%
TX	16.0%	16.1%	17.1%	17.5%	17.7%	*16.9%*	1.7%
Gulf States	*98.8%*	*98.9%*	*98.8%*	*98.8%*	*98.6%*	*98.8%*	*-0.2%*
Other	1.2%	1.1%	1.2%	1.2%	1.4%	*1.2%*	0.2%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	

Source: NMFS SERO.

Gray Snapper Landings

From 2013 through 2017, recreational anglers landed approximately 93% of total landings (Table 1.1.1). The majority of gray snapper are harvested by recreational anglers aboard private and leased vessels. From 2013 through 2017, they accounted for an average of approximately 70% of annual recreational landings (Table 3.1.1.3). The majority of gray snapper are landed in Florida; on average approximately 78% of the landings occur there (Table 3.1.1.4).

Table 3.1.1.3. Percentage of recreational landings (lbs ww) of gray snapper by mode, 2013-2017.

Year	Private/Leased	Charter	Headboat	Shore	Total
2013	70.6%	20.8%	2.2%	6.4%	100.0%
2014	72.1%	17.9%	2.6%	7.4%	100.0%
2015	74.0%	14.5%	3.3%	8.2%	100.0%
2016	68.0%	20.8%	3.2%	8.0%	100.0%
2017	62.7%	21.4%	5.5%	10.4%	100.0%
Average	**69.5%**	**19.1%**	**3.3%**	**8.1%**	**100.0%**

Source: SEFSC Recreational ACL Data (Nov 29, 2018)

Table 3.1.1.4. Recreational landings (lbs ww) of gray snapper by state, 2013-2017.

Year	AL	FLW	LA/MS	TX	Total	Percentage FLW
2013	28,037	1,885,241	333,930	39,243	2,286,450	82.5%
2014	14,851	2,009,302	289,996	17,474	2,331,623	86.2%
2015	24,831	1,645,082	358,786	9,991	2,038,690	80.7%
2016	52,163	1,879,268	417,097	16,086	2,364,613	79.5%
2017	58,796	1,447,352	300,055	42,692	1,848,895	78.3%
Average	**35,735**	**1,773,249**	**339,973**	**25,097**	**2,174,055**	**81.4%**

Source: SEFSC Recreational ACL Data (Nov 29, 2018)

The fishing season for gray snapper runs from January 1 through December 31. Gray snapper aggregate at nearshore and offshore reefs for spawning during the summer months from June through August, and it is during that time, particularly during July and August, that the largest percentage of landings occur. From 2013 through 2017, approximately 34% of annual landings occurred during the July/August wave (Tables 3.1.1.5). Approximately 67% of annual landings occurred during two waves: from May/June through July/August.

Table 3.1.1.5. Percentage of recreational landings (lbs ww) of gray snapper by wave, 2013-2017.

Year	Jan/Feb	Mar/Apr	May/Jun	Jul/Aug	Sep/Oct	Nov/Dec	Total
2013	5.2%	8.8%	22.9%	41.0%	17.4%	4.7%	100.0%
2014	12.6%	8.2%	18.3%	32.7%	13.7%	14.4%	100.0%
2015	12.8%	14.9%	21.9%	31.7%	14.9%	3.9%	100.0%
2016	12.3%	9.7%	32.4%	24.6%	14.9%	6.1%	100.0%
2017	7.7%	10.6%	23.9%	37.5%	6.8%	13.5%	100.0%
Average	**10.1%**	**10.4%**	**23.9%**	**33.5%**	**13.5%**	**8.5%**	**100.0%**

Source: SEFSC Recreational ACL Data (Nov 29, 2018)

More gray snapper are harvested from state waters than federal waters. From 2013 through 2017, an average of approximately 19% of the gray snapper that were harvested were from federal waters (Table 3.1.1.6).

Table 3.1.1.6. Percentage of gray snapper (number of fish) harvested by anglers (not including those fishing from headboats) from Gulf of Mexico federal waters, 2013-2017.

Year	Percentage from federal waters
2013	23.5%
2014	14.2%
2015	16.7%
2016	17.4%
2017	22.3%
Average	**18.8%**

Source: NMFS Fisheries Statistics Division, November 8, 2018.

3.1.2 Commercial Sector

Commercial fishing for gray snapper represents less than 10% of the gray snapper landed in the Gulf. The majority of commercial landings of gray snapper reported by dealers occur in west Florida, followed by Louisiana. From 2013 through 2017, an annual average of 85% of gray snapper were landed in Florida. Combined, landings in the two states account for approximately 99% of annual gray snapper landings by permitted vessels (SEFSC Economic Query System, October 2018).

3.2 Description of the Physical Environment

The Gulf has a total area of approximately 600,000 square miles (1.5 million km^2), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel (Figure 3.2.1). Oceanographic conditions are affected by the Loop Current, discharge of freshwater into the northern Gulf, and a semi-permanent, anti-cyclonic gyre in the western Gulf. The Gulf includes both temperate and tropical waters (McEachran and Fechhelm 2005). Gulf water temperatures range from 54º F to 84º F (12º C to 29º C) depending on time of year and depth of water. Mean annual sea surface temperatures ranged from 73º F through 83º F (23-28º C) including bays and bayous (Figure 3.2.1) between 1982 and 2009, according to satellite-derived measurements.[4] In general, mean sea surface temperature increases from north to south with large seasonal variations in shallow waters.

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

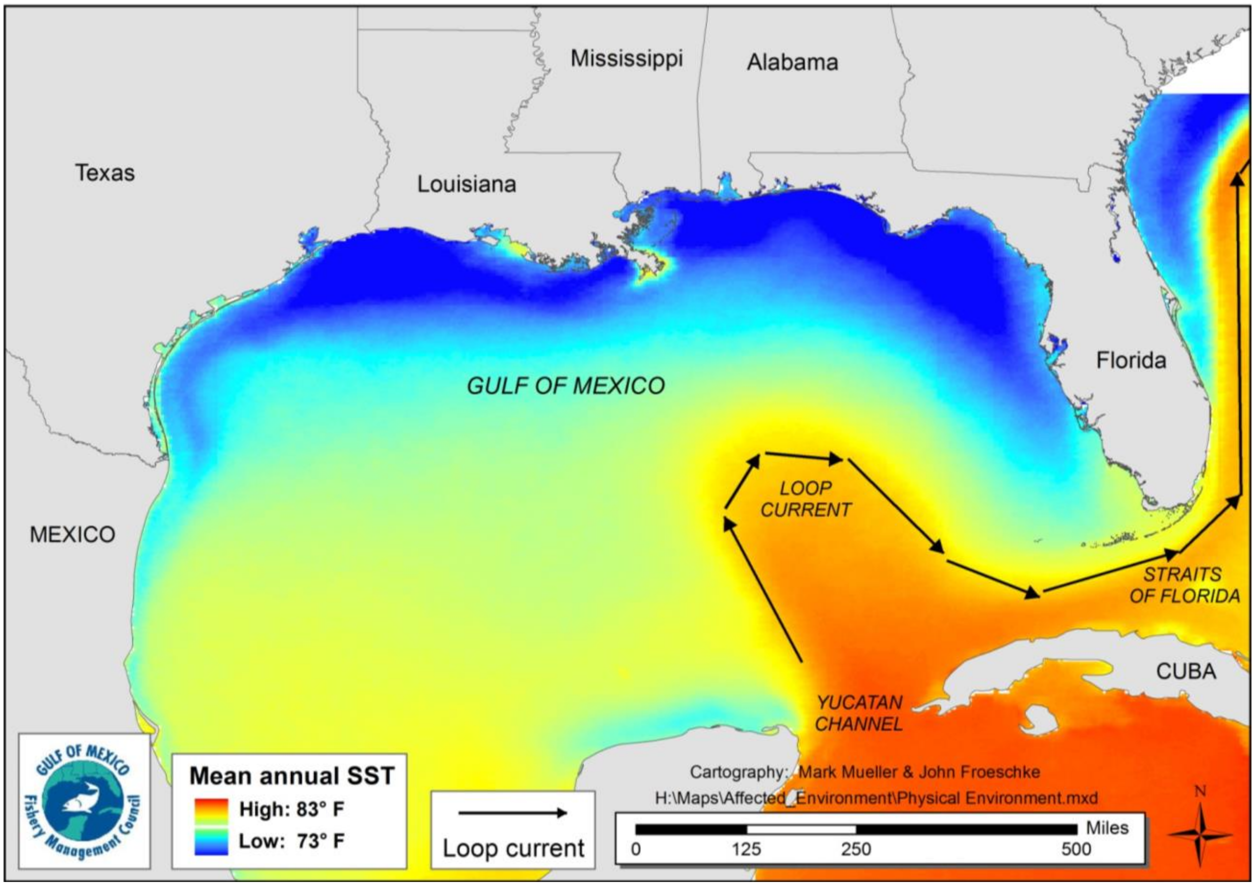

Figure 3.2.1. Physical environment of the Gulf including major feature names and mean annual sea surface temperature as derived from the Advanced Very High Resolution Radiometer Pathfinder Version 5 sea surface temperature data set (http://accession.nodc.noaa.gov/0072888).

The physical environment for Gulf reef fish, including gray snapper is also detailed in the Generic EFH Amendment, the Generic ACL/AM Amendment, and Reef Fish Amendment 40 (GMFMC 2004a; GMFMC 2011a; GMFMC 2014d, 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.

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 Essential Fish Habitat (EFH) Amendment (GMFMC 2004a) that are relevant to gray 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 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.[5]

Northern Gulf of Mexico Hypoxic Zone

Every summer in the northern Gulf, a large hypoxic zone forms. It is the result of allochthonous materials and runoff from agricultural lands by rivers to the Gulf, increasing nutrient inputs from the Mississippi River, and a seasonal layering of waters in the Gulf. The layering of the water is temperature and salinity dependent and prevents the mixing of higher oxygen content surface water with oxygen-poor bottom water. For 2018, the extent of the hypoxic area was estimated to be 2,720 square miles and fourth smallest area mapped since 1985.[6] The hypoxic conditions in the northern Gulf directly affect less mobile benthic macroinvertebrates (e.g., polychaetes) by influencing density, species richness, and community composition (Baustian and Rabalais 2009). However, more mobile macroinvertebrates and demersal fishes (e.g., gray snapper) are able to detect lower dissolved oxygen levels and move away from hypoxic conditions. Therefore, although not directly affected, these organisms are indirectly affected by limited prey availability and constrained available habitat (Baustian and Rabalais 2009; Craig 2012).

Greenhouse Gases

The Intergovernmental Panel on Climate Change has indicated greenhouse gas emissions are one of the most important drivers of recent changes in climate. Wilson et al. (2014) inventoried the sources of greenhouse gases in the Gulf from sources associated with oil platforms and those associated with other activities such as fishing. A summary of the results of the inventory are shown in Table 3.2.1 with respect to total emissions and from fishing. Commercial fishing and recreational vessels make up a small percentage of the total estimated greenhouse gas emissions from the Gulf (2.04% and 1.67%, respectively).

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

Table 3.2.1. Total Gulf greenhouse gas emissions estimates (tons per year [tpy]) from oil platform and non-oil platform sources, commercial fishing, and percent greenhouse gas emissions from commercial fishing vessels of the total emissions*. Data are for 2011 only.

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

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

3.3 Description of the Biological Environment

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

3.3.1 Gray Snapper

Life History and Biology

Distribution
Gray snapper occurs in marine and estuarine waters from Florida through Brazil including Bermuda, the Caribbean, and the northern Gulf of Mexico. (Tolan and Fisher 2009). Juvenile gray snapper have been collected as far north as Cape Cod, Massachussetts (Denit and Sponaugle 2004) but cannot survive water temperatures below 10°C and this likely limits the northward distribution of this species.

Gray snapper occur in estuaries and shelf waters of the Gulf, and are particularly abundant off south and southwest Florida. Gray snapper inhabit shallow waters to depths up to 180 m. Adults are demersal and mid-water dwellers, occurring in marine, estuarine, and riverine habitats; they occur offshore on natural and artificial reefs and inshore including freshwater creeks, rivers and freshwater springs. Gray snapper are found among mangroves, sandy grass beds, and coral reefs, and over sandy, muddy and rocky bottoms.

Spawning occurs offshore around reefs and shoals from June to August. Eggs are pelagic, and are present June through September after the summer spawn, occurring in offshore shelf waters and near coral reefs. Larvae are planktonic, occurring in peak abundance June through August in offshore shelf waters and near coral reefs from Florida through Texas. Postlarvae move into estuarine habitat and are found especially over dense grass beds of *Halodule* and *Syringodium*. Juveniles are marine, estuarine, and riverine dwellers, often found in estuaries, channels, bayous, ponds, grass beds, marshes, mangrove swamps, and freshwater creeks; they appear to prefer *Thalassia spp*. grass flats, marl bottoms, seagrass meadows, and mangrove roots (GMFMC 2004a).

Age

Fischer et al. (2005) estimated a maximum age of 28 years for gray snapper and subsequent studies have estimated a maximum age of 32 (SEDAR 51 2018) although regional differences in size and age structure have been observed (SEDAR 51 RD-06) noting that larger, older fish are more common in north Florida than in south Florida although this could be the result of greater fishing pressure in the south rather than a biological difference.

Growth

A growth curve, based on fractional ages and observed fork lengths at capture, was modeled using the von Bertalanffy growth model for the SEDAR 51 stock assessment. The recommended growth model parameters are L_∞= 54.69 cm FL, k = 0.1546, t0 = - 1.4554.

Reproduction

Gray snapper spawn from May through September and is estimated to be s, and 37 spawns were estimated to occur within that period (SEDAR51-DW-06). Fifty percent of individuals are estimated to attain maturity by 2.3 years of age or 253 mm FL (SEDAR 51 2018).

Natural Mortality

The life history working group convened as part of the SEDAR 51 assessment recommended natural mortality estimate of M = 0.15 based on a maximum age of 28 and applying Hoenig's regression for teleosts.

Status of the Gray Snapper Stock

Gray snapper are managed as a single stock in the Gulf including Monroe County (Florida Keys) in Florida. A review of the stock identification and delineation was conducted as part of the stock assessment (SEDAR 51-DW-09). The recommendations from the assessment included managing the Gulf and South Atlantic stock separately based on genetic differences and limited movement of adults. The working group convened as part of the assessment also recommended that Monroe County, Florida (Florida Keys) be considered as part of the Gulf stock.

The stock assessment of Gulf gray snapper (SEDAR 51 2018) indicated that the stock was experiencing overfishing but no determination was made about the stockstatus as the status determination criterion (Minimum Stock Size Threshold) has not been defined for this stock and is the subject of Action 3 in this document.

3.3.2 General Information on Reef Fish Species

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), and gray snapper whose larvae are found around submerged aquatic vegetation.

Status of Reef Fish Stocks

The Reef Fish Fishery Management Plan (FMP) currently encompasses 31 species (Table 3.3.2.1). Eleven other species were removed from the FMP in 2012 through the Generic ACL/AM Amendment (GMFMC 2011a).

Table 3.3.2.1. Status of species in the Reef Fish FMP grouped by family.

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

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

The NMFS Office of Sustainable Fisheries updates its Status of U.S. Fisheries Report to Congress[7] on a quarterly basis utilizing the most current stock assessment information. Stock assessments and status determinations have been conducted and designated for 12 stocks and can

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

be found on the Council[8] and SEDAR[9] websites. Of the 12 stocks for which stock assessments have been conducted, the most recent report of the 2018 Status of U.S. Fisheries classifies only one as overfished (greater amberjack), and two stocks as undergoing overfishing (greater amberjack and gray triggerfish).

The status of both assessed and unassessed stocks, as of the most recent version of the Status of U.S. Fisheries Report, is provided in Table 3.3.2.1. Reef Fish Amendment 44 (GMFMC 2017f), implemented December 2017, and modified the MSST for seven species in the Reef Fish FMP. Red snapper and gray triggerfish are now listed as not overfished but rebuilding, because the biomass for the stock is currently estimated to be greater than 50% of B_{MSY}. The greater amberjack stock remains classified as overfished.

The stock statuses of the species within the Reef Fish FMP are listed in Table 3.3.2.1. For those stocks that are listed as not undergoing overfishing, that determination has been made based on the annual harvest remaining below the OFL.

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, but also include fish that may be retained but not sold. Bycatch practicability analyses of the reef fish fishery, and specifically red snapper and West Florida hogfish, have been provided in several reef fish amendments (GMFMC 2004a, GMFMC 2007b, GMFMC 2014d, GMFMC 2015a, and GMFMC 2016a).

Protected Species

The Marine Mammal Protection Act (MMPA) and Endangered Species Act (ESA) provide special protections to some species that occur in the Gulf, and more information is available on the NMFS Office of Protected Resources website.[10] All 22 species of marine mammals in the Gulf are protected under the MMPA (Waring et al. 2016). These marine mammals include one sirenian species (a manatee), which is under U.S. Fish and Wildlife Service's (USFWS) jurisdiction, and 21 cetacean species (dolphins and whales), all under NMFS' jurisdiction. Four species (sperm, blue, sei, and fin whales, and manatees) are also protected under the ESA. On December 8, 2016, NMFS published a proposed rule to list the Bryde's whale as endangered under the ESA (81 FR 88639).

The MMPA requires that each commercial fishery be classified into one of three categories based on the level of incidental mortality or serious injury of marine mammals. NMFS classifies reef fish bottom longline/hook-and-line gear in the MMPA 2018 List of Fisheries as a Category

[8] www.gulfcouncil.org
[9] www.sedarweb.org
[10] http://www.nmfs.noaa.gov/pr/laws/

III fishery (83 FR 5349). This classification indicates the fishery has a remote likelihood of or no known incidental mortality or serious injury of marine mammals. There have been three observed takes of bottlenose dolphin from the continental shelf stock by this fishery.

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

NMFS has conducted consultations under section 7 of the ESA evaluating potential effects from the Gulf reef fish fishery on ESA-listed species and critical habitat. The most recent formal consultation or Biological Opinion (Bi Op) was finalized on September 30, 2011. It concluded that the continued authorization of the Gulf reef fish fishery is not likely to adversely affect listed whales or elkhorn or staghorn coral, and is not likely to jeopardize the continued existence of any sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish (NMFS 2011). An incidental take statement was issued specifying the amount and extent of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes. Since issuing the 2011 Bi Op, in memoranda dated September 16, 2014, and October 7, 2014, NMFS concluded that the activities associated with the Reef Fish FMP will not adversely affect critical habitat for the Northwest Atlantic Ocean loggerhead sea turtle DPS or the additional four species of coral. On September 29, 2016, NMFS reinitiated formal consultation on the continued authorization of the Gulf reef fish fishery because new species (Nassau grouper and North Atlantic and South Atlantic green sea turtle DPSs) were listed under the ESA that may be affected by the fishery. On March 6, 2018, NMFS revised the request for reinitiation to include the newly listed oceanic whitetip shark and the giant manta ray. NMFS also determined that the continued authorization of the fishery during the re-initiation period will not jeopardize the continued existence of these species.

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.[11] These changes are likely to affect plankton biomass and fish larvae abundance that could adversely affect fish, marine mammals, seabirds, and ocean biodiversity. Kennedy et al. (2002) and Osgood (2008) have suggested global climate change could affect temperature changes in coastal and marine ecosystems that can influence organism metabolism and alter ecological processes such as productivity and species interactions, change precipitation patterns and cause a rise in sea level. This could change the water balance of coastal ecosystems; altering patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs. The National Oceanic and Atmospheric

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

Association (NOAA) Climate Change Web Portal[12] predicts the average sea surface temperature in the Gulf will increase by 1-3ºC for 2010-2070 compared to the average over the years 1950-2010. For reef fishes, Burton (2008) speculated climate change could cause shifts in spawning seasons, changes in migration patterns, and changes to basic life history parameters such as growth rates. The smooth puffer and common snook are examples of species for which there has been a distributional trend to the north in the Gulf. For other species such as red snapper and the dwarf sand perch, there has been a distributional trend towards deeper waters. For other fish species, such as the dwarf goatfish, there has been a distributional trend both to the north and to deeper waters. These changes in distributions have been hypothesized as a response to environmental factors, such as increases in temperature.

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

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

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

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

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

Red Tide

Red tide is a common name for harmful algal bloom (HABs) caused by species of dinoflagellates and other organisms that causes the water to appear to be red. Red tide blooms occur in the Gulf almost every year, generally in late summer or early fall. They are most common off the central and southwestern coasts of Florida between Clearwater and Sanibel Island but may occur anywhere in the Gulf. More than 50 HAB species occur in the Gulf, but one of the best-known species is *Karenia brevis*. This organism produces brevetoxins capable of killing fish, birds and other marine animals.[13]

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

3.4 Description of the Economic Environment

3.4.1 Recreational Sector

The actions of this amendment concern fishing for gray snapper only. Consequently, the remainder of this section focuses exclusively on recreational fishing for gray snapper.

Gray snapper is a popular species among anglers. In 2017, an estimated 3.9 million directed angler trips, not including trips out of Louisiana and Texas, had at least one reef fish as the primary target, and 29.5% of those trips targeted gray snapper (NMFS Fisheries Statistics December 11, 2018). Also that year another 0.8 million directed trips had a reef fish as a secondary target, and 36.0% of those trips targeted gray snapper. Approximately 5.7 million trips landed reef fish, and 27.6% of them landed gray snapper.

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

The economic value of a gray snapper to anglers can be measured in the form of consumer surplus (CS) per additional fish kept on a trip for anglers (the amount of money that an angler would be willing to pay for a fish in excess of the cost to harvest the fish). The CS for an additional snapper, not specifically gray snapper, is estimated to be $13.08 in November 2018 (Haab et al. (2012) for original estimate and BLS CPI Inflation Calculator for 2018 estimate). The economic value for for-hire vessels can be measured by producer surplus (PS) per passenger trip (the amount of money that a vessel owner earns in excess of the cost of providing the trip). Estimates of the PS per for-hire passenger trip are not available. Instead, net operating revenue (NOR), which is the return used to pay all labor wages, returns to capital and owner profits, is used as a proxy for PS. For vessels in the Gulf, the estimated NOR value is $155 (2015 dollars) per charter angler trip (Liese and Carter 2011). The estimated NOR value per headboat angler trip is $54 in 2015 dollars.

In 2015, an estimated 2.3 million angler trips targeted or caught gray snapper, and approximately 91% of those trips were out of Florida. Anglers incur expenses, such as bait, tackle, and fuel, which generate economic impacts, such as jobs and income. Estimates of these impacts (in 2015 dollars) are summarized in Table 3.4.1.3 for comparative purposes with the previous table.

Table 3.4.1.3. Number of angler trips that targeted or caught gray snapper and economic impacts generated from those trips, 2015.

State	Trips (1,000s)	Jobs	Income (1,000s)	Sales (1,000s)	Value-Added (1,000s)
AL	125	149	$7,776	$19,397	$11,834
West FL	2,040	3,018	$142,431	$346,217	$222,820
LA	59	89	$3,714	$8,934	$5,766
MS	7	7	$327	$744	$491

3.4.2 Commercial Sector

Overview

From 2011 through 2015, commercial fishermen in the United States landed an annual average of approximately 9.68 billion pounds of finfish and shellfish and the Gulf Region (Gulf) accounted for 15.3% of that figure (Table 3.4.2.1). During that 5-year period, commercial landings in the Gulf accounted for an average of approximately 16.6% of annual national landings by dockside value. In 2016, the nation's commercial fishermen landed approximately 9.62 billion pounds of finfish and shellfish with a dockside value of $5.34 billion. Commercial fishermen in the Gulf accounted for 18.0% of those 2016 national landings by weight and 16.9% by value.

Commercial landings support jobs and generate other economic impacts. For example, all landings in West Florida in 2015 supported 10,257 jobs and created approximately $994 million in sales impacts, $263 million in income impacts, and $403 million in value-added impacts (Table 3.4.2.2).

Table 3.4.2.1. Commercial landings in the Gulf Region and U.S., 2011 – 2016.

Year	All Gulf Landings (lbs)	All U.S. Landings (lbs)	Percent Gulf	Gulf Dockside Value (Nominal)	U.S. Dockside Value (Nominal)	Percent Gulf
2011	1,792,550,312	9,903,528,358	18.1%	$811,904,803	$5,370,261,217	15.1%
2012	1,489,595,406	9,487,491,919	15.7%	$784,868,796	$5,158,416,939	15.2%
2013	1,346,243,804	9,755,748,177	13.8%	$941,557,376	$5,528,269,717	17.0%
2014	1,245,300,683	9,522,657,940	13.1%	$1,059,776,151	$5,531,974,536	19.2%
2015	1,553,245,334	9,755,486,827	15.9%	$877,766,876	$5,264,247,973	16.7%
Average (2011 – 2015)	**1,485,387,108**	**9,684,982,644**	**15.3%**			**16.6%**
2016	1,735,765,297	9,621.764,619	18.0%	$905,203,299	$5,344,917,324	16.9%

Source: Fisheries Economics of the United States (FEUS) 2015 and NMFS Fisheries Statistics Division ALS for 2016 landings.

Table 3.4.2.2. Economic impacts (without imports) of all Gulf Region landings by state, 2015.

State	Jobs	Sales (1,000s 2015$)	Income (1,000s 2015$)	Value-Added (1,000s 2015$)
AL	9,348	$421,219	$168,896	$220,481
FL	10,257	$994,047	$262,855	$403,399
LA	30,635	$1,601,577	$623,704	$838,255
MS	9,485	$464,680	$185,834	$239,474
TX	14,571	$966,117	$351,189	$492,440

Source: FEUS 2015.

Reef Fish Fishery

Annual dockside revenue from all reported landings of the species and species groups in the reef fish fishery increased from approximately $41.7 million in 2011 to approximately $61.3 million in 2015 (Table 3.4.2.3). Reported landings of reef fish by permitted vessels accounted for an average of 5.8% of the dockside revenue from all annual landings in the Gulf from 2011 through 2015. In 2016, landings of reef fish by federally permitted vessels accounted for 5.9% of dockside revenue from all landings in the Gulf.

From 2011 through 2015, there were Gulf reef fish landed outside the region; however, an annual average of approximately 99% of those landings outside the region were in eastern and inland Florida. Within the region (AL, western FL, LA, MS, and TX), most reef fish landings reported by permitted vessels occur in West Florida. For example, in 2015 they accounted for approximately 65% of landings by weight and 64% by dockside revenue. These landings generate economic impacts, such as jobs and income, as shown in Table 3.4.2.4.

Table 3.4.2.3. Comparison of dockside revenues (nominal) from reef fish (RF) landings in Gulf region (AL, West FL, LA, MS and TX) by permitted vessels and all landings by all vessels in Gulf region, and percentage of all landings by permitted vessels landings of reef fish, 2011-2016.

Year	Dockside Revenue from RF Landings by Federally Permitted Vessels	Dockside Revenue from All Landings by All Vessels	Percent from RF by Federally Permitted Vessels
2011	$41,685,649	$811,904,803	5.1%
2012	$46,457,776	$784,868,796	5.9%
2013	$50,483,000	$941,557,376	5.4%
2014	$59,403,207	$1,059,776,151	5.6%
2015	$61,335,922	$877,766,876	7.0%
Average (2011 – 2015)			**5.8%**
2016	$60,837,917	$905,203,299	5.9%

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018) for landings of reef fish.by permitted vessels, October 29, 2018; all landings by all vessels from ALS, S &T October 26, 2018.

Table 3.4.2.4. Reported reef fish (RF) landings by (reef-fish) permitted vessels and economic impacts of those landings, 2015.

State	RF Landings (lbs gw)	RF Dockside Revenue (2015 $)	Jobs	Sales (1,000s 2015$)	Income (1,000s 2015$)	Value-Added (1,000s 2015$)
AL	369,957	$1,356,889	196	$9,170	$3,646	$4,741
West FL	10,018,023	$39,098,246	1,737	$157,555	$43,211	$65,336
LA	2,036,785	$8,461,057	547	$26,826	$10,868	$14,438
MS	239,669	$480,952	43	$2,089	$833	$1,073
TX	2,620,082	$11,938,778	688	$40,732	$16,857	$22,725
Sub-total	15,284,516	$61,335,922	3,532	$254,109	$82,686	$118,037
All Other[1]	38,613	$144,568	10	619	256	345
Total	**15,323,129**	**$61,480,490**	**3,542**	**$254,728**	**$82,942**	**$118,382**

1. Economic impacts of landings in areas outside the region are those to the nation.
Source: Estimates of economic impacts calculated by NMFS SERO using model developed for NMFS (2016).

Landings of reef fish account for over 90% of total dockside revenue for all permitted vessels that land reef fish. From 2013 through 2017, an annual average of 95.2% of total dockside revenue for the permitted vessels were from reef fish (Table 3.4.2.5).

Table 3.4.2.5. Nominal dockside revenue from reef fish, jointly caught fish and species caught from other trips 2015 $) and percentage of total dockside revenue from reef fish, 2011-2017.

Year	Revenue from RF	Revenue from Jointly Caught Species	Revenue from Non-RF Trips	Total Revenue	Percent RF
2011	$42,067,426	$1,307,434	$1,219,736	$44,594,596	94.3%
2012	$46,978,008	$1,387,696	$1,373,078	$49,738,782	94.4%
2013	$50,819,511	$1,289,541	$1,573,363	$53,682,415	94.7%
2014	$59,684,277	$1,442,107	$1,859,494	$62,985,878	94.8%
2015	$61,710,100	$1,265,673	$1,431,231	$64,407,004	95.8%
2016	$61,334,086	$1,177,660	$1,915,939	$64,427,685	95.2%
2017	$54,582,891	$1,036,579	$1,594,442	$57,213,912	95.4%

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), October 29, 2018.

The actions of this amendment concern fishing for gray snapper only. Consequently, the remainder of this section focuses exclusively on commercial fishing for gray snapper. For more information about the economics of the vessels in the reef fish fishery, see Overstreet and Liese 2018).

Gray Snapper

Dockside revenue from landings of gray snapper relative to dockside revenue from landings of reef fish by permitted vessels are minimal. From 2011 through 2017, gray snapper landings represented, on average, less than 1% of reef fish landings by value (nominal dockside revenue) (Table 3.4.2.6). From 2013 through 2017, gray snapper accounted for an annual average of 0.66% of all dockside revenue from reef fish landings by all permitted vessels.

Table 3.4.2.6. Nominal dockside revenue from landings of gray snapper (GS) and reef fish landings (RF) for all permitted vessels and dockside revenue from GS as percent of revenue from RF, 2011-2017.

Year	Dockside Revenue from GS Landings	Dockside Revenue from RF Landings	Percentage GS
2011	$373,523	$42,067,426	0.89%
2012	$354,722	$46,978,008	0.76%
2013	$303,291	$50,819,511	0.60%
2014	$454,468	$59,684,277	0.76%
2015	$382,385	$61,710,100	0.62%
2016	$430,915	$61,334,086	0.70%
2017	$347,088	$54,582,891	0.64%

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

Average landings (lbs gw) of gray snapper per vessel and per trip have generally declined since 2011 for those vessels that land gray snapper (Table 3.4.2.6). From 2013 through 2017, the average trip that harvested gray snapper landed 49 lbs gw and the average vessel that harvested the species landed 342 lbs gw of gray snapper annually.

Table 3.4.2.6. Landings (lbs gw) of gray snapper (GS), numbers of trips and permitted vessels that landed GS, and average landings of GS per trip and per vessel, 2011-2017.

Year	Landings of GS	Trips that Landed GS	Vessels that Landed GS	Average Landings of GS per Trip	Average Landings of GS per Vessel
2011	146,168	2,072	364	71	402
2012	139,968	2,421	379	58	369
2013	113,712	2,235	354	51	321
2014	160,065	2,771	399	58	401
2015	143,796	2,990	401	48	359
2016	131,947	2,962	400	45	330
2017	113,709	2,712	380	42	299
Average 2013-17	**132,646**	**2,734**	**387**	**49**	**342**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

Gray snapper accounts for a slight percentage of annual dockside revenues for the permitted vessels that land the species. Since 2012, dockside revenue from gray snapper landings represents less than 1% of dockside revenue from all landings by the permitted vessels that land gray snapper (Table 3.4.2.7).

Table 3.4.2.7. Nominal dockside revenue from gray snapper (GS) and all other species landed during a GS trip, total dockside revenue from all trips that did not land GS by permitted vessels that landed GS, and percent of all dockside revenue from GS landings, 2011-2017.

Year	Dockside Revenue from GS	Total Dockside Revenue from Trips that Landed GS	Total Dockside Revenue from Other Trips	Dockside Revenue from All Trips	GS as Percent of Total Dockside Revenue from all Trips
2011	$373,523	$14,693,236	$20,440,335	$35,133,571	1.1%
2012	$354,722	$18,603,564	$21,427,666	$40,031,230	0.9%
2013	$303,291	$19,321,612	$21,402,504	$40,724,116	0.7%
2014	$454,468	$24,870,910	$25,870,776	$50,741,686	0.9%
2015	$382,385	$25,284,947	$26,655,326	$51,940,273	0.7%
2016	$430,915	$25,972,447	$26,939,314	$52,911,761	0.8%
2017	$347,088	$21,582,359	$22,453,991	$44,036,350	0.8%
Average 2013-17					**0.8%**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

Landings of gray snapper generate economic impacts, such as jobs and income. From 2013 through 2017, average annual dockside revenue (2017$) from all gray snapper landings was $395,007 (Table 3.4.2.8). Those landings generate 52 jobs (full- and part-time) and approximately $1.44 million in income, $2.03 million in value-added, and $3.92 million in sales impacts (Table 3.4.2.9).

Table 3.4.2.8. Real dockside revenue (2016$) from all gray snapper (GS) landings, 2011-2017.

Year	Dockside Revenue from GS Landings (2017$)
2011	$410,942
2012	$382,905
2013	$321,751
2014	$473,186
2015	$393,905
2016	$439,104
2017	$347,088
Average 2013-17	**$395,007**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018, and Bureau of Economic Analysis (BEA) for GDP implicit price deflator.

Table 3.4.2.9. Average annual economic impacts from gray snapper landings, 2013-2017.

Average Annual Dockside Revenue from GS Landings (2017$)	Jobs	Income (1,000s 2017$)	Value-Added (1,000s 2017$)	Sales (1,000s 2017$)
$395,007	52	$1,438.83	$2,032.91	$3,917.05

Source: Estimates of economic impacts calculated by NMFS SERO using model developed for NMFS 2016 and BEA for implicit price deflator.

Average landings (lbs gw) of gray snapper per vessel and per trip vary significantly when evaluated by the gear used (Tables 3.4.2.10 and 3.4.2.11). Vessel and trips that use divers and harvest the species have the highest average annual landings, followed in turn by hand hook-and-line (H&L hand), electric hook-and-line (H&L hand), bottom longline (bottom LL) and other gears.

Table 3.4.2.10. Average landings (lbs gw) of gray snapper per vessel by gear, 2011-2017.

Average Landings of GS per Vessel					
Year	**Bottom LL**	**Divers**	**H&L Hand**	**H&L Elec**	**Other**
2011	133	562	595	175	29
2012	109	547	416	262	88
2013	147	343	395	215	38
2014	312	639	400	264	10
2015	354	668	345	202	9
2016	307	396	352	199	7
2017	271	643	309	130	57
Average 2013-17	**278**	**538**	**360**	**202**	**24**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

Table 3.4.2.11. Average landings (lbs gw) of gray snapper per trip by gear, 2011-2017.

Average Landings of GS per Trip					
Year	**Bottom LL**	**Divers**	**H&L Hand**	**H&L Elec**	**Other**
2011	25	93	124	34	20
2012	20	87	84	42	48
2013	22	67	85	33	17
2014	42	96	75	41	11
2015	45	92	54	32	7
2016	39	57	56	33	7
2017	37	110	49	21	31
Average 2013-17	**37**	**85**	**64**	**32**	**14**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

Average dockside revenue from gray snapper landings per vessel and per trip also vary considerably by gear. While the average vessel that used divers to harvest gray snapper landed $1,626 of gray snapper annually from 2013 through 2017, the average vessel that used electrical hook-and-line landed $604 of the species annually (Table 3.4.2.12). The average trip that used divers had the highest dockside revenue from landings of gray snapper (Table 3.2.1.13).

Table 3.4.2.12. Average dockside revenue (2017$) from gray snapper landings per vessel by gear, 2011-2017.

Average Dockside Revenue (2017$) from GS per Vessel					
Year	**Bottom LL**	**Diving**	**H&L Hand**	**H&L Elec**	**Other**
2011	$315	$1,759	$1,656	$486	$74
2012	$254	$1,570	$1,152	$699	$227
2013	$397	$1,004	$1,111	$613	$104
2014	$926	$1,891	$1,182	$782	$75
2015	$963	$1,872	$948	$553	$24
2016	$1,021	$1,327	$1,178	$661	$25
2017	$885	$2,036	$898	$410	$179
Average 2013-17	**$838**	**$1,626**	**$1,063**	**$604**	**$81**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

Table 3.4.2.13. Average dockside revenue (2017$) from gray snapper landings per trip by gear, 2011-2017.

Average Dockside Revenue (2017$) from GS per Trip					
Year	**Bottom LL**	**Diving**	**H&L Hand**	**H&L Elec**	**Other**
2011	$60	$292	$346	$96	$53
2012	$46	$251	$234	$111	$124
2013	$60	$197	$239	$95	$46
2014	$126	$283	$221	$121	$33
2015	$122	$253	$148	$88	$18
2016	$130	$187	$186	$109	$25
2017	$120	$342	$142	$66	$96
Average 2013-17	**$111**	**$253**	**$187**	**$96**	**$44**

Source: SEFSC Socioeconomic Panel (Version 7) accessed by the SEFSC Economic Query System (October 2018), November 6, 2018.

3.5 Description of the Social Environment

This amendment affects the management of gray snapper in the Gulf for the commercial and recreational sectors. This section provides the background for the proposed actions that are evaluated in Chapter 4.

Descriptions of the top ranking communities by the number of commercial reef fish permits are included, along with descriptions of the top communities involved in commercial gray snapper and overall engagement. Descriptions of the top ranking communities by the number of federal for-hire permits are included, along with top recreational fishing communities based on recreational engagement and reliance. Community level data are presented to meet the requirements of National Standard 8 of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which requires the consideration of the importance of fishery resources to human communities when changes to fishing regulations are considered. Lastly, social vulnerability data are presented to assess the potential for environmental justice (EJ) concerns.

3.5.1 Commercial Fishing Communities

The majority of gray snapper commercial landings are in the state of Florida. Over 80% of landings have occurred in Florida for the past 7 years, except in 2011 when Louisiana saw an uptick in its landings to over 20%, which has dwindled since to below 10%. Gray snapper landings occur in the other Gulf states but are nominal.

Gulf commercial reef fish permits are held by entities with mailing addresses in 233 communities, located in 14 states (SERO Permit Office, July 22, 2018). Communities with the most Gulf commercial reef fish permits are located in Florida and Texas (Table 3.5.1.1). The community with the most Gulf commercial reef fish permits is Panama City, Florida (approximately 8% of commercial reef fish permits, Table 3.5.2.1).

Table 3.5.1.1. Top ranking communities based on the number of Gulf commercial reef fish permits.

State	Community	Permits
FL	Panama City	67
FL	Key West	37
FL	St. Petersburg	27
FL	Largo	23
TX	Galveston	23
FL	Destin	21
FL	Seminole	19
FL	Cortez	18
FL	Pensacola	17
FL	Clearwater	15
FL	Tampa	14
FL	Miami	13
FL	Lecanto	12
FL	Steinhatchee	12
TX	Houston	12
FL	Apalachicola	11
FL	Fort Myers	11
FL	Naples	11

Source: NMFS SERO permit office, July 22, 2018.

The descriptions of communities include information about the top communities based on a "regional quotient" (RQ) of commercial landings and value for gray snapper. The RQ is the proportion of landings and value out of the total landings and value of that species for that region, and is a relative measure. These communities would be most likely to experience the effects of the proposed actions that could change the fishery and impact participants, associated businesses, and communities within the region. If a community is identified as a gray snapper community based on the RQ, this does not necessarily mean that the community would experience significant impacts due to changes in the fishery as a different species or number of species may be more important to the local community and economy. Additional detailed information about communities with the highest RQs included here can be found on the SERO Community Snapshots website, which includes a ranking of important species landed within each community.[14]

In Figure 3.5.1.1 the community RQ for pounds of gray snapper is illustrated for the years 2010-2016. The community RQ is the amount of gray snapper landed within a community out of all gray snapper landed within the region. The communities are ranked based upon their 2016 regional quotient. Most of the top fifteen communities are in Florida as would be expected with the majority of landings there as mentioned earlier, although Venice, Louisiana is ranked in the top five. As shown in Figure 3.5.1.1, many communities have seen a fluctuation in their RQ over the seven years represented, yet their ranking remains about the same for most. Marathon is the top community and has been throughout the recent history of the fishery, but has seen fluctuations in regional quotient. The community of Key West is second with a substantially larger RQ than other communities and close to Marathon's even surpassing it in some years. The community of Madeira Beach has recently moved up in RQ with a steady increase since 2010, as has the community of Hudson. The community of St. Petersburg has seen its regional quotient decline recently. Other communities have relatively stable regional quotient, although New Orleans has seen some fluctuation in the intervening years with a substantial spike in RQ in 2011. The fluctuations in RQ may represent vessel movement or other factors within a particular community that might have changed the harvest of gray snapper in a particular year. Such changes may be related to vessel downtime, or a number of other issues. In some cases, it may be a change in business address, although the landing facility may have not changed. It is the trend of the regional quotient that is likely more informative of what is happening in the community over time with regard to its dependence upon gray snapper.

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

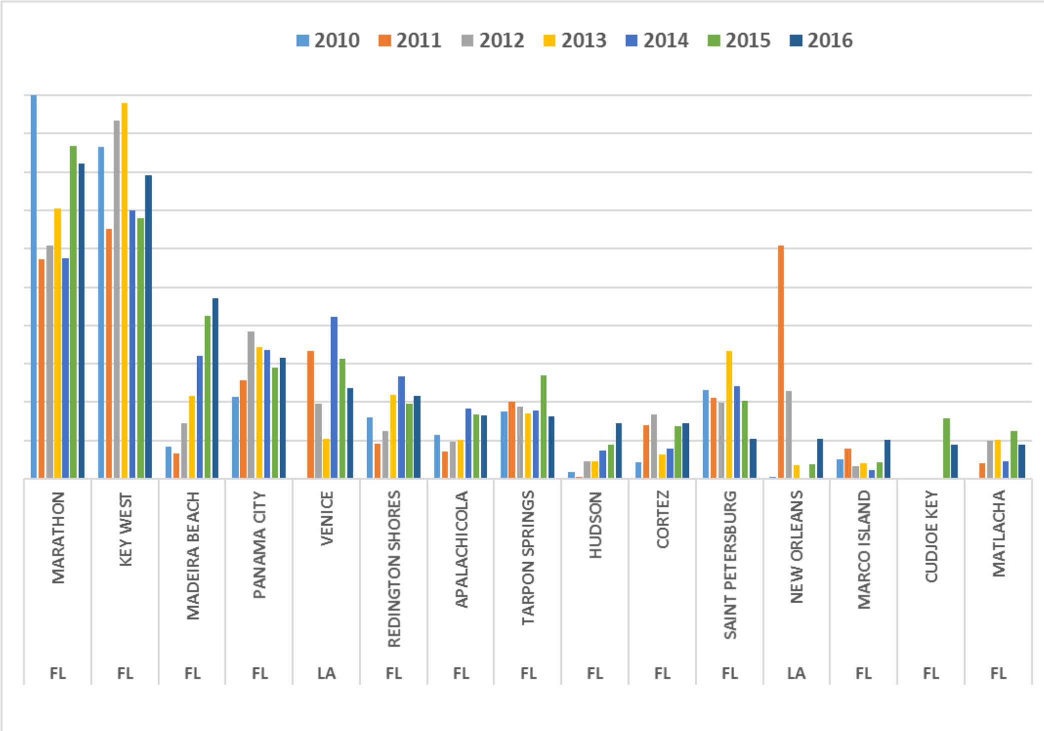

Figure 3.5.1.1. The top fifteen communities ranked by gray snapper regional quotient 2010-2016 with 2016 as base year.
Source: ALS based on dealer addresses, NMFS, SERO.

The overall measure of a community's commercial fishing engagement for the top gray snapper commercial fishing communities is depicted in Figure 3.5.1.2. Several communities in Figure 3.5.1.2 would be considered to be highly or moderately engaged in commercial fishing as they are well above 1 and ½ standard deviation for all years represented. Cudjoe Key and Redington Shores demonstrate some engagement with scores at or above the ½ standard deviation threshold. Those communities that are below the lowest threshold (Marco Island and Matlacha) demonstrate the least amount of engagement in commercial fishing overall.

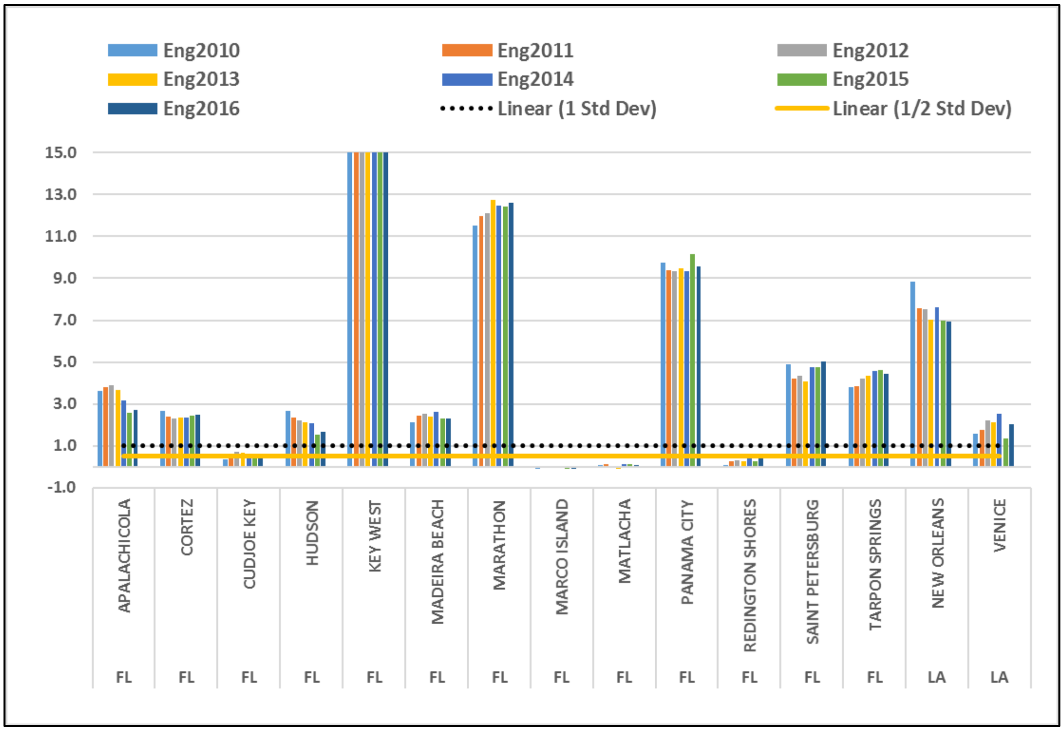

Figure 3.5.1.2. Commercial fishing engagement of the top fifteen commercial gray snapper communities for 2010-2016.
Source: SERO, Community Social Vulnerability Indicators Database 2018 (American Community Survey 2012-2016).

3.5.2 Recreational Fishing Communities

Federal for-hire permits are held by those with mailing addresses in 364 communities, located in 23 states (SERO permit office, July 22, 2018). The communities with the most for-hire permits for reef fish are provided in Table 3.5.2.1.

Table 3.5.2.1. Top ranking communities based on the number of federal for-hire permits for Gulf reef fish, including historical captain permits, in descending order.

State	Community	Permits
FL	Destin	67
AL	Orange Beach	51
FL	Panama City	51
FL	Naples	46
FL	Key West	42
FL	Pensacola	26
TX	Galveston	23
FL	St. Petersburg	22
FL	Sarasota	20
FL	Cape Coral	17
FL	Clearwater	17
FL	Fort Myers	17
LA	Metairie	17
TX	Houston	17
FL	Panama City Beach	15
MS	Biloxi	15
TX	Port Aransas	15
FL	Marco Island	14
TX	Freeport	14

Source: NMFS SERO permit office, July 22, 2018.

When Gulf reef fish for-hire vessels are separated into charter vessels or headboats, the majority are charter vessels (95% of for-hire vessels as of September 20, 2016) and a smaller proportion are headboats (approximately 5%, NMFS SERO permit office).

Landings for the private recreational sector are not available by species at the community level; therefore, it is not possible with available information to identify communities as dependent on recreational fishing for specific species. Because limited data are available concerning how recreational fishing communities are engaged and reliant on specific species, 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). Recreational fishing engagement is represented by the number of recreational permits and vessels designated as "recreational" by homeport and owners address and recreational infrastructure (number of boat ramps and fishing piers). Fishing reliance includes the same variables as fishing engagement, divided by population. Factor scores of both engagement and reliance were plotted.

Figure 3.5.2.1 identifies the top Gulf communities with reef fish permits 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. All fifteen included communities demonstrate high levels of recreational engagement, with Orange Beach, Alabama demonstrating reliance upon recreational fishing, although neither is specific to fishing for gray snapper.

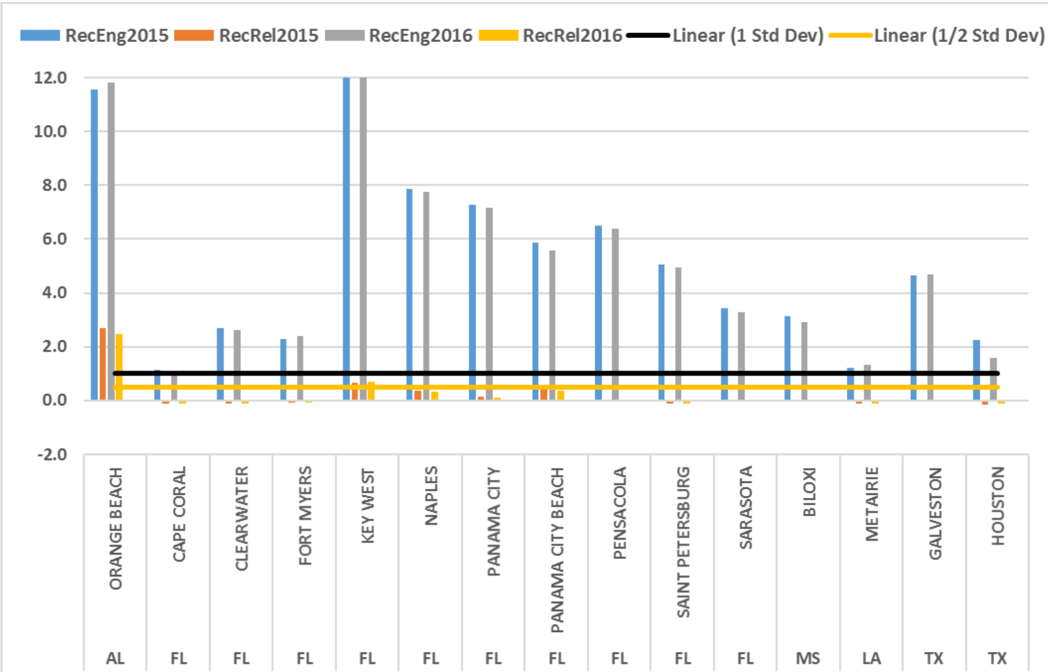

Figure 3.5.2.1. Recreational fishing engagement and reliance for the top fifteen recreational gray snapper communities for 2015-2016.
Source: SERO, Community Social Vulnerability Indicators Database 2018 (American Community Survey 2012-2016).

3.5.3 Environmental Justice Considerations

Executive Order 12898 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, 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 focus of Executive Order 12898 is to consider "the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories…" This executive order is generally referred to as environmental justice (EJ).

Commercial and recreational anglers and associated industries could be impacted by the proposed actions. However, information on the race and income status for groups at the different participation levels is not available. Although information is available concerning communities overall status with regard to minorities and poverty (e.g., census data), such information is not available specific to anglers and those involved in the industries and activities, themselves. To help assess whether any EJ concerns arise from the actions in this amendment, a suite of indices were created to examine the social vulnerability of coastal communities. The three indices are poverty, population composition, and personal disruptions. The variables included in each of these indices have been identified through the literature as being important components that contribute to a community's vulnerability. Indicators such as increased poverty rates for different groups, more single female-headed households and households with children under the age of five, disruptions such as higher separation rates, higher crime rates, and unemployment all are signs of populations experiencing vulnerabilities. Again, for those communities that exceed the threshold it would be expected that they would exhibit vulnerabilities to sudden changes or social disruption that might accrue from regulatory change.

Figures 3.5.3.1 and 3.5.3.2 provide the social vulnerability index scores of the top commercial and recreational communities that have been identified as having some association with gray snapper. Some communities appear in both figures to allow comparison with other communities included in that sector. The communities of New Orleans and Venice, Louisiana both exceed the threshold of 1 standard deviation for poverty in Figure 3.5.3.1, demonstrating some vulnerability when combined with other index scores. Several communities exceed the threshold of one-half standard deviation above the mean for more than one index (Panama City, Florida; New Orleans and Venice, Louisiana). These commercial fishing communities would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

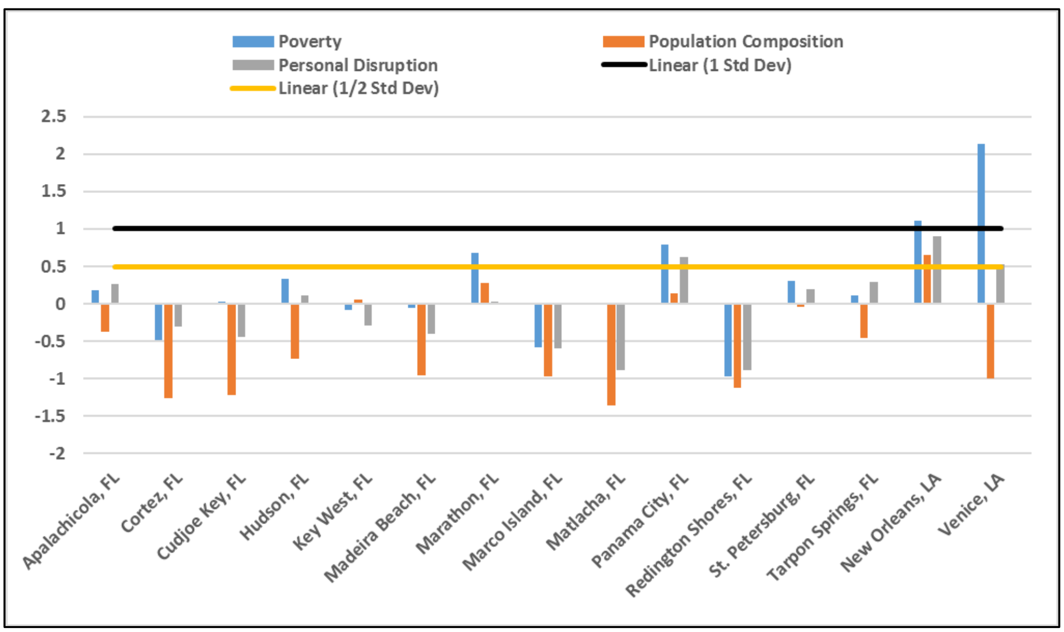

Figure 3.5.3.1. Social vulnerability indices for select commercial fishing communities associated with gray snapper.
Source: SERO, Community Social Vulnerability Indicators Database 2018 (American Community Survey 2012-2016).

The communities of Biloxi, Mississippi and Houston Texas both exceed one standard deviation for Poverty and Population Composition respectively in Figure 3.5.3.2. Several communities exceed the threshold of one-half standard deviation above the mean for more than one index

(Fort Myers and Panama City, Florida; Biloxi, Mississippi; Galveston and Houston, Texas). These recreational fishing communities that exceed the thresholds would be the most likely to exhibit vulnerabilities to social or economic disruption due to regulatory change.

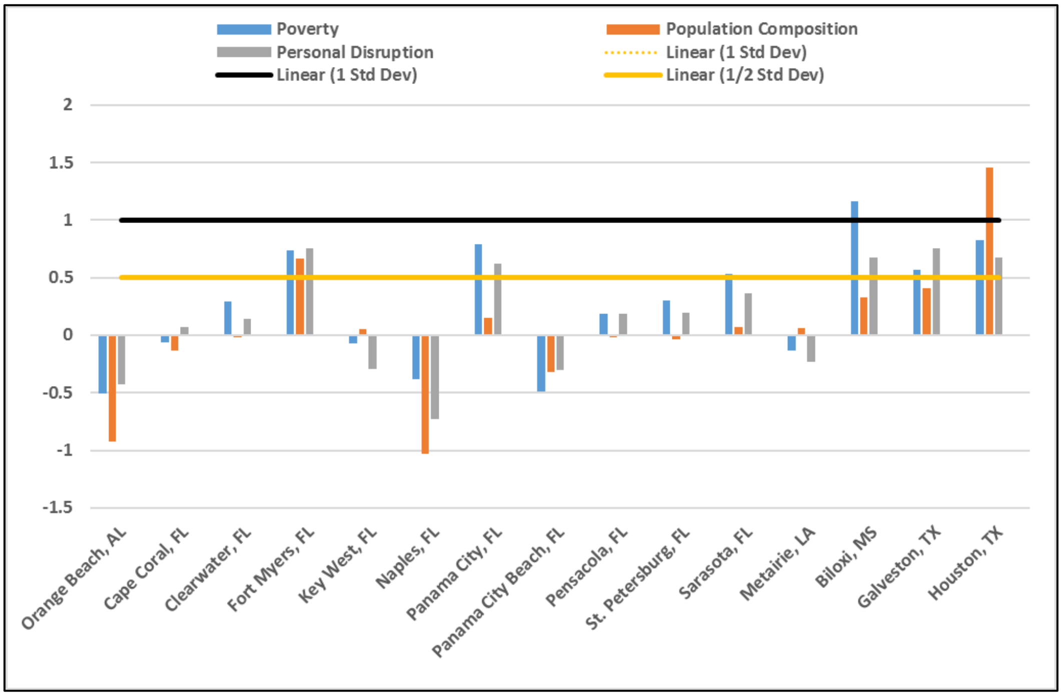

Figure 3.5.3.2. Social vulnerability indices for select recreational fishing communities associated with gray snapper.
Source: SERO, Community Social Vulnerability Indicators Database 2018 (American Community Survey 2012-2016).

People in these communities may be affected by fishing regulations in two ways: participation and employment. Although these communities may have the greatest potential for EJ concerns, no data are available on the race and income status for those involved in the local fishing industry (employment), or for their dependence on gray snapper specifically (participation). However, the implementation of the proposed actions of this amendment would not discriminate against any group based on their race, ethnicity, or income status because the proposed actions would be applied to all participants in the fishery. Further, there is no known subsistence fishing for gray snapper. Thus, the actions of this amendment are not expected to result in adverse or disproportionate environmental or public health impacts to EJ populations. Although no EJ issues have been identified, the absence of potential EJ concerns cannot be assumed.

3.6 Description of the Administrative Environment

3.6.1 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 exclusive economic zone (EEZ). The EEZ is defined as an area extending 200 nautical miles from the seaward boundary of each of the coastal states. The Magnuson-Stevens Act also claims authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the Secretary 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 C. In most cases, the Secretary has delegated this authority to NMFS.

The Gulf Council is responsible for fishery resources in federal waters of the Gulf. For reef fish, these waters extend 9 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 extending 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

The Gulf Council consists of seventeen voting members: 11 public members appointed by the Secretary; one each from the fishery agencies of Texas, Louisiana, Mississippi, Alabama, and Florida; and one from NMFS. The public is also involved in the fishery management process.

3.6.2 State Fishery Management

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

Table 3.6.2.1. Gulf state marine resource agencies and web pages.

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

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1 – Maximum Sustainable Yield (MSY) Proxy for Gulf of Mexico (Gulf) Gray Snapper

Alternative 1. No Action. Do not establish a MSY proxy for gray snapper.

Alternative 2. For gray snapper, the MSY proxy is the yield when fishing at 30% spawning potential ratio ($F_{30\%\ SPR}$).

Alternative 3. For gray snapper, the MSY proxy is the yield when fishing at 40% spawning potential ratio ($F_{40\%\ SPR}$).

Alternative 4. For future assessments of gray snapper, the MSY proxy equals the yield produced by $F_{MSY\ or\ PROXY}$ recommended by the Gulf of Mexico Fishery Management Council's (Council) Scientific and Statistical Committee (SSC), and subject to approval by the Council through a plan amendment.

Note: Alternative 4 can be selected with **Alternative 2** or **Alternative 3** as the preferred.

4.1.1 Direct and Indirect Effects on the Physical Environment

The alternatives in this action establish a proxy for MSY. The MSY proxy is the basis for establishing the catch levels for the overfishing limit (OFL), acceptable biological catch (ABC), and annual catch limit (ACL). This action would not directly affect the physical environment; however, proxies that allow larger or smaller catch levels may change fishing activity levels that could indirectly affect this environment.

The commercial sector of the reef fish fishery is conducted using vertical lines (i.e., electric reel, bandit rig, hook-and-line, and trolling) and longlines, however, less than 10% of gray snapper is landed by the commercial sector. The recreational sector (headboat, charter, and private modes) primarily uses vertical line gear (hook-and-line).

Longline gear is deployed over hard bottom habitats using weights to keep the gear in direct contact with the bottom. The potential for this gear to adversely impact the bottom depends on the type of habitat it is set on, the presence or absence of currents and the behavior of fish after being hooked. In addition, this gear, upon retrieval, can abrade, snag, and dislodge smaller rocks, corals, and sessile invertebrates (Hamilton 2000; Barnette 2001). Direct underwater observations of longline gear in the Pacific halibut fishery by High (1998) noted that the gear could sweep across the bottom. A study that directly observed deployed longline gear (Atlantic tilefish fishery) found no evidence that the gear shifted significantly, even when set in currents (Grimes et al. 1982). Lack of gear shifting even in strong currents was attributed to setting anchors at either end of the longline to prevent movement, which is the standard in the longline component of the commercial sector of the reef fish fishery. Based on direct observations, it is logical to assume that bottom longline gear would have a minor impact on sandy or muddy habitat areas. However, due to the vertical relief that hard bottom and coral reef habitats provide, it would be expected that bottom longline gear may become entangled, resulting in potential negative effects to habitat (Barnette 2001).

Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus vertical line gear fishing generally occurs over hard bottom areas (GMFMC 2004a). Vertical lines include multi-hook lines known as bandit gear, handlines, and rod-and-reels. Vertical line gear is less likely to contact the bottom than longlines, but still has the potential to snag and entangle bottom structures and cause attached organisms such as soft corals and sponges to tear off or be abraded (Barnette 2001). In using bandit gear, a weighted line is lowered to the bottom, and then the weighted line is raised slightly off the bottom (Siebenaler and Brady 1952). The gear is in direct contact with the bottom for only a short period of time. Barnette (2001) suggests that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers).

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

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

Action 1 would define the gray snapper MSY proxy. **Alternative 1** (No Action) would leave the MSY proxy officially undefined. Therefore, under **Alternative 1** there would be no change to the fishing effort or effects on the physical environment because there would be no defined catch level. However, landings would still be limited as the stock is managed under an ACL based on historical landings. **Alternative 2** and **Alternative 3** would base the MSY proxy on the fishing mortality rate (F) associated with a particular spawning potential ratio ($F_{x\%\ SPR}$). Lower SPRs allow higher MSY levels and possibly higher levels of fishing effort, producing potentially greater adverse effects to the physical environment. **Alternative 2** would specify the gray snapper MSY proxy as the yield at $F_{30\%\ SPR}$, which is less conservative than the **Alternative 3** proxy of the yield at $F_{40\%\ SPR}$. Thus, **Alternative 3** would likely result in less fishing effort and fewer adverse effects on the physical environment than **Alternative 2**.

4.1.2 Direct and Indirect Effects on the Biological/Ecological Environment

Direct and indirect effects from fishery management actions have been discussed in detail for a variety of reef fish species in past Reef Fish FMP Amendments (e.g., GMFMC 2004a, 2007, 2008a, 2008b, 2008c, 2009, 2011b, 2012b, 2012c, 2015b, 2016a, 2017f)) and are incorporated here by reference. Management actions that affect this environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size. Fishing gear have different selectivity patterns that refer to a fishing method's ability to target and capture organisms by size and species. This would include the number of discards, mostly sublegal fish or fish caught during seasonal closures, and the mortality associated with releasing these fish. Potential impacts of the 2010 *Deepwater Horizon* MC252 oil spill on the biological/ecological environment are discussed in Section 3.2 of a January 2011 Regulatory Amendment (GMFMC 2011d), and the Deepwater Horizon Programmatic Damage Assessment and Restoration Plan (DWH Trustees 2016) and are also incorporated here by reference. Impacts include recruitment failure and reduced fish health.

Fishing can affect life history characteristics of reef fish such as growth and maturation rates. For example, Fischer et al. (2004) and Nieland et al. (2007) found that the average size-at-age of red snapper had declined and associated this trend with fishing pressure. Woods (2003) found that the size at maturity for Gulf red snapper had declined and speculated this change may also have been due to increases in fishing effort. Lombardi-Carlson et al. (2006) found that the mean size of gag at age was larger pre-1990 than in post-1990 years and suggested this change was also due to fishing. Grouper reproduction may also have been impacted by fishing. Fitzhugh et al. (2006a, 2006b) reported the size at 50% maturity and 50% transition from females to males was smaller in their studies compared to earlier years. In addition, for hermaphroditic species, fishing pressure has been suggested for changes in sex ratios. The proportion of male gag in the population has decreased from historical levels of 17% (Hood and Schlieder 1992) to 2-10% in the 1990s (Coleman et al. 1996), leading to concerns by the Council's Reef Fish Stock Assessment Panel that the reduction in proportion of males may have a potentially negative consequence on population reproductive potential (GMFMC 1998). It has been suggested the resulting reduction in the number of males is a consequence of males being more aggressive feeders than females. Thus, hook-and-line fishing on gag spawning aggregations tends to selectively remove males before females (Gilmore and Jones 1992; Koenig at al. 1996). A decline in the ratio of male to female gag in the Gulf has been an ongoing source of concern. Furthermore, for species that aggregate, such as gag, the species is particularly vulnerable to fishing because they are concentrated at specific locations. This problem is confounded because of the depth gag spawn (from 27-66 fathoms, but concentrated around 44 fathoms; Koenig at al. 1996). At these depths, gag are vulnerable to mortality from barotrauma through the capture process.

Bycatch does occur within the reef fish fishery. If fish are released due to catch limits, seasons, or other regulatory measures, these fish are considered bycatch. Bycatch practicability analyses have been completed for red snapper (GMFMC 2004a, GMFMC 2007, GMFMC 2014a, GMFMC 2015b), grouper (GMFMC 2008a, GMFMC 2009, GMFMC 2011d, GMFMC 2012a), vermilion snapper (GMFMC 2004b, GMGMC 2017e), greater amberjack (GMFMC 2008b, GMFMC 2012b), gray triggerfish (GMFMC 2012c), and hogfish (GMFMC 2016a). In general, these analyses have found that reducing bycatch provides biological benefits to managed species as well as benefits to the fishery through less waste, higher yields, and less forgone yield. In some cases, actions are approved that can increase bycatch through regulatory discards such as increased minimum sizes and closed seasons. Under these circumstances, biological benefit to the managed species outweighs any increases in discards from the action.

The reef fish fishery can also affect species outside the reef fish complex. For example, , sea turtles have been observed to be directly affected by the longline component of the Gulf reef fish fishery. These effects occur when sea turtles interact with fishing gear and result in an incidental capture injury or mortality and are summarized in GMFMC (2009). However, for sea turtles and other Endangered Species Act listed species, the most recent biological opinion (NMFS 2011) for the Reef Fish FMP concluded authorization of the Gulf reef fish fishery managed in the Reef Fish FMP is not likely to jeopardize the continued existence of sea turtles, smalltooth sawfish, or *Acropora* species (See Section 3.3 for more information). This fishery is also not expected to adversely affect marine mammals; the primary gear types used by the commercial sector (longline and hook-and-line) were classified in the 2017 List of Fisheries (82 FR 3655) as a Category III fishery with regard to marine mammal species, indicating the gear has little effect on these populations (see Section 3.3 for more information).

Action 1 would define the gray snapper MSY proxy. **Alternative 1** (No Action) would leave the MSY proxy officially undefined. Therefore, under **Alternative 1** there would be no change to the fishing effort or effects on the biological environment because there would be no proxy to define the other SDCs. However, landings would still be limited as the stock is managed under an ACL based on historical landings. **Alternative 2** and **Alternative 3** would base the MSY proxy on the fishing mortality rate (F) associated with a particular spawning potential ratio ($F_{\% SPR}$). Lower SPRs allow higher MSY levels and possibly higher levels of fishing effort, producing potentially greater adverse effects to the gray snapper stock. **Alternative 2** would specify the gray snapper MSY proxy as the yield at $F_{30\% SPR}$, which is less conservative than the **Alternative 3** proxy of the yield at $F_{40\% SPR}$. Thus, **Alternative 3** would likely result in less fishing effort and fewer adverse effects on the biological environment than **Alternative 2**.

4.1.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would not establish a MSY proxy for gray snapper. Therefore, **Alternative 1** would not be expected to affect gray snapper harvests and would not be expected to result in economic effects.

Alternative 2 would formally define the MSY proxy for gray snapper as the yield when fishing at $F_{30\% SPR}$. Relative to **Alternative 2, Alternative 3** would be more conservative in setting a MSY proxy for gray snapper. **Alternative 3** would set the MSY proxy for gray snapper as the yield at $F_{40\% SPR}$. Therefore, relative to **Alternative 2**, **Alternative 3** would be expected to result in potential negative economic effects stemming from possible decreases in fishing opportunities in the short run but the anticipated decreases in the risk of stock depletion would be expected to result in positive economic effects in the long run. **Alternative 4**, which could be selected as a preferred alternative in conjunction with **Alternatives 2** or **3**, would add flexibility to the determination of future gray snapper MSY proxies by streamlining modifications to the proxy without the development of regulatory actions. With Council approval, **Alternative 4** would allow the establishment of a proxy recommended by the SSC and based on a stock assessment. Therefore, **Alternative 4** would be expected to result in positive indirect economic effects due to a more timely adjustment to the MSY proxy, when warranted.

4.1.4 Direct and Indirect Effects on the Social Environment

Although additional effects are not usually expected from retaining **Alternative 1** (No Action), the lack of stock status determination criteria is not consistent with NS1 guidelines and an MSY or its proxy needs to be defined. The effects of the actions in this amendment are related, in that indirect negative social effects may result from establishing an MSY proxy (Action 1) if the related status determination criteria result in an undergoing overfishing or overfished status (Actions 2 and 3), warranting a reduction to the annual catch limit (Action 5), which would be expected to reduce fishing opportunities.

Gray snapper does not have a sector allocation, but the majority of landings (> 90%) are made by the recreational sector. Of the recreational landings, greater than 80% are in Florida (Table 3.1.1.6). Thus, potential social effects would occur primarily in Florida among recreational anglers.

Alternative 2 would formally adopt an MSY proxy consistent with the current MFMT (Action 2, Alternative 1) that was recommended by the Council's SSC. Based on the current MFMT, gray snapper is considered to be undergoing overfishing. Thus, some indirect negative effects would be expected from **Alternative 2** when compared to **Alternative 1** as catch levels would need to be reduced (Action 5) to address the overfishing status, and potentially, overfished status (depending on the selection of the MSST in Action 3). On the other hand, the short-term negative effects that may result from reduced harvest opportunities would be expected to be mitigated in the long term by protecting the stock.

Alternative 3 would adopt a more conservative MSY proxy than **Alternative 2**. In the short term, **Alternative 3** could indirectly result in the need for lower catch limits compared to **Alternative 2**, and thus could entail more short-term negative effects if fishing activity is restricted further. However, decreasing the risk of stock depletion by selecting a more conservative MSY proxy (**Alternative 3**) would be expected to result in positive indirect effects for the long term.

Some minimal positive effects would be expected from **Alternative 4**. The SSC would continue to recommend an MSY proxy and the Council would still need to adopt the MSY proxy through a plan amendment, including its approval. **Alternative 4** would remove the requirement that the Council evaluate a range of alternatives for the adoption of a new SSC-recommended MSY proxy. Thus, the effects of **Alternative 4** are essentially procedural and thus administrative. Nevertheless, there are some small positive effects from reducing the administrative burden.

4.1.5 Direct and Indirect Effects on the Administrative Environment

The setting of MSY would have effects on the administrative environment through additional rulemaking (direct effect), addressing overfished and overfishing conditions (indirect effect from setting other status determination criteria), and monitoring the harvest (indirect effect). Because any of the alternatives would not result in added regulations, there would not be any immediate effect on the administrative environment from rulemaking.

Alternative 1 would leave the MSY proxy officially undefined for gray snapper and would not be consistent with NS1 guidance. When compared to **Alternative 1**, **Alternative 2** and **Alternative 3** are administratively advantageous because they would result in a metric assisting to assure that harvest levels are set at a level reduces the probability of overfishing or stock depletion. Because the MSY proxy under **Alternative 3** (yield at $F_{40\%SPR}$) is more risk averse than **Alternative 2** (yield at $F_{30\%SPR}$), maintaining this MSY proxy would be least likely to lead to overfishing or stock depletion and likely have the lowest probability of needing additional administrative actions to ensure overfishing does not occur or the stock become depleted.

Although the different alternatives have different effects on the administrative environment, these effects are likely minor. Assessing stocks to determine if the stock biomass is above or below MSY and other status determination criteria are routine endeavors by the National Marine Fisheries Service (NMFS). Actions to control harvest by the Council and NMFS are mostly routine and conducted through the Council system established by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Additionally, the Council and NMFS can determine if overfishing is occurring annually and take measures to reduce the likelihood a stock would enter an overfished condition through the use of ACLs and AMs. This minimizes the risk that harvest levels would deviate from MSY values established through this action.

4.2 Action 2 - Maximum Fishing Mortality Threshold

Alternative 1. No Action. The current definition for the gray snapper maximum fishing mortality threshold (MFMT) will be retained and is equal to $F_{30\%\ SPR}$

Alternative 2. The definition for the gray snapper MFMT equal to $F_{40\%\ SPR}$.

4.2.1 Direct and Indirect Effects on the Physical Environment

Direct and indirect effects are discussed in detail in Section 4.1.1 and incorporated by reference here. This action does not affect the gear used and therefore has no direct effect on the physical environment. However, changes to the MFMT could affect the likelihood of a stock being declared undergoing overfishing, which could result in indirect effects. An "overfishing" determination would require that action be taken to end overfishing immediately, which would likely include restrictions that further restrict fishing effort. Less fishing effort would result in less gear interaction with the physical habitat, which would be beneficial to the environment. Therefore, alternatives that allow higher levels of fishing mortality before overfishing is declared, or which do not provide a means to determine if overfishing is occurring, would have a greater negative effect on the physical environment.

Alternative 1 leaves the existing gray snapper MFMT definition in place. This definition was implemented in the Generic Sustainable Fisheries Act Amendment (GMFMC 1999b). **Alternative 2** sets the MFMT equal to the proxy use in Action 1's Alternative 3 based on $F_{40\%SPR}$. Because the F proxy would not change under **Alternative 1**, there should be no change of effects on the physical environment. **Alternative 2** would use a more conservative F value for MFMT than **Alternative 1**, so fishing effort would be much more restrictive. Thus, **Alternative 2** would have the least adverse effect on the physical environment of the two alternatives.

4.2.2 Direct and Indirect Effects on the Biological Environment

Direct and indirect effects are discussed in Section 4.1.2 in detail and incorporated by reference here. For MFMT, alternatives that result in greater fishing effort and landings are more likely to adversely affect the biological/ecological environment than alternatives that reduce fishing effort and landings. Setting MFMT should have very little effect on other reef fish stocks and other species in general. The reef fish fishery is a multispecies fishery where fishermen can target other species on trip. Thus, changing fishing practices on one stock does not generally change overall fishing effort, particularly for minor stocks within the fishery.

An "overfishing" determination would require that action be taken to end overfishing immediately, which would likely include restrictions that reduce fishing effort. Less fishing effort would result in fewer fish harvested from a stock, which would be beneficial to the biological/ecological environment. Therefore, alternatives that allow higher levels of fishing mortality before overfishing is declared would have a greater negative impact on the biological/ecological environment.

Alternative 1 would retain the existing MFMT definition. **Alternative 2** sets the MFMT equal to the MSY $F_{40\%SPR}$ proxy and is consistent with Action 1's Alternative 3. Because F in **Alternative 2** is more conservative than F in **Alternative 1**, **Alternative 2** is less adverse to the biological/ecological environment for the reasons explained above.

4.2.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would retain the current definition for gray snapper MFMT, i.e., equal to $F_{30\% SPR}$. Therefore, **Alternative 1** would not be expected to affect gray snapper fishing practices and anticipated harvests and would not be expected to result in economic effects.

Alternative 2 would set the gray snapper MFMT equal to $F_{40\% SPR}$. **Alternative 2**, which would establish a MFMT consistent with the MSY proxy considered in **Alternative 3-Action 1**, would set a more conservative MFMT than **Alternative 1**. In and of itself, **Alternative 2** would not be expected to impact the harvest of gray snapper and would therefore not be expected to result in direct economic effects. However, by setting a more conservative MFMT compared to **Alternative 1**, **Alternative 2** would be expected to increase the likelihood that gray snapper would be rebuilt according to the schedule determined in its rebuilding plan (should the gray snapper be under rebuilding), thereby potentially resulting in positive indirect economic benefits. In the event that the MSY proxy considered in **Alternative 3-Action 1** is also adopted, **Alternative 2** would be expected to result in indirect economic benefits relative to **Alternative 1** because it would ensure consistency between the MFMT and the MSY proxy for gray snapper.

4.2.4 Direct and Indirect Effects on the Social Environment

Under the current definition of MFMT (**Alternative 1**), gray snapper is considered to be undergoing overfishing. Although additional effects to the social environment are not expected from **Alternative 1**, along with the establishment of the related status determination criteria this alternative would warrant the need to reduce harvest levels (Action 5), thereby resulting in negative indirect effects for the short-term. As with selecting the MSY proxy in Action 1, these negative short-term effects would be expected to be mitigated in the long term by protecting the stock.

Additional indirect effects would be expected under **Alternative 2** compared to **Alternative 1**, which would establish a more conservative threshold for determining whether overfishing is occurring. More restrictive catch levels, and the potential need to establish harvest restriction through a subsequent regulatory action, would be more likely under **Alternative 2** compared to **Alternative 1**. Again, any short-term reductions to fishing opportunities would be offset by long-term benefits from protecting the stock and ensuring harvest opportunities in the future. If the Council selects **Alternative 3** in Action 1, selecting **Alternative 2** would modify the MFMT definition such that it matches the MSY proxy selected in Action 1, and the indirect effects would be similar for the respective species as discussed in Action 1.

4.2.5 Direct and Indirect Effects on the Administrative Environment

This action would directly affect the administrative environment by defining overfishing thresholds. If these thresholds are exceeded, then action needs to be taken by the Council and NMFS to end overfishing immediately. MFMT has already been defined for gray snapper through the Generic Sustainable Fisheries Act Amendment (GMFMC 1999b), so this stock is consistent with the Magnuson-Stevens Act requiring an overfishing threshold. However, if the MSY proxy is defined in Action 1's Alternative 3, then the current definition would be inconsistent with the MSY proxy and **Alternative 2** would need to be chosen for consistency. This would benefit the administrative environment by creating internal stability within the status determination criteria. **Alternative 2** also has the more conservative MFMT, so the probability of F exceeding the MFMT is greater than **Alternative 1**. Therefore, this alternative would adversely affect the administrative environment more as the likelihood of needing to take corrective action is greater.

Although the alternatives have different effects on the administrative environment, these effects are likely minor. Assessing stocks to determine if the F is above or below MFMT are routine endeavors by NMFS. Actions to control harvest by the Council and NMFS are mostly routine and conducted through the Council system established by the Magnuson-Stevens Act. Additionally, through the use of ACLs and AMs the Council and NMFS can determine if overfishing is occurring annually and take measures to reduce the likelihood a stock would get into an overfished condition. This minimizes the risk that the fishing morality (F) for a stock would increase above MFMT and be considered undergoing overfishing.

4.3 Action 3 – Establish a Minimum Stock Size Threshold for Gray Snapper

Alternative 1. No Action. Do not establish a minimum stock size threshold (MSST) for gray snapper.

Alternative 2. The MSST for gray snapper = (1-M)* B_{MSY} (or proxy) where M is the natural mortality rate.

Alternative 3. The MSST for gray snapper = 0.75*B_{MSY} (or proxy).

Alternative 4. The minimum stock size threshold for gray snapper = 0.50*B_{MSY} (or proxy).

4.3.1 Direct and Indirect Effects on the Physical Environment

Fishery management actions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat, either through gear impacts to bottom habitat as described in Section 4.1.1. This action does not affect how fishing gear is used and so has no direct effect on the physical environment. However, establishing a gray snapper minimum stock size threshold (MSST) could affect the likelihood of the stock being declared overfished, which could result in indirect effects. An "overfished" determination would require that a rebuilding plan be implemented, which would likely include restrictions that reduce fishing effort. Less fishing effort would result in less gear interaction with the physical habitat, which would be beneficial to the environment. Therefore, alternatives that allow overfishing to occur for a longer time before an overfished status is declared (i.e., larger buffers between B_{MSY} (or proxy) and MSST, would have a greater negative effect on the physical environment.

Alternative 1, no action, would leave MSST undefined. Without an MSST, an overfished determination cannot be made. Therefore, there would be no control on stock biomass levels (although OFLs and ACLs could restrict harvest). This alternative could potentially allow greater fishing effort and more adverse effects to the physical environment than any of the alternatives that set an MSST.

Alternative 2 would apply the (1-M)*B_{MSY} (or proxy) formula to all currently undefined stocks. Under this MSST proxy, the buffer between B_{MSY} and MSST depends on the average natural mortality rate of the species, which for gray snapper is 0.15. Thus the MSST would be set at 85% of B_{MSY}. Relative to **Alternative 3** and **Alternative 4**, this alternative result in the highest likelihood of a stock being declared overfished, and so would have the lowest potential level of allowing higher fishing effort that could lead to overfishing. This alternative would have the least potential for negative effects to the physical environment.

Alternative 3 would apply to 0.75*B_{MSY} (or proxy) formula to all currently undefined stocks. Relative to **Alternative 1**, this alternative would have fewer adverse effects on the physical environment because it would result in limits on fishing effort if the stock biomass dropped below MSST. Relative to **Alternative 2**, this alternative could have greater adverse effects through the allowance of greater fishing effort.

Alternative 4 would set MSST at 0.50*B_{MSY}, which is the lowest MSST allowed under the NS1 guidelines. Relative to **Alternative 1**, this alternative would have fewer adverse effects on the physical environment because it would result in limits on fishing effort if the stock biomass dropped below MSST. Relative to **Alternative 2** and **Alternative 3**, this alternative could have greater adverse effects for stocks because it could allow a higher potential fishing effort, and therefore the greatest potential for negative effects to the physical environment.

4.3.2 Direct and Indirect Effects on the Biological Environment

Direct and indirect effects are discussed in Section 4.1.2 in detail and incorporated by reference here. In essence, alternatives that result in greater fishing effort and landings are more likely to adversely affect the biological/ecological environment than alternatives that reduce fishing effort and landings. Setting MSST should have very little effects on other reef fish stocks and other species in general. The reef fish fishery is a multispecies fishery where fishermen can target other species on trip. Thus, changing fishing practices on one stock does not generally change overall fishing effort, particularly for minor stocks within the fishery. This action should also not effect red drum as harvest of this species is prohibited in federal waters.

The closer MSST is to B_{MSY} (or proxy), the time needed to rebuild the stock would likely be shorter. This is because the likelihood of larger declines in biomass from fishing is reduced and would provide more protection to the stock. **Alternative 1**, no action, would leave MSST as undefined leaving no metric for determining if stock is overfished or not. Therefore, **Alternative 1** would be the most adverse alternative to this environment.

Alternative 2 is the most conservative approach considered among the alternatives because the buffer between the MSST and B_{MSY} (or proxy) is the lowest. Although this alternative results in the greatest likelihood of a stock being declared overfished if there is a decline in stock size, it would also provide the greatest positive biological/ecological effect by preventing the target stock from large declines in biomass. It would also reduce the likelihood of negative biological/ecological impacts to other species as a result of effort shifting because of a more stringent rebuilding plan.

Alternative 3 is the next most conservative approach considered and would prevent the target stock from declines in biomass beyond 0.75*B_{MSY} (or proxy). It would also reduce the likelihood of negative biological/ecological impacts to other species as a result of effort shifting during a rebuilding plan. However, because the M for gray snapper is below 0.25, the buffer between B_{MSY} (or proxy) and MSST is greater than the buffer in **Alternative 2**. Thus, overfishing could potentially occur for a longer time before the stocks are declared overfished under **Alternative 3** than **Alternative 2**.

Alternative 4 would set MSST at 50% * B_{MSY} (or proxy), which is the lowest MSST allowed under the NS 1 guidelines. Relative to the other alternatives, this would result in the longest rebuilding time and the most restrictive management measures should a stock biomass fall below MSST, and would therefore have the greatest negative impacts on the biological/ecological environment of the alternatives in this action. Therefore, **Alternative 4** the most adverse of the alternatives proposing an MSST.

4.3.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would not define MSST for gray snapper. An undefined MSST would not be consistent with MSA requirements. **Alternative 1** would not be expected to alter the harvest of reef fish species and would not be expected to result in economic effects.

Alternatives 2-4 consider gray snapper MSST values ranging from 0.50*B_{MSY} (**Alternative 4**) to (1-M)*B_{MSY} (**Alternative 2** when M is less than 0.25). The establishment of a MSST for gray snapper is an administrative action and would therefore not be expected to result in direct economic effects. **Alternative 4** would set the lowest MSST value and would be expected to be associated with the smallest likelihood of classifying gray snapper as overfished. **Alternative 4** would grant more flexibility to manage gray snapper by providing a wider buffer between the MSST and the biomass at MSY. Therefore, **Alternative 4** would be expected to result in indirect positive economic effects due to additional harvesting opportunities that could be made available by the increased management flexibility. The magnitude of the potential indirect economic benefits would be determined by the expected additional harvests afforded to recreational anglers and commercial fishermen. However, should gray snapper be declared overfished, a smaller gray snapper MSST would be expected to warrant more restrictive rebuilding measures, thereby resulting in negative indirect economic effects during the rebuilding period. Although unknown at this time, the net effects that would be expected from adjustments to the MSST for gray snapper would depend on the relative size of these potential benefits and adverse economic effects.

Because **Alternative 3** would set a greater MSST than **Alternative 4**, it is expected that potential benefits due to management flexibility would be lessened under **Alternative 3**. However, compared to **Alternative 4**, **Alternative 3** would require less restrictive rebuilding measures if gray snapper are overfished, thereby resulting in smaller negative effects during the rebuilding period. It follows that **Alternative 2**, which would set a greater MSST than **Alternative 3**, would be expected to result in smaller adverse economic effects during the rebuilding period compared to **Alternative 3**.

4.3.4 Direct and Indirect Effects on the Social Environment

This action would define the threshold at which gray snapper would be considered overfished. Direct effects would not be expected from establishing an overfished threshold. Indirect effects would relate to regulatory action in response to determinations of whether gray snapper is overfished. The closer (narrower buffer) the threshold is set to MSY, the more likely for the overfished threshold to be triggered, resulting in indirect negative effects from the loss of harvest opportunities. A narrow buffer increases the uncertainty that gray snapper may enter an overfished status due to natural fluctuations in biomass. That uncertainty can have negative impacts on business planning and other aspects of both commercial and recreational fishing, as it may initiate changes in fishing behavior such as switching to other species or increased regulatory discards. On the other hand, the farther away (wider buffer) the threshold is set from MSY, the less likely the overfished threshold would be triggered. However, triggering the threshold set under a wider buffer would likely require more restrictive measures in a rebuilding plan, resulting in greater negative social effects, than if the threshold had been triggered sooner.

The management measures for a rebuilding plan that may follow a determination that gray snapper is overfished as a result of setting or modifying the MSST are unknown. Thus, it is not possible to describe the scope and strength of any indirect effects from triggering an overfished status. Therefore, this discussion of social effects is general and qualitative in nature. Moving into an overfished status could have negative social effects if harvest levels are reduced significantly. **Alternative 1** would not define MSST for gray snapper and there would be no change in management, and thus, no additional social effects. However, **Alternative 1** is inconsistent with NS1 guidance and needs to be defined.

Alternative 2 would provide a narrow buffer related to the natural mortality rate of gray snapper, currently estimated at 0.15, and would be the most conservative alternative for setting MSST as it would be most likely for the overfished threshold to be triggered. Using a narrow buffer for a stock such as gray snapper, which has a low natural mortality rate (e.g., less than M = 0.25), may result in the stock being more likely to move in and out of an overfished status due to natural fluctuations in biomass. Furthermore, given the lack of precision in the estimates of B_{MSY}, MSST, and current biomass, there is increased uncertainty with respect to whether the current biomass has actually dropped below MSST. The more stable approach to setting a wider buffer (such as **Alternatives 3** and **4**) that prevents a stock from moving into an overfished status may be preferable as stability would be preferable for both commercial and recreational stakeholders and businesses. **Alternative 2** would provide a more stable approach biologically, but the possibility of short-term negative effects may be higher under some circumstances such as when stock biomass fluctuates below MSST due to a narrow buffer. However, there may be positive long-term effects if stock status becomes more stable.

Alternative 4 would adopt the widest buffer allowed under the NS 1 guidelines and also among the alternatives, and would apply the same buffer as selected for the seven stocks included in Amendment 44 (GMFMC 2017f). In that amendment, this MSST definition resulted in two stocks (red snapper and gray triggerfish) being redefined from overfished to not overfished. (However, because each stock was in a rebuilding plan, that plan continues until the stock is rebuilt to B_{MSY}.) By adopting the widest buffer, the overfished threshold would be least likely to be triggered, avoiding negative effects from an overfished determination that triggers development of a rebuilding plan. However, in the event the threshold under **Alternative 4** is reached and gray snapper declared overfished, the rebuilding plan would be expected to include greater harvest restrictions than if a narrower buffer had been adopted. **Alternative 3** would set a buffer that sets MSST at 75% of B_{MSY}, and is a wider buffer than **Alternative 2** and a narrower buffer than **Alternative 4**. Thus, the effects of **Alternative 3** would be intermediary between **Alternatives 2** and **4**.

In summary, the social effects from **Alternatives 2-4** would be indirect and occur subsequent to a determination of overfished status based on the selected buffer. Wider buffers may allow for current fishing activity to continue, but risk future fishing activity being curtailed more if the stock falls into an overfished status. Narrow buffers may be more likely to result in an overfished determination and a subsequent rebuilding plan could curtail existing fishing effort, but may allow for more consistent fishing activity over the long term.

4.3.5 Direct and Indirect Effects on the Administrative Environment

This action would directly affect the administrative environment. Under **Alternatives 2-4**, MSST would be defined for gray snapper. Thus, selecting any of these alternatives as preferred would be administratively more efficient than **Alternative 1** (No Action), where MSST would remain undefined.

How MSST is determined under **Alternatives 2-4** also has indirect administrative implications. The lower the MSST value is (i.e., the greater the difference between B_{MSY} (or proxy) and MSST), the less likely the stock could be depressed below the MSST and be declared overfished. However, after a stock has been declared overfished, action must be taken to rebuild the stock to B_{MSY} (or proxy). The greater the difference between the overfished stock biomass and B_{MSY} (or proxy), the greater the harvest restrictions would need to be to allow the stock to recover to B_{MSY} (or proxy) within the rebuilding timeframe. Therefore, the lower MSST is, the greater the likelihood any rebuilding plan would require more restrictive management measures.

With respect to **Alternatives 2-4**, **Alternative 2** would set the highest MSST value and **Alternative 4** the lowest MSST value. Thus, the likelihood of the stock being reduced from overfishing to an overfished condition and in need of a rebuilding plan is greater under **Alternative 2**. **Alternative 3** is intermediate to **Alternative 2** and **Alternative 4**. In order, **Alternative 2** would have the greatest chance of adversely affecting the administrative environment through additional management measures, followed by **Alternative 3**, and then **Alternative 4**.

Although the alternatives have different effects on the administrative environment, these effects are likely minor. Assessing stocks to determine if the stock biomass is above or below MSST are routine endeavors by NMFS. Actions to control harvest by the Council and NMFS are mostly routine and conducted through the Council system established by the Magnuson-Stevens Act. Additionally, through the use of ACLs, OFLs, and AMs, the Council and NMFS can determine if overfishing is occurring annually and take measures to reduce the likelihood a stock would get into an overfished condition. This minimizes the risk that the stock size would fall below MSST and be considered overfished.

4.4 Action 4 – Establish Optimum Yield for Gray Snapper

Alternative 1. No Action. Do not establish an optimum yield for gray snapper.

Alternative 2. Set an optimum yield (OY for gray snapper that is the long-term yield that implicitly accounts for relevant economic, social, or ecological factors by fishing at:

> **Option 2a**. 50% of $F_{MSY\ Proxy}$.
> **Option 2b**. 75% of $F_{MSY\ Proxy}$.
> **Option 2c**. 90% of $F_{MSY\ Proxy}$.

4.4.1 Direct and Indirect Effects on the Physical Environment

This action does not affect the gear used and therefore has no direct effects on the physical environment that are identified in Section 4.1.1. However, the definition of optimum yield (OY) could affect the long-term harvest levels, which could result in indirect effects.

Alternative 1 would leave OY undefined for gray snapper. Harvest levels would continue to be determined by the ACL, which have been derived from historical landings, but may be defined by the assessment in Action 5. There would be no change to the current effects on the physical environment under this alternative.

Alternative 2 would define OY as the yield when fishing at a fixed percentage of the MSY proxy. If the MSY proxy is based on F, then OY would be the yield when fishing at some percentage of the F_{MSY} proxy. The percentage applied would depend upon which option is selected. **Option 2a** would set that percentage at the lowest level, or 50%, resulting in the lowest OY, the smallest amount of fishing effort and would have the fewest adverse effects on the physical environment than either **Option 2b** or **Option 2c**. **Option 2b** would set the percentage at 75%, resulting in an intermediate level of harvest and slightly greater adverse effects on the physical environment than **Option 2a**, but less than **Option 2c**. **Option 2c** would set the percentage at the highest level, 90%, resulting in greater adverse effects that either **Option 2a** or **Option 2b** because it would allow the highest fishing effort level. In summary, the level of adverse effects to the physical environment for each option, from least to greatest, are **Option 2a**, **Option 2b**, and **Option 2c**. All three options would likely result in lower harvest and fewer adverse effects to the physical environment than **Alternative 1**. However, the relative effects of setting an OY harvest level depend on how the OY harvest levels and the ACL harvest levels are integrated into management. That discussion is beyond the scope of this amendment.

4.4.2 Direct and Indirect Effects on the Biological Environment

Direct and indirect effects are discussed in Section 4.1.2 in detail and incorporated by reference here. In essence, alternatives that result in greater fishing effort and landings are more likely to adversely affect the biological/ecological environment than alternatives that reduce fishing effort and landings.

Setting OY is not expected to have any direct effects on the biological/ecological environment; however, the definition of OY could affect the long-term harvest levels. Management measures that would be required to maintain harvests at or below OY would produce biological/ecological impacts. Consequently, the biological/ecological impacts of the alternatives in this action would be indirect. Furthermore, the impacts could be positive or negative depending on the level of risk that is acceptable.

Alternative 1 would leave the OY value undefined for gray snapper. This would provide no long-term harvest target and could be detrimental to the long-term health of the stock should current harvest levels be too high. Thus, this alternative is least beneficial for the biological/ecological environment.

Alternative 2, Option 2a is the most conservative of the OY proxies (50% of MSY) and would have the lowest F and highest biomass (B) levels associated with it. Thus, it would have the lowest risk of allowing the stock size becoming depleted and would be the most beneficial **Alternative 2** option to the biological/ecological environment. **Option 2c** is the least precautionary option with the highest associated F value and the lowest associated B. Maintaining this OY proxy would be the most adverse of the **Alternative 2** options. **Option 2b** is intermediate to **Options 2a** and **2c**.

4.4.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would not define optimum yield for gray snapper. Under **Alternative 1**, this reference point could be defined in future regulatory actions as the need arises. Therefore, **Alternative 1** would not be expected to affect gray snapper fishing practices or harvests and would not be expected to result in economic effects.

Alternative 2 would define OY for gray snapper as a fixed percentage of $F_{MSY\ Proxy}$. The percentages considered range from 50% (**Option 2a**) to 90% (**Option 2c**). **Alternative 2, Option 2b** would set OY at 75% of $F_{MSY\ Proxy}$. The definitions of OY for gray snapper considered in **Alternative 2** would not be expected to affect gray snapper fishing practices or harvest levels. Therefore, **Alternative 2** would not be expected to result in direct economic effects. However, if the gray snapper ACL is indirectly linked to future OY definitions, then **Alternative 2** may be expected to result in indirect economic effects. The direction as well as the magnitude of these potential indirect economic effects would be determined by the relationship between the gray snapper ACL and OY.

4.4.4 Direct and Indirect Effects on the Social Environment

Additional effects would not be expected under **Alternative 1**, but OY would remain undefined and the reference point would need to be defined in a plan amendment. The effects from **Alternative 2** would be indirect and relate to any changes to the total allowable harvest that results from setting OY. In general, positive effects would result in the short-term from increasing harvest levels and negative effects from a decrease in current harvest levels. However, if an increase in harvest levels jeopardizes the health of the stock, indirect long-term negative effects could result if increased catch levels trigger an overfishing or overfished status and require a rebuilding plan.

Alternative 2 specifies fixed percentages of $F_{MSY\ Proxy}$ at which OY would be defined. It has been assumed that long-term benefits would result from setting OY at some percentage below MSY or its proxy, as there may be less chance of a stock moving into an overfished status. Without knowing what economic or social benefits are foregone, however, it is difficult to determine whether OY is truly being attained. **Option 2a** would result in a definition of OY that is reduced the most from the MSY proxy, and could result in the greatest negative effects among the options, as the least amount of gray snapper could be caught. **Option 2c** would set OY the closest to the MSY proxy, resulting in the least short-term effects by allowing the most gray snapper to be caught. However, as discussed above, higher catch levels in the short-term can increase the likelihood of triggering an overfished or overfishing status, resulting in stricter regulations during a rebuilding plan, if required. The effects of **Option 2b** would be intermediary between **Options 2a** and **2c**.

4.4.5 Direct and Indirect Effects on the Administrative Environment

This action would directly affect the administrative environment by defining a long-term harvest goal for gray snapper assuming equilibrium levels. Under **Alternative 1** (No Action), the OY definition would be undefined and would be in conflict with NS 1 guidelines. Selecting either of the options in **Alternative 2** would provide consistency with the guidelines.

Alternative 2 would set OY as a percentage of the F_{MSY} or proxy. The lower OY is, the less likely the stock could end up in a depleted condition that could end up requiring a stock rebuilding plan that allows the stock to recover to a healthy level. Therefore, of the **Alternative 2** options, **Option 2a** would be the least adverse to the administrative environment, **Option 2c** the most adverse, and **Option 2b** would be intermediate to these options.

Although the alternatives have different effects on the administrative environment, these effects are likely minor. Assessing stocks to determine if the stock biomass is above or below OY and other status determination criteria are routine endeavors by NMFS. Actions to control harvest by the Council and NMFS are mostly routine and conducted through the Council system established by the Magnuson-Stevens Act. Additionally, through the use of ACLs and AMs, the Council and NMFS can determine if overfishing is occurring annually and take measures to reduce the likelihood a stock would get into an overfished condition. This minimizes the risk that harvest levels would deviate from OY.

4.5 Action 5 – Modify the Gray Snapper Overfishing Limit (OFL), Acceptable Biological Catch (ABC), Annual Catch Limit (ACL), and Annual Catch Target (ACT)

Alternative 1: No Action. The ACL for gray snapper will remain at 2.42 million pounds (mp) whole weight (ww) and the ACT will remain at 2.08 mp ww (86.0% of ACL).

Alternative 2: The ACL for gray snapper for the years 2019 through 2021 and beyond will be equal to the ABC yield stream using the MSY proxy of $F_{30\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	2.31	2.27	2.27
2020	2.33	2.29	2.29
2021+	2.36	2.32	2.32

Alternative 3: The ACL for gray snapper for the years 2019 through 2021 and beyond will be equal to the ABC yield stream using the MSY proxy $F_{40\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	1.83	1.80	1.80
2020	1.90	1.86	1.86
2021+	1.95	1.92	1.92

Alternative 4: Apply the ACL/ACT Control Rule (landings from 2014 through 2017) to establish an 11% buffer between the ABC and the ACL. The ACL for gray snapper for the years 2019 through 2021 will be reduced from the ABC yield by 11% using the MSY proxy $F_{30\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	2.31	2.27	2.03
2020	2.33	2.29	2.04
2021+	2.36	2.32	2.07

Alternative 5: Apply the ACL/ACT Control Rule (landings from 2014 through 2017) to establish an 11% buffer between the ABC and the ACL. The ACL for gray snapper for the years 2019 through 2021 will be reduced from the ABC yield by 11% using the MSY proxy $F_{40\%SPR}$ selected in Action 1. Do not set an ACT.

Year	OFL (mp ww)	ABC (mp ww)	ACL (mp ww)
2019	1.83	1.80	1.61
2020	1.90	1.86	1.66
2021+	1.95	1.92	1.71

4.5.1 Direct and Indirect Effects on the Physical Environment

Modifying harvest limits including OFLs, ABCs, ACLs, and ACTs should not directly affect the physical environment because this action does not affect the gear used and therefore has no direct effects on the physical environment that are identified in Section 4.1.1. However, modifying the allowable harvest levels including the OFL, ABC, and ACL would affect the long-term harvest levels, which could result in indirect effects.

Alternative 1 would retain the current OFL, ABC, ACL, and ACT for gray snapper. However, the current OFL (2.87 mp ww) and ABC (2.42 mp ww) exceed the OFL and ABC yield streams recommended by the SSC based on their review of the stock assessment completed in 2018. As the current allowable harvest levels exceed the SSC recommendation **Alternative 1** is not viable and is least beneficial for the biological/ecological environment.

In comparison to **Alternative 1**, **Alternative 2** would be the smallest reduction in allowable harvest followed **Alternative 4**, **Alternative 3**, and **Alternative 5**

Alternative 5 would set the lowest annual ACLs of the alternatives considered (Table 4.5.1.1) followed by **Alternative 2**, and **Alternative 1**. All four action alternatives options would result in lower harvest and fewer adverse effects to the physical environment than **Alternative 1**, but the reef fish fishery is a multispecies fishery and any reduction in effort and corresponding effects to the physical environment is likely to offset by corresponding increases in effort for other reef fish species.

Table 4.5.1.1. Alternatives for gray snapper annual catch limits (pounds whole weight) for 2019 – 2021+.

Year	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
2019	2.42	2.27	1.61	2.03	1.61
2020	2.42	2.29	1.66	2.04	1.66
2021+	2.42	2.32	1.71	2.07	1.71

4.5.2 Direct and Indirect Effects on the Biological Environment

Direct and indirect effects are discussed in Section 4.1.2 in detail and incorporated by reference here. In essence, alternatives that result in greater fishing effort and landings are more likely to adversely affect the biological/ecological environment than alternatives that reduce fishing effort and landings. As described in Section 4.1.2, effects on the biological environment are associated with fishing effort and the associated landings that correspond with effort. Therefore, landings are used as a proxy for fishing effort and are presented in Table 1.1.1.

Alternative 1 would allow the highest allowable harvest and would be expected to have the greatest adverse effect on the biological environment. In contrast, **Alternative 5** would set the lowest annual ACLs of the alternatives considered (Table 4.5.1.1) as it is based on a more conservative fishing mortality rate ($F_{40\%SPR}$) than **Alternatives 2** and **4** ($F_{30\%SPR}$) and applies a buffer between the ABC and the ACL. **Alternatives 3** and **5** are based on the same fishing mortality rate ($F_{40\%SPR}$) followed by, **Alternative 4**, **Alternative 2**, and **Alternative 1**. All of the action alternatives are a reduction in allowable harvest relative to **Alternative 1** but again, the reef fish fishery is a multispecies fishery and any reduction in effort and corresponding effects to the biological environment is likely to offset by corresponding increases in effort for other reef fish species.

4.5.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 (No Action) would maintain a 2.42 mp gray snapper ACL and a 2.08 mp ACT. **Alternative 1** would not be expected to affect gray snapper fishing practices or harvests and would therefore not be expected to result in economic effects.

Alternatives 2-5 consider a range of gray snapper ACL reductions starting in 2019. Gray snapper ACLs would range from a minimum of 1.61 mp (**Alternative 5** in 2019) to a maximum of 2.32 mp (**Alternative 2** in 2021 and beyond). Between 2013 and 2017, the recreational and commercial sectors accounted for an average of 92.5 percent and 7.5 percent of the total gray snapper landings in the Gulf (Table 1.1.2), respectively. Economic effects that would be expected to result from **Alternatives 2-5** are estimated based on these percentages. For **Alternatives 2-5,** gray snapper ACLs, ACL changes relative to **Alternative 1**, and recreational and commercial estimated portions of the ACL changes are provided in Table 4.5.3.1. For the recreational sector, estimated portions of the ACL changes expressed in number of fish were obtained by dividing the expected changes in ACLs by an average weight of 1.4 lbs per gray snapper (DiLeone, pers. communication).

Table 4.5.3.1. Gray snapper ACLs, ACL changes, and recreational and commercial shares of the ACL changes relative to Alternative 1**.**

	ACL (mp)	ACL Change (lbs)	Share of the ACL Change		
			Recreational		Commercial
			lbs	Fish	lbs
Alternative 1	**2.42**				
Alternative 2					
2019	2.27	-150,000	-138,750	-99,107	-11,250
2020	2.29	-130,000	-120,250	-85,893	-9,750
2021	2.32	-100,000	-92,500	-66,071	-7,500
Alternative 3					
2019	1.8	-620,000	-573,500	-409,643	-46,500
2020	1.86	-560,000	-518,000	-370,000	-42,000
2021	1.92	-500,000	-462,500	-330,357	-37,500
Alternative 4					
2019	2.03	-390,000	-360,750	-257,679	-29,250
2020	2.04	-380,000	-351,500	-251,071	-28,500
2021	2.07	-350,000	-323,750	-231,250	-26,250
Alternative 5					
2019	1.61	-810,000	-749,250	-535,179	-60,750
2020	1.66	-760,000	-703,000	-502,143	-57,000
2021	1.71	-710,000	-656,750	-469,107	-53,250

For the recreational sector, the expected economic effects of the proposed alternatives were measured in changes in economic value, i.e., changes in CS for anglers. 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 changes in CS were based on the estimated CS per gray snapper and on the recreational share of the estimated change in ACL, expressed in number of fish. Estimates of the CS per fish for most individual species are not available, and this includes gray snapper. Because the value of the CS per gray snapper is unknown, the proxy value used in this analysis is the CS value for an additional "snapper" (not specific to the species) kept on a trip, i.e., $12.75 (Haab et al. 2012; values updated to 2017 dollars). This analysis does not include changes in producer surplus (PS) or net operating revenue (NOR) that would accrue to for-hire operators. The NOR is based on charter angler trips, and since expected changes in trips resulting from a change in gray snapper ACL cannot be estimated, the resulting change to the NOR cannot be estimated at this time. The exclusion of PS or NOR estimates would not affect the ordinal ranking of the proposed alternatives.

For the commercial sector, the expected economic effects of the proposed ACL changes were measured in changes in ex-vessel value. Changes in ex-vessel values were based on the commercial shares of estimated ACL changes and on an average ex-vessel price of $2.99 ($2017) per pound of gray snapper.

Table 4.5.3.2 provides nominal and net present values for estimated changes in recreational economic values and in commercial ex-vessel values. Net present values are based on a 7 percent annual discount rate. In general, greater reductions in ACL relative to **Alternative 1** would be expected to result in greater estimated losses in recreational economic value and in commercial ex-vessel value. Therefore, single-year losses in recreational economic value or in commercial ex-vessel value would be lowest under **Alternative 2** in 2021. Conversely, single-year losses would be greatest under **Alternative 5** in 2019. Over the 2019-2021 time interval, **Alternative 5**, which would implement the greatest aggregate reduction in gray snapper ACL, would be expected to result in losses in recreational economic value of more than $19 million (with a net present value of approximately $18 million). During the same time interval, **Alternative 5** would be expected to result in aggregate losses in ex-vessel value of about $0.51 million (with a net present value of approximately $0.48 million) to the commercial sector Because **Alternative 2** would correspond to the lowest aggregate reduction in ACL over the three-year interval, it would be expected to result in the lowest reductions in recreational economic value and in commercial ex-vessel value. Based on the relative magnitude of ACL reductions under **Alternatives 3** and **4**, estimated losses under **Alternative 4** are lower than losses that would be expected to result from **Alternative 3.**

Table 4.5.3.2. Gray snapper recreational and commercial shares of ACL changes, and changes in economic value and ex-vessel value relative to **Alternative 1.** Net present values are based on a 7 percent annual discount rate.

	Recreational			Commercial		
	Number of Fish	Nominal Value	Net Present Value	lbs	Nominal Value	Net Present Value
Alternative 2						
2019	-99,107	-$1,263,616	-$1,263,616	-11,250	-$33,638	-$33,638
2020	-85,893	-$1,095,134	-$1,023,490	-9,750	-$29,153	-$27,245
2021	-66,071	-$842,411	-$735,794	-7,500	-$22,425	-$19,587
Total	**-251,071**	**-$3,201,161**	**-$3,022,900**	**-28,500**	**-85,215**	**-$80,470**
Alternative 3						
2019	-409,643	-$5,222,946	-$5,222,946	-46,500	-$139,035	-$139,035
2020	-370,000	-$4,717,500	-$4,408,879	-42,000	-$125,580	-$117,364
2021	-330,357	-$4,212,054	-$3,678,971	-37,500	-$112,125	-$97,934
Total	**-1,110,000**	**-$14,152,500**	**-$13,310,796**	**-126,000**	**-$376,740**	**-$354,334**
Alternative 4						
2019	-257,679	-$3,285,402	-$3,285,402	-29,250	-$87,458	-$87,458
2020	-251,071	-$3,201,161	-$2,991,739	-28,500	-$85,215	-$79,640
2021	-231,250	-$2,948,438	-$2,575,280	-26,250	-$78,488	-$68,554
Total	**-740,000**	**-$9,435,000**	**-$8,852,420**	**-84,000**	**-$251,160**	**-$235,652**
Alternative 5						
2019	-535,179	-$6,823,527	-$6,823,527	-60,750	-$181,643	-$181,643
2020	-502,143	-$6,402,321	-$5,983,478	-57,000	-$170,430	-$159,280
2021	-469,107	-$5,981,116	-$5,224,138	-53,250	-$159,218	-$139,067
Total	**-1,506,429**	**-$19,206,964**	**-$18,031,143**	**-171,000**	**-$511,290**	**-$479,990**

4.5.4 Direct and Indirect Effects on the Social Environment

Changing the harvest levels does not affect fishing behavior directly. Rather, indirect social effects would be expected if a change to allowable harvest levels results in harvest restrictions, which in turn affect existing fishing activity. In general, an increase in harvest levels would be associated with indirect positive effects by providing additional fishing opportunities, while a decrease in harvest levels would be associated with negative effects as fishing opportunities are restricted. Although this action would modify the OFL, ABC, ACL, and ACT for gray snapper, this analysis uses the magnitude of change to the ACL to discuss the indirect social effects, as the ACL is used for gray snapper management purposes. The OFL and ABC are not associated with fishing regulations, and the ACT is not currently used for the management of gray snapper (and would no longer be established under **Alternatives 2-5**).

The effects of this action would primarily affect the recreational sector, which makes up over 90% of the annual landings of gray snapper. Gulf-wide, approximately 78% of gray snapper is landed in Florida (SEFSC Recreational ACL Data [MRFSS], November 29, 2018). Thus, potential social effects would occur primarily in Florida among recreational anglers. **Alternatives 2-5** would reduce the ACL (and associated harvest levels) compared to **Alternative 1** and could result in indirect negative effects. These effects would be realized if the ACL is met or exceeded two years in a row, as an in-season closure would be triggered in year two. For example, if the ACL is exceeded in year one, in year two, an in-season closure would be triggered when the ACL is estimated to be caught, prohibiting further harvest of gray snapper for the duration of the year. Thus, lost fishing opportunities would occur from a shortened fishing season, which would not occur until 2020 at the earliest. On the other hand, positive effects could result in the long term if harvest is reduced by protecting the stock, mitigating some of the negative effects from an in-season closure.

Under each of **Alternatives 2-5**, the ACL reduction is greatest in 2019, then increases from the 2019 levels in 2020 and 2021; the ACLs would remain the same as the 2021 levels until modified by the Council. This pattern would reduce the potential negative effects from an in-season closure that is triggered in 2020 or 2021 (as a result of an ACL overage in 2019 or 2020, respectively), as the ACL in those years would be slightly higher than the previous year in which the ACL overage occurred.

Among **Alternatives 2-5**, the fewest indirect negative effects would be expected under **Alternative 2**, which in 2019 would reduce the ACL by 6% from **Alternative 1**. That is, it would be least likely for an in-season closure to be triggered by an ACL overage in a preceding year, and if such an in-season closure occurred, it would be later in the year than under **Alternatives 3-5**. Indirect effects would be intermediary under **Alternative 4** (2019 ACL reduced by 16%) followed by **Alternative 3** (2019 ACL reduced by 26%). Negative effects would be greatest and most likely under **Alternative 5**, which would reduce the ACL in 2019 by 33% from **Alternative 1**. These effects would be realized in the year following an ACL overage, when in-season monitoring of the ACL would be triggered and the season would be closed when the ACL is estimated to be met. Because the ACL is the lowest under **Alternative 5**, the ACL would be most likely to be met compared to the other alternatives, and if triggered, an in-season closure would occur earlier resulting in greater lost harvest opportunities. If gray snapper landings approximate the average landings of the most recent 5 years (Table 1.1.1; 2.14 mp ww), it would be likely that an ACL overage would occur in 2019 under **Alternatives 3-5**, but not under **Alternative 2**. If gray snapper landings approximate total landings in 2017 (i.e., 1.96 mp ww), the year of lowest landings during those recent years, an ACL overage would be most likely to occur in 2019 under **Alternative 5**, followed by **Alternative 3**, but would not be expected under **Alternatives 2** or **4**. Nevertheless, multiple factors account for variations in landings from one year to the next, and future landings may not reflect recent fishing activity.

4.5.5 Direct and Indirect Effects on the Administrative Environment

Modifying annual harvest levels including the OFL, ABC, and ACL and ACTs does not typically result in substantial direct or indirect administrative effects. However, since Alternatives 2 – 5 will reduce the allowable harvest compared to Alternative 1, it is possible that a closure will need to be implemented, resulting in an additional administrative burden to notice and enforce such a closure. All of the action alternatives allow for modest increases of the ACL each year from 2019 through 2021. This should reduce or mitigate the likelihood of exceeding the ACL and trigger the AMs for this stock. Once these ACLs are implemented, the type of regulations needed to manage the reef fish fishery would remain unchanged regardless of the choice of harvest levels. The National Marine Fisheries Service's (NMFS) Office of Law Enforcement, in cooperation with state agencies, would continue to monitor both recreational and commercial landings. The Southeast Regional Office (SERO) monitors both the recreational and commercial landings in cooperation with the Southeast Fisheries Science Center (SEFSC) and Gulf states to determine if landings are meeting or exceeding the specified ACLs. Some administrative burden is anticipated with respect to outreach as it relates to notifying stakeholders of the changes to harvest levels.

4.6 Cumulative Effects Analysis

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

1. *The area in which the effects of the proposed action will occur* - The affected area of this proposed action encompasses the state and federal waters of the Gulf as well as Gulf communities that are dependent on reef fish fishing. Most relevant to this proposed action is gray 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 that goes into great detail about these important resources as well as other relevant features of the human environment.

2. *The impacts that are expected in that area from the proposed action* - The proposed action would define the gray snapper status determination criteria as well as modify ACLs. The environmental consequences of the proposed status determination criteria are analyzed in detail in Sections 4.1-4.5. Setting status determination criteria and OY as well as the ACLs should have very little effect on the physical and biological/ecological environment because the action is not expected to alter the manner in which the fishery is prosecuted. These actions would not have direct effects on the social and economic environments and any indirect effects would likely be minor for the near future. The reef fish fishery is a multispecies fishery where fishermen can target other species on trip. Thus, changing fishing practices on one stock does not generally change overall fishing effort, particularly for minor stocks within the fishery.

3. *Other Past, Present and RFFAs that have or are expected to have impacts in the area* - There are tens of thousands of actions going on in the Gulf annually. Many of these activities are expected to have impacts associated with them. It is not possible, nor necessary to list all of

them here. Below are discussed the actions expected to have the potential to combine with the effects of the proposed action to have some kind of a cumulative effects.

Other Fishery related actions - The cumulative effects relative to reef fish management have been analyzed in the EISs for Amendments 22 (GMFMC 2004d), 26 (GMFMC 2006), and 27/14 (GMFMC 2007), Amendments 29 (GMFMC 2008a), Amendment 30A (GMFMC 2008b), Amendments 30B (GMFMC 2008c), 31 (GMFMC 2009), 40 (GMFMC 2014d), and 28 (GMFMC (2015b). These cumulative effects analyses are incorporated here by reference. Other pertinent actions are summarized in the history of management (Section 1.3). Currently, there are several RFFAs that are being considered by the Council for the Reef Fish FMP, which could affect reef fish stocks. These include: a framework action to reduce red grouper ACLs and ACTs through a framework action (directly related to this action); Amendment 36B, which would further revise the red snapper and grouper-tilefish commercial individual fishing quotient (IFQ) programs; Amendments 42 and 41, which would provide flexibility in the headboat and charter vessel sub-components, respectively; Amendment 48, which would establish status determination criteria for many reef fish stocks; Amendment 50, which would establish state recreational management programs for red snapper; and some as yet unnumbered plan amendments to address red snapper allocation, the carryover of unharvested quota, acceptable biological catch control rule revisions and framework procedures, and modifications to charter vessel and headboat reporting requirements. In addition, several framework actions are being developed to address red snapper, and greater amberjack. Descriptions of these actions can be found on the Council's Web page at http://gulfcouncil.org/.

Non-fishery related actions - Actions affecting the reef fish fishery have been described in previous cumulative effect analyses (e.g., Amendment 40). Three important events include impacts of the *Deepwater Horizon* MC252 oil spill, the Northern Gulf Hypoxic Zone, and climate change. 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. However, it is unlikely that the oil spill in conjunction with setting SDCs and ACLs would have any significant cumulative effect given the primarily administrative function of this action.

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.[15] Global climate changes could affect the Gulf fisheries as discussed in Section 3.3. 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 3.3, the contribution to greenhouse gas emissions from fishing is minor compared to other emission sources (e.g., oil platforms).

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

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.

5. *The overall impact that can be expected if the individual impacts are allowed to accumulate:* RFFAs are listed in Part 3 of this section and pertinent past actions are summarized in the history of management (Section 1.3). This action, combined with past actions and RFFAs, is not expected to have significant beneficial or adverse effects on the physical and biological/ecological environments because this action will only minimally affect current fishing practices (physical and biological/ecological effects descriptions in Sections 4.1-4.5). However, for the social and economic environments, short-term adverse effects, although minor, are likely and could result in economic losses to fishing communities (economic and social effects descriptions in Sections 4.1-4.5). These short-term effects are expected to be compensated for by long-term management goals to maintain the stock at healthy levels. These effects are likely minimal as the proposed action, along with past 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 and RFFAs, is not expected to have significant adverse effects on public health or safety.

6. Summary: The proposed action, if conducted in a manner consistent with specific alternatives, is not expected to have individual significant effects to the biological, physical, or socio-economic environment. 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, the Southeast Region Headboat Survey, and the Texas Marine Recreational Fishing Survey, and the Louisiana Department of Wildlife and Fisheries LA Creel Program. In addition, the Alabama Department of Conservation and Natural Resources has instituted a program to collect information on reef fish, and in particular, red snapper recreational landings information. Commercial data are collected through trip ticket programs, port samplers, and logbook programs, as well as dealer reporting through the individual fishing quota program.

For the reasons outlined in this CEA and the rest of the environmental assessment, we do not expect this proposed action to have the potential to combine with other past, present and reasonably foreseeable future actions to have a significant cumulative effect on the human environment.

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APPENDIX A. OTHER APPLICABLE LAW

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

Administrative Procedure Act

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

Coastal Zone Management Act

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

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

Data Quality Act

The Data Quality Act (Public Law 106-443) effective October 1, 2002, requires the government to set standards for the quality of scientific information and statistics used and disseminated by federal agencies. Information includes any communication or representation of knowledge such as facts or data, in any medium or form, including textual, numerical, cartographic, narrative, or audiovisual forms (includes web dissemination, but not hyperlinks to information that others disseminate; does not include clearly stated opinions).

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

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

Fish and Wildlife Coordination Act

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

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

National Historic Preservation Act

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

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

<u>Executive Orders (E.O.)</u>

E.O. 12630: Takings

The E.O. on Government Actions and Interference with Constitutionally Protected Property Rights that became effective March 18, 1988, requires each federal agency prepare a Takings Implication Assessment for any of its administrative, regulatory, and legislative policies and actions that affect, or may affect, the use of any real or personal property. Clearance of a regulatory action must include a takings statement and, if appropriate, a Takings Implication Assessment. The NOAA Office of General Counsel will determine whether a Taking Implication Assessment is necessary for this amendment.

E.O. 12962: Recreational Fisheries

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

E.O. 13089: Coral Reef Protection

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

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

E.O. 13132: Federalism

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

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

E.O. 13158: Marine Protected Areas

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