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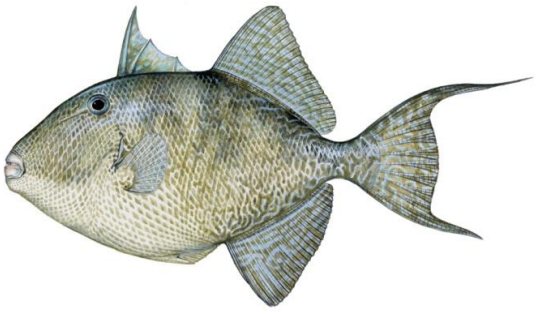
Modifications to the Gray Triggerfish Rebuilding Plan Including Adjustments to the Annual Catch Limits and Annual Catch Targets for the Commercial and Recreational Sectors



Final Amendment 37

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

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

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COVER SHEET

Name of Action

Reef Fish Amendment 37 to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico: Modifications to the Gray Triggerfish Rebuilding Plan including Adjustments to the Annual Catch Limits and Annual Catch Targets for the Commercial and Recreational Sectors.

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Abstract

The purpose of this amendment is to modify the gray triggerfish rebuilding plan based on new information from the 2011 Update Assessment, which determined that the stock was not rebuilding on target. This amendment would reduce the commercial and recreational annual catch targets to 60,900 and 217,100 pounds whole weight, respectively. To meet the necessary reductions, a fixed closed season from June 1 through July 31 would be established for the commercial and recreational sectors. In addition, this amendment would implement a commercial trip limit of 12 gray triggerfish, establish a recreational bag limit of 2-gray triggerfish per angler bag limit within the 20 reef fish aggregate, and modify the recreational accountability measures.

ABBREVIATIONS USED IN THIS DOCUMENT

AA	Assistant Administrator
ABC	acceptable biological catch
ACL	annual catch limit
ACT	annual catch target
AM(s)	accountability measure(s)
Council	Gulf of Mexico Fishery Management Council
EA	environmental assessment
EEZ	Exclusive Economic Zone
EIS	environmental impact assessment
F	instantaneous rate of fishing mortality
FL	fork length
F_{MSY}	fishing mortality rate corresponding to an equilibrium yield of MSY
F_{OY}	fishing mortality rate corresponding to an equilibrium yield of OY
$F_{30\% \text{ SPR}}$	fishing mortality corresponding to 30% spawning potential ratio
FMP	Fishery Management Plan
GMFMC	Gulf of Mexico Fishery Management Council
HBS	headboat survey
M	instantaneous rate of natural mortality
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MFMT	maximum fishing mortality threshold
MRFSS	Marine Recreational Fisheries Survey and Statistics
MSST	minimum stock size threshold
MSY	maximum sustainable yield
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA Fisheries	Same as NMFS
SEDAR	Southeast Data, Assessment and Review
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
SSASPM	State-Space Age-Structured Production Model
SSBR	spawning stock biomass per recruit
SSC	Scientific and Statistical Committee
SPR	spawning potential ratio
TPWD	Texas Parks and Wildlife Department
ww	whole weight

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LIST OF PREFERRED ALTERNATIVES

Action 1 - Modify the Gray Triggerfish Rebuilding Plan

Preferred Alternative 3: Modify the rebuilding plan based on a constant fishing mortality rate that does not exceed the fishing mortality rate at optimum yield.

Action 2 - Establish Annual Catch Limits and Annual Catch Targets for Gray Triggerfish

The current sector allocations for gray triggerfish are 21% commercial and 79% recreational as established in Amendment 30A.

Preferred Alternative 4: Use Amendment 30A to determine the sector allocation and the Council's ACL/ACT control rule to determine the buffers between the ACLs and ACTs. Based on an ABC = 305,300 pounds whole weight (lbs ww), set the commercial ACL = 64,100 lbs ww (21% of the ABC) and the recreational ACL = 241,200 lbs ww (79% of the ABC) consistent with the sector allocations established in Amendment 30A. The commercial ACT = 60,900 lbs ww (commercial ACL reduced by 5%) and the recreational ACT = 217,100 lbs ww (recreational ACL reduced by 10%) based on the ACL/ACT control rule buffers for each sector.

ABC	Commercial ACL	Recreational ACL
305,300 lbs ww	64,100 lbs ww	241,200 lbs ww
	Commercial ACT (quota)	**Recreational ACT**
	60,900 lbs ww	217,100 lbs ww

Action 3 - Commercial Management Measures

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

Preferred Alternative 2: Establish a fixed closed season for gray triggerfish during peak spawning (June 1 through July 31).

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

Preferred Alternative 3: Establish a commercial trip limit of 12 gray triggerfish.

Action 4 - Recreational Management Measures

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

Preferred Alternative 3: Establish a fixed closed season for gray triggerfish during peak spawning (June 1 through July 31).

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

Preferred Alternative 3: Establish a 2-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit.

Action 5 - Modify Recreational Accountability Measures

Preferred Alternative 2: Replace the current accountability measure with an in-season closure authority for gray triggerfish based on the recreational ACT. The in-season closure authority will act as the accountability measure. The accountability measure is:

If the recreational gray triggerfish ACT is reached or projected to be reached within a fishing year, the Assistant Administrator for Fisheries shall file a notification with the Office of the Federal Register to prohibit the recreational sector from harvesting gray triggerfish. If the ACT has been met, the closure will occur immediately; otherwise the closure will occur on the date the ACT is projected to be met. If, after reviewing landings data, it is determined the ACT was not met, the Assistant Administrator for Fisheries may file a notification with the Office of the Federal Register to reopen the recreational fishing season so the recreational sector can catch the remaining harvest allowed by the ACT.

Preferred Alternative 4: Add an overage adjustment to the accountability measure. The overage adjustment is:

If the recreational gray triggerfish ACL is exceeded, at or near the beginning of the following fishing year, the Assistant Administrator for Fisheries shall file a notification with the Office of the Federal Register to reduce the ACL (and the ACT if Alternative 2 is selected as preferred) for that following year by the amount of the ACL overage in the prior fishing year, unless the best scientific information available determines that a greater, lesser, or no overage adjustment is necessary. The overage adjustment will be applied:

> **Preferred Option b:** Only if the ACL is exceeded and the gray triggerfish stock is overfished.

FISHERY IMPACT STATEMENT

The primary purpose of this amendment is to modify the gray triggerfish rebuilding plan in response to recommendations of acceptable biological catch (ABC) made by the Scientific and Statistical Committee (SSC) after reviewing the Southeast Data Assessment and Review 2011 Update Assessment (SEDAR 9 Update 2011b). The update assessment determined the gray triggerfish rebuilding plan initiated in Reef Fish Amendment 30A (GMFMC 2008) was not on target. Therefore, this amendment is needed to ensure the gray triggerfish stock rebuilds within 10 years of the rebuilding plan start, which ends in 2017. The management measures proposed in this amendment are expected to prevent future overfishing and to achieve optimum yield. Impacts to the physical, biological, economic, and social environments from the proposed management actions are summarized below. Detailed analyses and discussion of these impacts are provided in Chapter 4.

The Gulf of Mexico Fishery Management Council (Council) modified the rebuilding plan based on a constant fishing mortality rate that does not exceed the fishing mortality rate at optimum yield. This reduction in fishing mortality is projected to rebuild the stock in 5 years or by 2016. The Council requested an interim rule at their April 2012 meeting to end overfishing by reducing sector annual catch limits (ACLs) and annual catch targets (ACTs) until long-term management measures established in this amendment can be implemented. The interim rule was implemented in late May; therefore, the first year of the revised rebuilding plan is 2012. To end overfishing and achieve this revised rebuilding plan, the commercial and recreational ACTs were reduced by 43% and 46%, respectively, from no action. These are the same sector ACTs as implemented through the interim rule. The effectiveness of this revised rebuilding plan will be unknown until completion of the next benchmark assessment, currently scheduled in 2015.

The effects of the proposed modifications to the rebuilding plan and decreases in the commercial and recreational ACLs and ACTs on the physical and biological environments may impact fishing effort in a variety of ways. For the physical environment, reduced effort generally means less interaction of fishing gear with the bottom and associated habitat and could reduce the impacts from fishing. In the biological environment, reduced effort could result in fewer removals allowing the stock to recover more quickly. However, reducing effort on one stock can also result in shifts in effort to other reef fish species. Decreasing the commercial gray triggerfish ACT by 45,100 lbs whole weight (ww) relative to no action, would potentially result in losses in annual ex-vessel revenues estimated at $42,845. Decreasing the recreational gray triggerfish ACT by 187,000 lbs ww relative to the no action alternative is expected to result in reductions in consumer and producer surplus estimated at approximately $1.060 million and $0.283 million, respectively. Generally, short-term social impacts will result from the reduced ACLs and ACTs, because it is likely that the accountability measures (AMs) will be triggered sooner, shortening the fishing season and restricting the amount of gray triggerfish that may be kept on fishing trips. These impacts are expected to be mitigated over the long-term by a rebuilt gray triggerfish stock and a corresponding greater ACL.

The Council selected two commercial management measures. The first would establish a trip limit of 12 gray triggerfish, slowing harvest and potentially extending the fishing season. The

second would establish a fixed closed season from June 1 through July 31 during peak spawning. These combined management measures are not expected to constrain landings which could exceed the ACT by 25,527-lbs ww and would likely result in an early in-season closure in the fall prior to December 31. Because the combined effects of the two commercial sub-actions do not meet the necessary reductions, they are expected to provide fewer beneficial effects to the physical and biological environment compared to the combinations of alternatives that meet the necessary reductions. It is unknown how effort will shift in response to the implementation of a fixed closed season and trip limit because gray triggerfish is a component of the reef fish fishery and is not a targeted species.

For the economic and social environments, the Council's preferred combination of commercial management measures would be expected to result in a reduction in ex-vessel values estimated at $87,651. However, this combination of alternatives would not be expected to constrain landings below the selected ACT. Therefore, should the Council's preferred combination be implemented, an additional closure of the gray triggerfish component of the commercial reef fish fishery would be required after the commercial ACT is met. The selected commercial management measures are ways to reduce landings to avoid triggering an in-season closure, which is regarded as more disruptive to fishing behavior. Gray triggerfish is not a directed target species but rather, is caught alongside other more economically valuable species. Nevertheless, gray triggerfish makes up a portion of a multi-species fishing trip. Establishing a commercial trip limit would only impact fishermen who land more than 12 gray triggerfish on a trip, yet could benefit commercial fishermen as a whole by allowing the season to remain open longer. Approximately one quarter of commercial trips from 2009 through 2011 landed more than 12 gray triggerfish on a single trip. Adoption of a two-month closed season will also reduce landings, forestalling an in-season closure. Because the combined trip limit and closed season are not expected to constrain landings below the ACT, an in-season closure is still likely to occur before the end of the year.

The Council has selected two recreational management measures. The first would establish a fixed closed season from June 1 through July 31 during peak spawning which is consistent with the proposed commercial sector closure. The second is to establish a 2-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit. The recreational model projections indicate these combined management measures meet the necessary reduction in the ACT. Because the combined effects of the two recreational sub-actions meet the necessary reductions they are expected to provide the greatest positive effects on the physical and biological environments. Relative to the no action alternative, the Council's preferred combination of alternatives would be expected to result in landings reductions of 205,666 lbs ww, which would be expected to generate short-term losses in consumer and producer surplus estimated at $1.16 million and $0.31 million, respectively. The selected recreational management measures are expected to reduce landings to avoid triggering an in-season closure when the ACT is reached. An in-season closure is generally more disruptive to fishing behavior than established management measures which are known in advance. Modifying the number of gray triggerfish to two within the aggregate reef fish bag limit is expected to affect a small proportion of anglers, as few anglers keep more than two gray triggerfish on a single fishing trip. Implementing the proposed closed season will impact more anglers as the summer months are a time of peak

fishing effort. Nevertheless, these measures for the recreational sector are expected to constrain landings below the ACT, thereby avoiding a disruptive in-season closure.

This amendment also modifies the recreational AMs by establishing in-season closure authority for gray triggerfish based on the recreational ACT as well as a post-season overage adjustment that will be applied if the ACL is exceeded and the gray triggerfish stock is overfished. The in-season closure authority will act as the AM and is expected to provide beneficial effects to the physical and biological environment due to better monitoring during the recreational fishing season by lowering the probability of exceeding the ACL. Further, if the ACL is exceeded an overage adjustment will be applied, reducing the ACL and ACT the following year by the amount of the overage. The establishment of an overage adjustment would be expected to reduce fishing opportunities and therefore, would result in adverse short-term socio-economic effects. However, long-term beneficial effects on the socio-economic environment are expected from the enhanced protection afforded to gray triggerfish.

CHAPTER 1. INTRODUCTION

1.1 Background and Status of the Gray Triggerfish Stock

Gray triggerfish (*Balistes capriscus*) is one of 31 reef fish species in the management unit for the Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico. The FMP provides management for reef fish species in the federal waters of the Gulf of Mexico.

Gray triggerfish is caught throughout the Gulf of Mexico, but landings east of the Mississippi River are greater than in the western Gulf of Mexico (SEDAR 9 Update 2011b). Landings in the last eleven years, from 2001 through 2011, have increased and peaked in 2004 at almost 1,200,000 pounds whole weight (lbs ww) (Figure 1.1.1). Landings declined after 2004 to just under 500,000 lbs ww in 2008 and 2009 and decreased to around 350,000 lbs ww in 2010. In 2011, landings increased to 564,000 lbs ww (Figure 1.1.1).

Annual Catch Limits
The amount of fish that can be harvested from the stock each year.

Annual Catch Targets
A harvest level set lower than the annual catch limit to create a buffer so that overharvest does not occur.

Accountability Measures
Measures taken to prevent harvest from exceeding the annual catch limit and, if exceeded, can mitigate or correct the overage.

A benchmark stock assessment was conducted in 2006 for the Gulf of Mexico gray triggerfish stock (SEDAR 9 2006a). A benchmark assessment evaluates all known data sources, reviews all input data, considers different modeling approaches, and evaluates all past assessment decisions. The assessment used the two scenarios of a Stock Production Model Incorporating Covariates and the State-Space Age-Structured Production Model (SSASPM). The assessment results indicated the stock was both overfished and experiencing overfishing (SEDAR 9 2006a). In October 2006, National Marine Fisheries Service (NMFS) sent a letter to the Gulf of Mexico Fishery Management Council (Council) formally informing them that the gray triggerfish stock was overfished and experiencing overfishing. This required that the Council take action to end overfishing and develop a rebuilding plan.

Given the status of the stock, Reef Fish Amendment 30A (GMFMC 2008) put in place a stock rebuilding plan beginning in 2008 as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Commercial and recreational annual catch targets (ACTs[1]), annual catch limits (ACLs), and accountability measures (AMs) were also established in Amendment 30A. The sector-specific ACTs and ACLs are shown in Table 1.1.1. For the commercial sector, the in-season AM would close the fishing season within the year after the ACT (quota) is estimated to be met. For the recreational sector, if the ACL is exceeded, the

[1] Because this amendment was developed before the new National Standard 1 guidelines (74 FR 3178) were published, the Council used the term target total allowable catch to describe what are now referred to as ACTs.

post-season AM is to shorten the length of the fishing season the next year to the length estimated to land the ACT.

Since the implementation of Amendment 30A in 2008 the commercial sector has not exceeded either their ACT or ACL (Table 1.1.1). However, this has not been the case for the recreational sector. In 2008, gray triggerfish landings exceeded the ACT by 27% and ACL by 6% (Table 1.1.1). The recreational AMs were not applied due to the 2008 recreational ACL being exceeded by a small percentage and the 2008 ACL overage was not determined until later in 2009. Further, Amendment 30A had become effective late in 2008, thus new regulations were only in effect for a short period of time (GMFMC 2008). Landings projections indicated that increasing the minimum size limit to 14 inches fork length was sufficient to constrain the recreational harvest to less than the ACL without the need to shorten the recreational fishing season. In 2009, the recreational sector exceeded the ACT, but not the ACL. Recreational and commercial landings were much lower in 2010 and remained below the ACT and ACL. The limited landings in 2010 could be due to fisheries closures that were put in place as a result of the Deepwater Horizon MC252 oil spill. Information on the oil spill and the subsequent closures can be found on the Southeast Regional Office's website: (http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm). In 2011, the commercial landings of gray triggerfish were almost double those from 2010, but remained below the ACT and the ACL (Table 1.1.1). Recreational landings of gray triggerfish in 2011 also increased from 2010, but remained below the ACT and ACL based on the multi-year moving average of landings (Table 1.1.1). If the multi-year moving average of landings had not been used, the 2011 ACL would have been exceeded by 5,000 lbs ww, a 1% overage (Table 1.1.1).

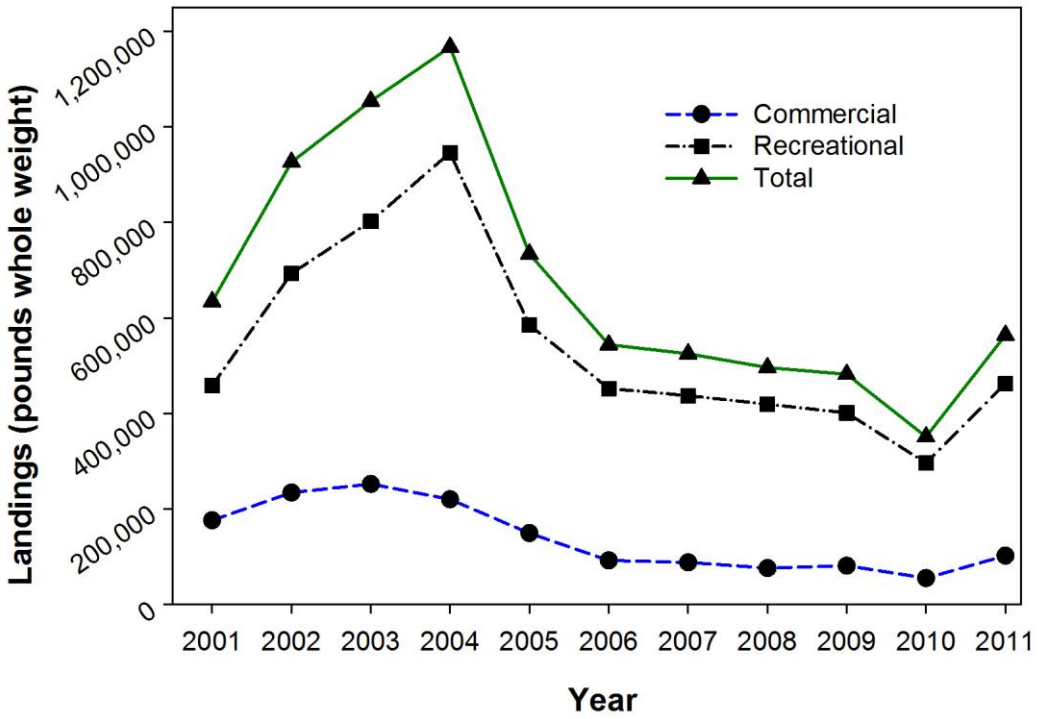

Figure 1.1.1. Gulf of Mexico gray triggerfish recreational, commercial, and total landings in pounds whole weight from 2001 through 2011. Source: SEDAR 9 Update 2011b and SERO-Annual Catch Limits dataset for 2011 landings.

Table 1.1.1. Gulf of Mexico harvest, ACTs, and ACLs for gray triggerfish during the first four years of the rebuilding plan. The ACLs for 2009 and beyond are based on an average of the F_{OY} yield streams as established in Amendment 30A (GMFMC 2008). Recreational landings were based on a multi-year moving average of harvest for comparison to the ACL for that year. Landings are reported in pounds whole weight.

	Recreational			Rec. Landings	Commercial		
Year	Harvest	ACT	ACL	Moving Average	Harvest	ACT (Quota)	ACL
2008	419,000	306,000	394,000	419,000	76,000	80,000	105,000
2009	401,000	356,000	426,000	410,000	81,000	93,000	122,000
2010	296,000	405,000	457,000	372,000	55,000	106,000	138,000
2011	462,000	405,000	457,000	386,000	102,000	106,000	138,000

Source: SEDAR 9 Update 2011b, Amendment 30A (GMFMC 2008), and SERO 2012.

An update stock assessment was conducted in 2011 for Gulf of Mexico gray triggerfish (SEDAR 9 Update 2011b). This type of assessment (i.e., update) adds additional data to the original benchmark assessment to update population estimates. The same assessment model (SSASPM model) from the 2006 gray triggerfish benchmark assessment (SEDAR 9 2006a) was applied and three scenarios were explored that re-run the same model with: 1) updated landings, catch-per-unit-effort series including 2010, and updated indices of abundance; 2) additional updated age-length information; and 3) updated shrimp trawl bycatch and effort data.

The Council's Scientific and Statistical Committee (SSC) reviewed the 2011 Update Assessment and accepted the second and third model scenarios listed above that used the updated age and length data and the shrimp trawl bycatch and effort data. The status determination criteria (Table 1.1.2) and the estimated rebuilding timeframes are based on future recruitment adhering to maximum sustainable yield (MSY) proxy. The MSY proxy is defined as the fishing mortality rate at 30% spawning potential ratio ($F_{30\%\ SPR}$). Future yields are normally based on recruitment projections that depend in part on the spawner-recruit curve developed in the assessment. However, in recent years, gray triggerfish recruitment has been at low levels relative to the spawner-recruit curve (SEDAR 9 Update 2011b). The reason for this low recruitment is unknown. Further, it is unknown whether recruitment in the near future will remain at these low levels or revert back to the levels projected by the spawner-recruit curve. Due to this uncertainty, the SSC set the acceptable biological catch (ABC) based on a low recruitment time period (i.e., 2005 through 2009) for 2012 and 2013 of 305,300 lbs ww (http://gulfcouncil.org/resources/SSC_Reports.php). The corresponding overfishing limit defined by the SSC was the yield at $F_{SPR30\%}$, equal to 401,600 lbs ww for these years.

Spawning Potential Ratio (SPR)

The spawning potential ratio assumes that a certain amount of fish must survive and spawn in order to replenish the stock.

The spawning potential ratio is calculated as the average number of eggs per fish over its lifetime when the stock is fished compared to the average number of eggs per fish over its lifetime when the stock is not fished.

Results from the update stock assessment showed that the gray triggerfish stock is continuing to experience overfishing. The current (2010) fishing mortality rate exceeds the maximum fishing mortality threshold (MFMT; Table 1.1.2). In addition, the stock is considered overfished. The current spawning stock biomass (SSB) in 2010 is below the minimum stock size threshold (MSST; Table 1.1.2). Egg production was used to estimate SSB. In March 2012, NMFS informed the Council of the status of the gray triggerfish stock[2].

Table 1.1.2. Status determination criteria and stock status of gray triggerfish SEDAR 9 Update 2011 accepted by the SSC (i.e., including shrimp effort, average bycatch, new age-length data, and recreational landings in numbers instead of pounds). The highlighted rows indicate gray triggerfish stock status as overfished ($SSB_{CURRENT}$/MSST) and experiencing overfishing ($F_{CURRENT}$/MFMT).

Criteria	Definition	Value
Mortality Rate Criteria		
F_{MSY}	$F_{30\%\ SPR}$	0.34
MFMT	$F_{MSY\ proxy}$	0.34
F_{OY} proxy	75% of $F_{30\%\ SPR}$	0.25
$F_{CURRENT}$ (2010)	2010	0.35
$F_{CURRENT}$/MFMT	**30% SPR proxy**	**1.04**
Base M	M	0.27
Biomass Criteria		
$SSB_{MSY\ proxy}$ (egg production)	Equilibrium egg production @$F_{30\%SPR}$	1.78E+12
MSST (egg production)	(1-M)*SSB30% SPR :M=0.27	1.30E+12
$SSB_{CURRENT}$ (2010)	2010	6.90E+11
$SSB_{CURRENT}$/MSST	**$SSB_{MSY\ proxy}$**	**0.53**
Equilibrium MSY (lbs ww)	Equilibrium Yield @ $F_{30\%\ SPR}$	984,410
Equilibrium OY proxy (lbs ww)	Equilibrium Yield @ 75%*$F_{30\%SPR}$	916,400

[2] March 13, 2012, letter from Roy Crabtree, Regional Administrator, Southeast Regional Office to Robert Gill, Chairman, Gulf of Mexico Fishery Management Council.

In response to this letter, the Council requested an interim rule for gray triggerfish be prepared for their April 2012 Council meeting that would reduce the recreational ACL to 241,200 lbs ww and recreational ACT to 217,100 lbs ww. The commercial ACL was reduced to 64,100 lbs ww and the commercial ACT (quota) was reduced to 60,900 lbs ww. The interim rule also established in-season closure authority for the recreational sector based on the ACT. Therefore, if the recreational gray triggerfish ACT is reached or projected to be reached within a fishing year, the Assistant Administrator for Fisheries can close the recreational sector from harvesting gray triggerfish the rest of the year (http://sero.nmfs.noaa.gov/fishery_bulletins/index.html). Amendment 30A (GMFMC 2008) had already established in-season closure authority for the commercial sector based on the ACT (quota). The interim rule is intended to reduce overfishing until long-term management measures in this amendment can be established.

Following the implementation of the interim rule in May 2012, the recreational sector was closed on June 11 and the commercial sector was closed on July 1. Preliminary landings data through October 9, 2012, from the Southeast Fisheries Science Center indicate 72,341 lbs of gray triggerfish has been landed by the commercial sector (SERO 2012 Gulf of Mexico Commercial Landings website: (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/commercial_gulf/index.html). Thus, the commercial overage is estimated to be 8,241 lbs ww (20%) over the 64,100 lbs ww ACL. For the recreational sector, preliminary landings (as of October 15, 2012) indicate 241,669 lbs ww have been caught by the recreational sector and these landings are 469 lbs ww above the recreational sector's ACL of 241,200 lbs ww (SERO 2012 Gulf of Mexico Recreational Landings and Annual Catch Limit website: (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/recreational_gulf/index.html).

1.2 Purpose and Need

The purpose of this amendment is to establish management measures that will end overfishing of gray triggerfish and rebuild the stock by 2017. The need for this action is established by the Magnuson-Stevens Act which requires NMFS and the regional fishery management councils to prevent overfishing, and achieve, on a continuing basis, the optimum yield from federally managed fish stocks.

Purpose for Action

To end overfishing of gray triggerfish and rebuild the stock by 2017.

Need for Action

To ensure regulations prevent future overfishing and achieve optimum yield from the fishery.

1.3 History of Management

The following summary describes management actions that affect the reef fish fishery in the Gulf of Mexico. The summary focuses on the management of grouper stocks in general, and in particular, the management of gray triggerfish in the **Fishery Management Plan** (**FMP) for the Reef Fish Resources of the Gulf of Mexico**. More information on the FMP can be obtained from the Council at http://www.gulfcouncil.org/fishery_management_plans/index.php.

Status in the fishery management unit:

Management measures from the initial **FMP** [with its associated environmental impact statement (EIS)] were implemented in November 1984. The original list of species included in the management unit consisted of snappers, groupers, and sea basses. Gray triggerfish was in a second list of species included in the fishery, but not in the management unit. This designation was for species not considered to be targeted because they were generally taken incidentally. Their inclusion in the Reef Fish FMP was for purposes of data collection, and their take was not regulated. Species including gray triggerfish were added to the fishery management unit through **Amendment 1** [with its associated environmental assessment (EA), regulatory impact review (RIR), and regulatory flexibility analysis (RFA)] in 1990.

Stock status determination criteria:

Management measures from **Amendment 1** (implemented in 1990) had a primary objective to stabilize long-term population levels of all reef fish species by establishing a spawning age survival rate to achieve at least 20% spawning stock biomass per recruit (SSBR), relative to the SSBR that would occur with no fishing. A framework procedure for the specification of the total allowable catch was created to allow for annual management changes. Measures in the **Generic Sustainable Fisheries Act Amendment** (with its associated EA, RIR, and RFA), were partially approved and implemented in November 1999. This amendment set the MFMT for gray triggerfish at $F_{30\%\ SPR}$. Estimates of the MSY, MSST, and optimum yield (OY) were disapproved because they were based on spawning potential ratio proxies rather than biomass based estimates. **Amendment 30A** (supplemental EIS/RIR/RFA) was developed in part to stop overfishing of gray triggerfish and rebuild the overfished stock. The amendment established the MSY, MSST, and OY status determination criteria disapproved in the **Generic Sustainable Fisheries Act Amendment**, and set ACLs and AMs (AMs) that were implemented in August 2008. Management measures from the **Final Generic ACL/AM Amendment for the Gulf of Mexico fishery Management Council's Red Drum, Reef Fish, Shrimp, Coral and Coral Reefs Fishery Management Plans (Generic ACL/AM Amendment)** (EIS/RIR/RFA) were implemented in January 2012. Although ACLs and AMs for gray triggerfish had been set in **Amendment 30A**, the **Generic ACL/AM Amendment** also established an ABC control rule, ACL/ACT control rule, and revised the framework procedures.

Allocation:

Amendment 1 provided a framework procedure for specifying the total allowable catch that was implemented in 1990. The framework procedure specified that allocations between the

commercial and recreational sectors were based on historical landing percentages from average landings during 1979-1987. This represented the total period for which both commercial and recreational landings data were available. However, this did not preclude the use of a plan amendment to set allocations using different criteria. The Council revised the allocation for gray triggerfish in 2008, on an interim basis, in **Amendment 30A** based on 2001-2004 landings. The allocation was set at 21% commercial and 79% recreational.

Bag limits:

Management measures from **Amendment 12** (with its associated EA and RIR) were implemented in January 1997. The management measures included the creation of an aggregate bag limit of 20-reef fish for all reef fish species not having a bag limit. Gray triggerfish were included in this aggregate bag limit.

Minimum size limits:

Amendment 16B established a 12-inch total length minimum size, which became effective in 1999. To assist fishermen in measuring gray triggerfish, the size limit was changed from total to fork length in **Amendment 30A** (implemented in August 2008). Amendment 30A also increased the minimum size limit to 14-inches fork length in as part of a rebuilding plan to end overfishing and allow the stock to recover.

Commercial quota:

Management measures from **Amendment 30A** established a commercial quota as part of the gray triggerfish rebuilding plan. This measure went into effect in August 2008.

Commercial permits:

Commercial reef fish permits were established through **Amendment 1** in 1990. **Amendment 4** (with its associated EA and RIR) established a moratorium on the issuance of new reef fish permits for a maximum period of three years. This moratorium was extended in **Amendments 9** (with its associated EA and RIR, rule implemented in July 1994), **11** (with its associated EA and RIR, rule implemented in January 1996), and **17** (with its associated EA and RIR) rule implemented in August 2000). It was extended indefinitely in **Amendment 24** [with its EA, RIR, and RFA), rule implemented in August 2005]. Rulemaking from **Amendment 14** (EA/RIR/RFA), implemented in March and April 1997, provided for a ten-year phase-out for the fish trap fishery, allowed transfer of fish trap endorsements for the first two years, and prohibited the use of fish traps west of Cape San Blas, Florida.

For-hire permits:

For-hire reef fish permits were put in place through **Amendment 11** in January 1997. Management measures from **Amendment 20** (with its associated EA, RIR, and RFA) were implemented in June 2003 to establish a three-year moratorium on the issuance of new charter and headboat vessel permits for Gulf of Mexico reef fish to limit further expansion in the for-hire

fisheries while the Council considered the need for more comprehensive effort management systems. This moratorium was replaced by a permanent limited entry system by actions in **Amendment 25** (with its supplemental EIS, RIR, and RFA) which was effective in June 2006.

CHAPTER 2. MANAGEMENT ALTERNATIVES

2.1 Action 1 - Modify the Gray Triggerfish Rebuilding Plan

Alternative 1: No Action - Maintain the gray triggerfish rebuilding plan at a constant fishing mortality rate defined as fishing mortality at optimum yield (F_{OY}) from the 2006 benchmark assessment and implemented in Amendment 30A.

Alternative 2: Modify the rebuilding plan based on a constant fishing mortality rate equal to zero (F = 0).

Preferred Alternative 3: Modify the rebuilding plan based on a constant fishing mortality rate that does not exceed the fishing mortality rate at optimum yield.

Alternative 4: Modify the rebuilding plan based on constant fishing mortality rate that does not exceed the fishing mortality at maximum fishing mortality threshold (MFMT).

Note: The modifications to the rebuilding plan are assumed to begin in 2012 based on the results of the SEDAR 9 Update 2011 and approval of the 2012 interim rule for gray triggerfish (http://sero.nmfs.noaa.gov/bulletins/pdfs/2012/FB12-034_Gray_Triggerfish_Comment.pdf). All the alternatives assume that the 2012 harvest will be restricted to the acceptable biological catch (ABC) of 305,300 lbs ww. However, preliminary information (see Section 1.1) indicates the 2012 ABC has been exceeded by 8,710 lbs ww. Most of this overage (95%) comes from the commercial sector and will be compensated for with an overage adjustment as per the commercial accountability measures (AMs).

Discussion:

This action evaluates different fishing mortality rates and resulting time periods to rebuild the gray triggerfish stock. The stock needs to be rebuilt to a size that can support harvesting the maximum sustainable yield (MSY). For gray triggerfish, the yield at the fishing mortality rate (F) that can support a 30% spawning potential ratio (SPR), or the yield at $F_{30\%\ SPR}$ is used as a proxy for MSY. This F value is the MFMT used in **Alternative 4**. Harvesting gray triggerfish at less than or equal to $F_{30\%\ SPR}$ yields would have a 50% or better probability of rebuilding the stock within the 10-year period, or by 2017. To account for uncertainty in stock dynamics, current stock status, and recruitment variability, Restrepo et al. (1998) suggest that rebuilding plans should be designed to possess a 50% or higher chance of achieving the biomass target with the proposed rebuilding time period.

Alternative 1 is based specifically on the rebuilding projections from the 2006 benchmark assessment (SEDAR 9 2006a) and would continue the rebuilding plan established through Amendment 30A (GMFMC 2008). When this plan was developed, projections indicated the stock could recover in 6 years, or by 2013. However, the maximum time period to rebuild the stock was 10 years, or by 2017. The 2011 update assessment indicated the stock was still overfished and undergoing overfishing (SEDAR 9 Update 2011b). Additionally, it indicated that inadequate progress has been made to rebuild the stock. The National Marine Fisheries Service

(NMFS) informed the Gulf of Mexico Fishery Management Council (Council) of this determination in a March 12, 2012, letter. If the Council were to do nothing, the rebuilding plan would not meet the requirements at §304(e)(3) and (4) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). This part of the Magnuson-Stevens Act requires the Council to end overfishing immediately and revise the stock rebuilding plan to allow the stock to recover within the allowable time period. In addition, National Standard 2 of the Magnuson-Stevens Act requires that conservation and management measures be based on the best scientific information available, which is the Southeast Data, Assessment, and Review (SEDAR) 9 Update (2011b). Therefore, selecting **Alternative 1** would be contrary to the obligations of the Council.

Alternatives 2-4 are based on the more recent SEDAR Update Assessment (SEDAR 9 Update 2011b). As noted in the discussion of **Alternative 1**, the rebuilding plan was implemented in 2008, and has therefore been in effect for four years (through 2011). The additional time needed for the stock to recover was determined by using the average recruitment of the spawner-recruit curve developed in the assessment. As the stock size gets larger, the spawner-recruit curve is expected to change from the recent low spawner-recruit level that the Council's Scientific and Statistical Committee (SSC) used to recommend the ABC, to the long-term average spawner-recruit level (see Section 1.1 for more information on the spawner-recruit curves). Table 2.1.1 provides the rebuilding times for these alternatives assuming the 2012 harvest will be limited to 305,300 pounds whole weight (lbs ww).

Alternative 2 establishes an F of zero (harvest prohibited) from 2013 through 2015. This alternative would mean the gray triggerfish stock is expected to rebuild in approximately four years from 2012 (Table 2.1.1). This is the minimum time the stock is expected to rebuild if all sources of fishing mortality (including discard mortality) were eliminated. It would require a complete closure of the gray triggerfish component of the reef fish fishery from 2013 to 2015. Unlike other reef fish species, gray triggerfish is considered hardy and less susceptible to discard mortality (SEDAR 9 2006a). Therefore, this alternative could be feasible for rebuilding the stock. For other reef fish species, discard mortality is greater and so alternative measures to reduce bycatch within different sectors would need to be considered for a rebuilding plan where F is zero to work.

Preferred Alternative 3 and **Alternative 4** are similar because both use a strategy that holds F constant to rebuild the stock. Consequently, as the stock recovers (the population increases), the amount of fish that can be harvested also increases. Where **Preferred Alternative 3** and **Alternative 4** differ is in the maximum level of F that can be used to set the yields. **Preferred Alternative 3** uses F_{OY} when the stock has recovered and is at equilibrium levels. The projected time from 2012 to rebuild the stock for this alternative is 5.0 years (Table 2.1.1). **Alternative 4** would cap the F at the MFMT, which, if exceeded, would result in overfishing. This alternative is projected to rebuild the stock in 6.3 years from 2012. Because the F in **Preferred Alternative 3** is less than the F in **Alternative 4**, **Preferred Alternative 3** is more conservative than **Alternative 4**. Because **Alternative 4** would not rebuild the stock until 2018, it would exceed the 10-year rebuilding time period of 2008-2017. **Preferred Alternative 3** is consistent with Reef Fish Amendment 30A's AMs that use the yield associated with F_{OY} as the annual catch target.

Table 2.1.1. Rebuilding times from 2012 of the gray triggerfish stock to the spawning stock biomass associated with harvesting at the fishing mortality rate associated with a 30% spawning potential ratio given the revised rebuilding plan begins in 2012 with an allowable biological catch of 305,300 lbs ww.

Alternative	Fishing mortality (F) associated with rebuilding	Rebuilding time (years)
Alternative 2	F = 0	4.1
Preferred Alternative 3	$\mathbf{F_{OY}}$	**5.0**
Alternative 4	F_{MFMT}	6.3

Note: Table shows corresponding time to rebuild gray triggerfish based on the assumption that future recruitment will fluctuate about the level predicted by the average spawner-recruit relationship.

2.2 Action 2 - Establish Annual Catch Limits and Annual Catch Targets for Gray Triggerfish

The current sector allocations for gray triggerfish are 21% commercial and 79% recreational as established in Reef Fish Amendment 30A.

Alternative 1: No Action – do not modify the gray triggerfish sector annual catch limits (ACLs) and annual catch targets (ACTs) from what was developed in Amendment 30A and is in effect after the 2012 interim rule expires.

ABC	Commercial ACL	Recreational ACL
659,000 lbs ww	138,000 lbs ww	457,000 lbs ww
	Commercial ACT (quota)	**Recreational ACT**
	106,000 lbs ww	405,000 lbs ww

Alternative 2: Set sector ACLs and ACTs for gray triggerfish at zero pounds until a new stock assessment has been completed.

Alternative 3: Use Amendment 30A to determine the sector allocation and buffers between the ACLs and ACTs. Based on an ABC = 305,300 lbs ww, set the commercial ACL = 64,100 lbs ww (21% of the ABC) and the recreational ACL = 241,200 lbs ww (79% of the ABC) consistent with the sector allocations established in Amendment 30A. Set the commercial and recreational ACTs using the Amendment 30A buffers. The commercial ACT = 49,400 lbs ww (commercial ACL reduced by 23%) and the recreational ACT = 188,100 lbs ww (recreational ACL reduced by 22%).

ABC	Commercial ACL	Recreational ACL
305,300 lbs ww	64,100 lbs ww	241,200 lbs ww
	Commercial ACT (quota)	**Recreational ACT**
	49,400 lbs ww	188,100 lbs ww

Preferred Alternative 4: Use Amendment 30A to determine the sector allocation and the Council's ACL/ACT control rule to determine the buffers between the ACLs and ACTs. Based on an ABC = 305,300 lbs ww, set the commercial ACL = 64,100 lbs ww (21% of the ABC) and the recreational ACL = 241,200 lbs ww (79% of the ABC) consistent with the sector allocations established in Amendment 30A. The commercial ACT = 60,900 lbs ww (commercial ACL reduced by 5%) and the recreational ACT = 217,100 lbs ww (recreational ACL reduced by 10%) based on the ACL/ACT control rule buffers for each sector.

ABC	Commercial ACL	Recreational ACL
305,300 lbs ww	64,100 lbs ww	241,200 lbs ww
	Commercial ACT (quota)	**Recreational ACT**
	60,900 lbs ww	217,100 lbs ww

Discussion:

Alternative 1, no action, would maintain the gray triggerfish sector ACLs and ACTs as defined in Amendment 30A (GMFMC 2008). Selection of this alternative as preferred would be inconsistent with the Magnuson-Stevens Act and the current National Standard (NS) 1 and 2 guidance, because the current total of the commercial and recreational ACLs (595,000 lbs ww) exceeds the SSC's ABC recommendation for 2012 and 2013 (305,300 lbs ww). The SSC modified their ABC recommendation after reviewing the SEDAR 9 Update (2011b). As established in Amendment 30A, the SSC's recommendation for ABC is equal to the yield stream at F_{OY}. **Alternative 1** would allow overfishing and slow the recovery of the stock.

Alternative 2 would set the ACL at zero. Because NS 1 guidance says the ACT must be less than or equal to the ACL, the ACT in this alternative would also be zero. This alternative is consistent with **Action 1**, **Alternative 2** that modifies the rebuilding plan so there is no gray triggerfish harvest until the stock is rebuilt. This modified rebuilding plan is the most conservative and projects the gray triggerfish stock to be rebuilt within in approximately four years of implementation. Note that by selecting **Alternative 2** as preferred, the multi-year averaging of the recreational allocation of the F_{OY} yields used to set the recreational ACLs in Amendment 30A would be replaced. Future recreational ACLs would be based on the recreational allocation of each year's ABC.

Amendment 30A established both ACLs and ACTs for gray triggerfish. **Alternative 3** would use the revised ABC to set the sector ACLs based on the Amendment 30A sector allocations. This allocation was based on landings for each sector from 2000 to 2004. The resulting gray triggerfish allocation was 21% commercial and 79% recreational. By applying the allocation to the ABC, sector ACLs would be 64,100 lbs ww and 241,200 lbs ww, respectively.

The buffer between the ACL and ACT for the recreational sector in Amendment 30A was based on the estimated harvest reduction of the yield from fishing at F_{OY} and the reduction in harvest by increasing the recreational minimum size limit to 14-inches fork length (FL) (GMFMC 2008). The Council selected this minimum size limit because it met the objectives of the rebuilding plan and was favored by the recreational sector. This resulted in an ACT that was 22% below the ACL (Table 2.2.1). To achieve similar reductions between sectors in setting ACTs, the Council selected a 23-24% buffer in setting the commercial quota (Table 2.2.1). By applying these buffers to the ACLs listed in **Alternative 3,** the recreational ACT would be 188,100 lbs ww and the commercial ACT would be 49,400 lbs ww.

Table 2.2.1. The ABC and commercial and recreational ACLs and ACTs. Percent reduction is calculated for each sector by comparing the ACLs to the ACTs. Yields are in pounds whole weight.

		Recreational			Commercial		
Year	**ABC**	**Yield at F_{OY}**	**ACT**	**Percent reduction**	**ACL**	**ACT**	**Percent reduction**
2008	499,000	394,000	306,000	22	105,000	80,000	24
2009	580,000	458,000	356,000	22	122,000	93,000	24
2010	659,000	521,000	405,000	22	138,000	106,000	23

Note: The values listed as the recreational ACL are based on 79% of the ABC which was based on F_{OY} yields for the stock in the Amendment 30A rebuilding plan. The actual ACLs listed in Amendment 30A were based on averages after the first year (GMFMC 2008). For 2008, it was the recreational F_{OY} yield (ACL = 394,000 lbs ww), 2009 it was the 2-year average of 2008 and 2009 recreational F_{OY} yields (ACL = 426,000 lbs ww), and 2010 and subsequent years, it was a three-year average of recreational F_{OY} yields (ACL = 457,000 lbs ww) based on the average of 2008-2010 F_{OY} yields.

The Council established an ACL/ACT control rule in the Generic ACL/AM Amendment (GMFMC 2011a). This control rule was developed so the Council could objectively and efficiently assign ACLs and ACTs that take into account management uncertainty. The rule uses different levels of information about landing levels, stock management practices, and data quality. This information is then used to assign levels of reduction from the ABC to account for uncertainty in setting either the ACLs or ACTs.

The same allocation of the ABC used for **Alternative 3** was used for **Preferred Alternative 4**. Therefore, the ACLs are the same between the two alternatives. As with **Alternative 2**, the multi-year averaging of the recreational allocation of the F_{OY} yields used to set the recreational ACLs in Amendment 30A would also cease and the recreational ACLs would be based on the recreational allocation of each year's ABC. **Preferred Alternative 4** differs from **Alternative 3** in setting the buffer between the ACL and ACT. The buffers using the ACL/ACT control rule were 5% for the commercial sector and 10% for the recreational sector (see Appendices A and B, respectively). Because the buffers are less than the **Alternative 3** buffers, the **Preferred Alternative 4** ACTs are greater than the **Alternative 3** ACTs. The **Preferred Alternative 4** recreational ACT would be 217,100 lbs ww and the commercial ACT would be 60,900 lbs ww.

The buffers proposed in **Preferred Alternative 4**, at least for the commercial sector, may be insufficient to keep the ACL from being exceeded. Although this alternative is consistent with the measures implemented in a 2012 interim rule setting gray triggerfish ACLs and ACTs (NMFS 2012), the 2012 commercial ACL has been exceeded. Preliminary landings data through July 30, 2012, from the Southeast Fisheries Science Center indicate 76,768 lbs ww of gray triggerfish has been landed by the commercial sector (SERO 2012 Gulf of Mexico Commercial Landings webpage: http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/commercial_gulf/index.html). So far, the overage of the 64,100 lbs ww ACL is 12,668 lbs (20%). After the landings are finalized, the overage will be deducted from the commercial 2013 ACT and ACL. Had the 23-24% buffer between the ACL and ACT proposed in **Alternative 3** been adopted, the ACL may

not have been exceeded because commercial gray triggerfish fishing would have been closed sooner. However, management measures in Actions 3.1 and 3.2 are designed slow down the gray triggerfish harvest and should allow NMFS to better monitor the landings. Thus, if the commercial management measures from Actions 3.1 and 3.2 are implemented, the likelihood of an overage in 2013 would be reduced.

Both **Alternative 3** and **Preferred Alternative 4** set a fixed ACL and ACT that will remain in place until changed by the Council in a future regulatory action. In **Action 1**, the preferred alternative is to set ABC based on F_{OY}, which would normally allow the ABC, along with ACL and ACT, to increase as the rebuilding plan progresses. However, for reasons discussed in Section 1.1, the SSC was unable to establish yield streams based on F values, and therefore, the SSC set a fixed ABC based on low recruitment. As the rebuilding plan progresses and the stock rebuilds, the fixed ABC, ACL, and ACT could have resulted in a more conservative landings level than would occur under an F_{OY} strategy if the SSC had been able to project a yield stream. This assumes that landings can be constrained to the ACLs and ACTs.

2.3 Action 3 - Commercial Management Measures

*** Note: A preferred alternative may be selected under each sub-action.**

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

Alternative 1: No Action – do not establish a fixed closed season for the commercial sector.
Preferred Alternative 2: Establish a fixed closed season for gray triggerfish during peak spawning (June 1 through July 31).
Alternative 3: Establish a fixed closed season for gray triggerfish during peak harvest (August 1 through December 31).
Alternative 4: Establish a fixed closed season for gray triggerfish (April 1 through August 31).

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

Alternative 1: No Action – do not establish a commercial trip limit for gray triggerfish.
Alternative 2: Establish a commercial trip limit of 6 gray triggerfish.
Preferred Alternative 3: Establish a commercial trip limit of 12 gray triggerfish.
Alternative 4: Establish a commercial trip limit of 18 gray triggerfish.

Discussion for Section 2.3: Action 3 - Commercial Management Measures

The commercial decision tool for gray triggerfish (SERO-LAPP Gulf Amendment 37 2012) was developed to allow the Council to examine a range of options after establishing ACLs and ACTs in Action 2. The commercial decision model for gray triggerfish provides estimates of total projected landings under the various management scenarios, but unlike other decision models, this one does not produce estimates of total removals. An estimate of total removals incorporates discard mortality. However, gray triggerfish is unlike many other reef fish species the Council manages, because this species is considered less susceptible to discard mortality. The assessments of this species determined discard mortality was minimal and discard mortality was modeled at 0% (SEDAR 9 2006a; SEDAR 9 Update 2011b). Following this assumption, discard mortality was modeled at 0% in the commercial decision tool (SERO-LAPP Gulf Amendment 37 2012).

The gray triggerfish commercial decision model estimates reductions in landings associated with various management measures (i.e., trip limits, size limits, and closed seasons) necessary to achieve the ACTs summarized in Action 2. Reductions in landings for trip limits and minimum size limits were determined using logbook and trip interview program data from 2009 through 2011. These reductions were applied to 2013 monthly projected commercial landings to determine how much harvest would be reduced by implementing new management regulations. The impacts of seasonal closures were modeled by converting the number of days closed into a percentage of days closed for a given month, and then applied the percentage to 2013 monthly

projected commercial landings. Projected 2013 landings were generated from a seasonal auto-regressive integrated moving average model (Box and Jenkins 1976), which uses a combination of historical landings data and past, present, and future exploitable abundances to predict future landings.

With regard to the model, the Deepwater Horizon MC252 oil spill is assumed to have caused gray triggerfish landings to decline because of fishing closures in 2010; however, the length and weight of gray triggerfish per trip from 2010 had similar distributions to 2009 and 2011. Therefore, 2010 data were included in the analysis. In addition, although the model could evaluate different size limit options as a way to reduce landings, the Council decided at their June 2012 meeting to maintain the 14-inch FL minimum size limit[3]. Therefore, the 14-inch FL size limit was held constant in the model runs when evaluating different season closure and trip limit alternatives.

The commercial decision tool does not account for effort shifting that may take place during season closures, nor does it consider any changes in the average size of gray triggerfish during rebuilding. Future fishing behavior is unknown and the model is based on past behavior and economic environments, but changes in effort and average size could affect the total number of pounds of gray triggerfish harvested. Further, the model also does not account for increases in numbers of trips taken to compensate for implemented effort controls such as trip limits and closed seasons for the same reasons. Therefore, it is unknown how the management measures considered in the model will impact commercial effort levels or catch-per-effort thereafter. As such, management reductions projected by the model may be overestimated, and caution should be taken in their interpretation and use.

<u>Discussion for Action 3.1</u>: Establish a Commercial Fixed Closed Season for Gray Triggerfish

Action 3.1 evaluates different fixed closed seasons for the commercial sector to rebuild the gray triggerfish stock. Figure 2.3.1.1 illustrates that gray triggerfish is landed throughout the year by the commercial sector and there is no discernible trend in monthly landings from 2008, 2009, and 2011. Landings were down in 2010 during the summer when much of the northern Gulf of Mexico was closed due to the Deepwater Horizon MC252 oil spill. Currently, the commercial sector closes if the harvest reaches or is projected to reach its ACT (quota). If a closure is necessary, the harvest of gray triggerfish would be prohibited until January 1 of the next year. This would continue if **Alternative 1** (no action) were selected as preferred.

Alternatives 2-4 would close different months of the year to achieve reductions in harvest. **Preferred Alternative 2** (June 1 through July 31) is estimated to achieve a 15% reduction in landings. **Alternative 3** (August 1 through December 31) is estimated to achieve a reduction of 46%, and **Alternative 4** (April 1 through August 31) is estimated to achieve a reduction of 42% (Table 2.3.1.1). These alternatives, by themselves, do not reduce gray triggerfish landings to the 60,900 lbs ww, which is the ACT selected by the Council in Action 2 (Preferred Alternative 4). Thus, unless additional management measures are selected in combination with the seasonal

[3] See Appendix C. Alternatives considered but rejected.

closures that achieve the needed harvest reductions, fishing for gray triggerfish would still close later in the year after the ACT is met per the commercial gray triggerfish AMs.

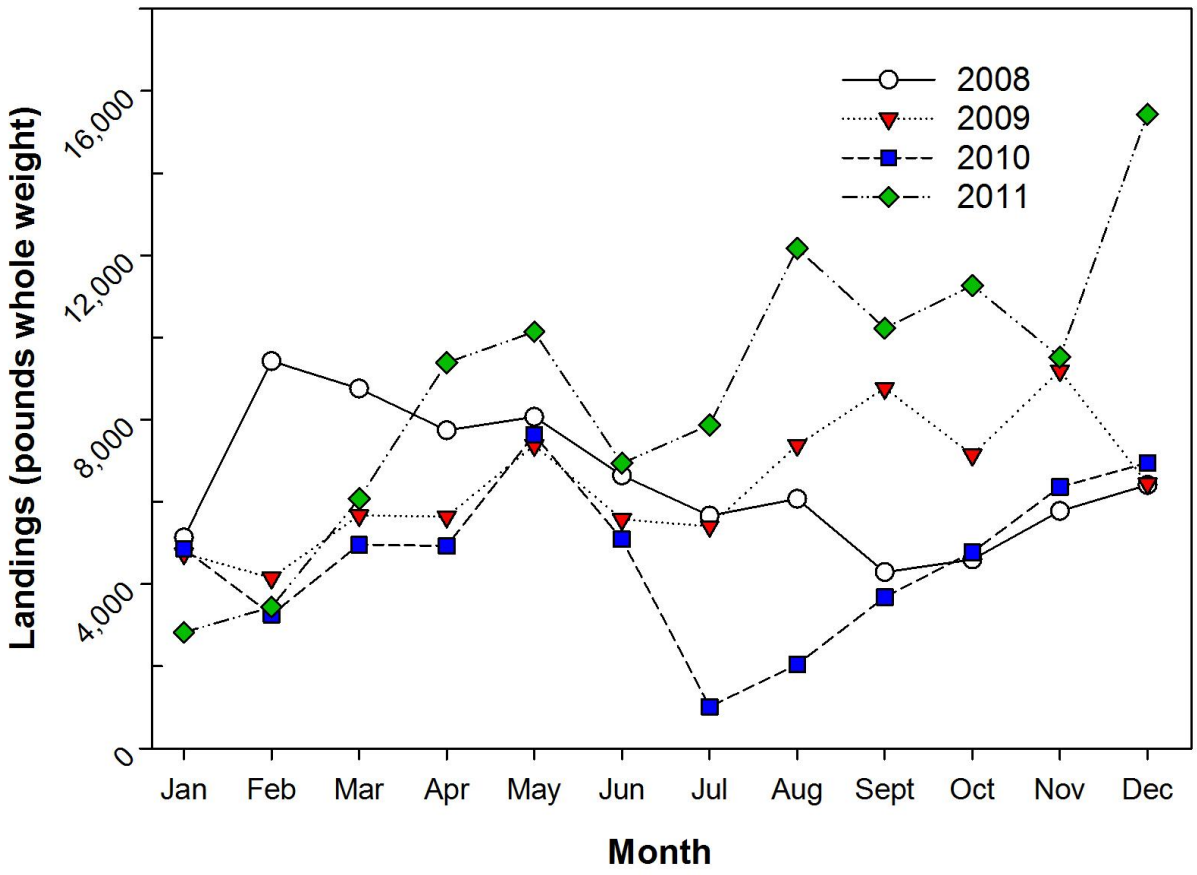

Figure 2.3.1.1. Commercial landings of gray triggerfish in the Gulf of Mexico by month from 2008 through 2011. Source: SERO-Annual Catch Limits dataset.

Table 2.3.1.1. Total projected landings and percent reduction expected by closing single months or a combination of months while maintaining the status quo minimum size limit (14 inches FL) and no commercial trip limit. **Alternatives 1-4** are currently listed as options and well as other options available in the commercial decision tool.

Action 3.1	Closed Month(s)	Total Projected Landings (ww)	Percent Reduction
Alternative 1	**None (No Action)**	**178,692 lbs**	**0%**
	January	166,519 lbs	7%
	February	167,618 lbs	6%
	March	164,451 lbs	8%
	April	163,418 lbs	9%
	May	162,562 lbs	9%
	June	165,120 lbs	8%
	July	165,209 lbs	8%
	August	162,072 lbs	9%
	September	163,115 lbs	9%
	October	162,693 lbs	9%
	November	162,551 lbs	9%
	December	160,282 lbs	10%
	Mar through Apr	149,178 lbs	17%
	Apr through May	147,289 lbs	18%
Preferred Alternative 2	**Jun through Jul**	**151,637 lbs**	**15%**
Alternative 3	**Aug through Dec**	**95,945 lbs**	**46%**
Alternative 4	**Apr through Aug**	**103,614 lbs**	**42%**

Source: SERO-LAPP Gulf Amendment 37 2012.

<u>Discussion for Action 3.2</u>: Establish a Commercial Trip Limit for Gray Triggerfish

Action 3.2 evaluates different commercial trip limits as a measure to reduce gray triggerfish commercial landings. The average weight of commercially harvested gray triggerfish was 4.1 lbs ww based on 1,808 observer samples from 2008 through 2011 (SERO-LAPP Gulf Amendment 37 2012). Based on the recommendations made by the Law Enforcement Advisory Panel (AP) the Council decided to use trip limits in numbers of fish instead of weight. The Law Enforcement AP felt it would be difficult to enforce such a low poundage of gray triggerfish per trip (i.e., 25, 50, and 75 lbs ww, see Addendum in Appendix C for more information).

Currently, there is no commercial trip limit for gray triggerfish. Figure 2.3.2.1 provides the percent of commercial trips from 2009 through 2011 that landed at least 1 lb ww of gray triggerfish. The majority (73%) of the Gulf of Mexico commercial trips from 2009 through 2011 landed less than 50 lbs ww or 12 gray triggerfish on any particular trip (Figure 2.3.2.1). The data can also be explored with the maximum pounds of gray triggerfish harvested per trip by each vessel (Figure 2.3.2.2). For example, 58% of the Gulf of Mexico vessels (n = 469) that harvested gray triggerfish from 2009 through 2011 had a maximum per trip gray triggerfish landing between 1-25 lbs ww (Figure 2.3.2.2). While 42% of the vessels had at least one trip with over 50 lbs ww, and 33% of the commercial vessels had at least one trip with greater than 75 lbs ww

or 18-fish (Figure 2.3.2.2). The commercial sector typically lands a relatively small number of pounds per trip, because gray triggerfish is one of the many species that is part of the reef fish component.

Alternative 1 (no action) would not implement a trip limit so no additional reductions in harvest will occur. **Alternative 2** (6 gray triggerfish) is estimated to reduce landings by 62% **Preferred Alternative 3** (12 gray triggerfish) is estimated to reduce landings by 42% and **Alternative 4** (18 gray triggerfish) is estimated to reduce landings by 30% (Table 2.3.2.1). A commercial trip limit would not attain the needed reductions in harvest to achieve the management goals of the rebuilding plan. This would result in a gray triggerfish commercial closure later in the year after the ACT (quota) is met. However, if trip limits were combined with other commercial management measures, the needed reductions in harvest to achieve the rebuilding plan could be met without a closure at the end of the year.

Table 2.3.2.1. The total projected landings and percent reduction expected from establishing a trip limit (pounds whole weight and numbers of gray triggerfish) while maintaining the other management measures (i.e., 14 inch FL minimum size limit and no fixed closed season). **Alternatives 1-4** are currently listed as options and well as other options available in the commercial decision tool.

Action 3.2	Trip Limit (ww)	Trip Limit Numbers	Total Projected Landings (ww)	Percent Reduction
Alternative 1	**None**	**0**	**178,692 lbs**	**0%**
Alternative 2	**25 lbs**	**6 fish**	**68,136 lbs**	**62%**
Preferred Alternative 3	**50 lbs**	**12 fish**	**103,386 lbs**	**42%**
Alternative 4	**75 lbs**	**18 fish**	**125,201 lbs**	**30%**

Source: SERO-LAPP Gulf Amendment 37 2012.

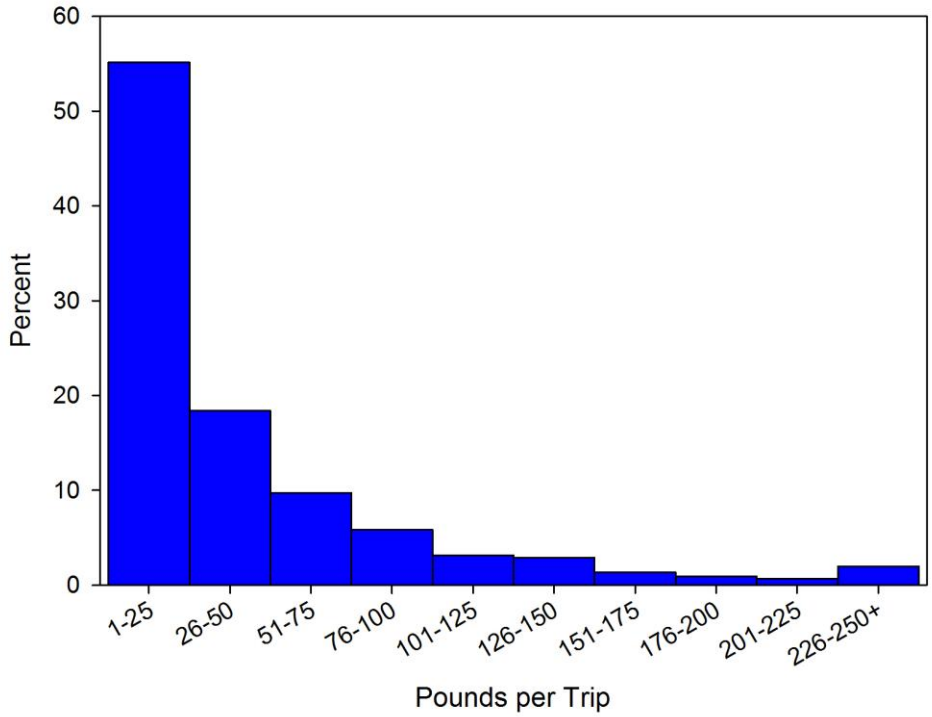

Figure 2.3.2.1. Percent of commercial trips landing gray triggerfish in 25-lb increments in the Gulf of Mexico from 2009 through 2011 (n = 4,692 trips that landed at least 1-lb of gray triggerfish). Pounds are in whole weight. Source: SERO-Annual Catch Limits dataset.

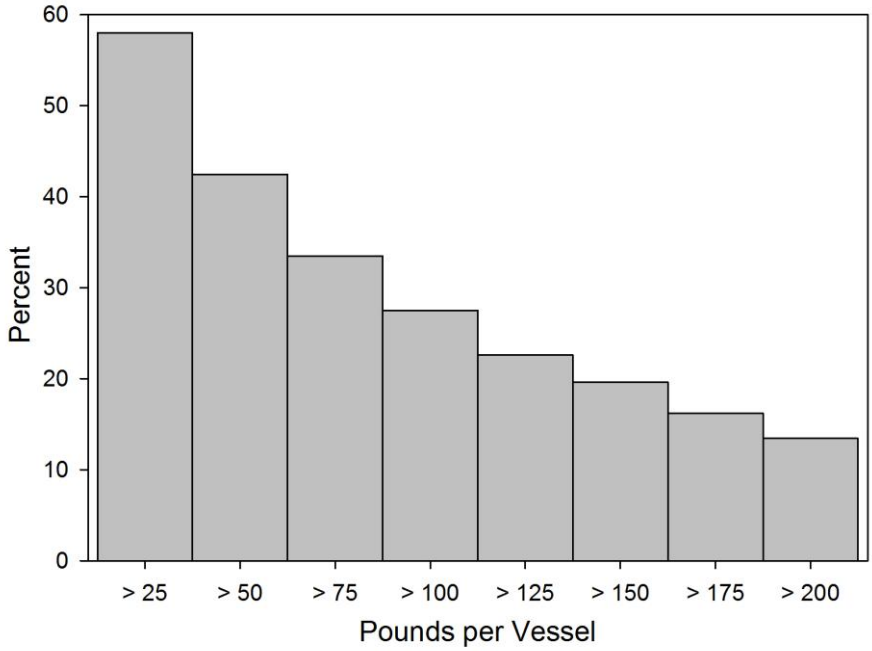

Figure 2.3.2.2. Percent of commercial vessels that had a maximum gray triggerfish catch per trip in the Gulf of Mexico from 2009 through 2011 (n = 469 vessels that landed at least 1-lb of gray triggerfish). Pounds are in whole weight. Source: SERO-Coastal Fisheries Logbook dataset.

A combination of alternatives from **Action 3.1** and **Action 3.2** could be used to limit the harvest to the ACT of 60,900 lbs ww. Table 2.3.2.3 shows the projected harvests when the alternatives from the two actions are combined. **Action 3.2, Alternative 2** in combination with **Action 3.1, Alternatives 2-4** and **Action 3.2, Alternative 3** in combination with **Action 3.1, Alternatives 3-4** would reduce the harvest enough so that the ACT is unlikely to be met. The projected landings when combining **Action 3.1, Preferred Alternative 2** with **Action 3.2, Preferred Alternative 3** are higher than the ACT. This would likely lead to an early closure of the commercial sector should the ACT be met before December 31.

Table 2.3.2.2. Comparison of the two commercial management measures: **Action 3.1:** Establish fixed closed seasons (**Alternatives 1-4**) and **Action 3.2:** Establish a commercial trip limit (**Alternatives 1-4**). This table shows what combination of alternatives is projected to achieve the ACT = 60,900 lbs ww (**Preferred Alternative 4** in **Action 2**) or is projected to exceed the ACT. Results are reported in pounds whole weight.

	Action 3.1: Establish a fixed closed season			
	Alternative 1 None	**Preferred Alternative 2 June through July**	**Alternative 3** August through December	**Alternative 4** April through August
Action 3.2: Establish a commercial trip limit for gray triggerfish				
Alt. 1: No action – Do not establish a commercial trip limit for gray triggerfish	178,692	151,637	95,945	103,614
Alt. 2: Establish a commercial trip limit of 6 gray triggerfish.	68,136	56,682	37,328	37,996
Preferred Alt. 3: Establish a commercial trip limit of 12 gray triggerfish.	103,386	**86,427**	55,652	58,063
Alt. 4: Establish a commercial trip limit of 18 gray triggerfish	125,201	105,049	66,530	70,399

Note: Cells shaded in gray indicate that the ACT of 60,900 lbs ww is projected to be exceeded. Source: SERO-LAPP Gulf Amendment 37 2012.

Combinations of Commercial Management Measures that meet the various reductions in ACTs listed in Action 2.

Different combinations of alternatives in commercial management measures listed in Actions 3.1-3.2 result in different landings estimates and expected season lengths (number of days open). Tables 2.3.2.3.-2.3.2.5 compare various combinations of alternatives that meet the necessary reductions for the ACT alternatives in Action 2, using the commercial decision tool but are not intended to be exhaustive (SERO-LAPP Gulf Amendment 37 2012). Note Action 2, Alternative 2 is not included because it sets the ACT and ACL at zero. This would effectively prohibit the commercial harvest of gray triggerfish. Note that even combining the alternatives in Action 3.1 and 3.2, should the ACT be met before the end of the fishing year, AMs would close the commercial sector the remainder of the year.

Table 2.3.2.3. Action 2, Alternative 1, Current annual catch target (ACT) = 106,000 lbs ww. This is the commercial ACT after the interim rule expires if other management actions are not taken.

Closed Season	Days Open	Trip Limit (ww)	Numbers	Total Projected Landings (ww)
Aug 18 through Dec 31	229	none (status quo)	0 fish	105,595 lbs

Source: SERO-LAPP Gulf Amendment 37 2012.

Table 2.3.2.4. Examples of management criteria using the commercial decision model that achieve **Action 2, Alternative 3** commercial annual catch target (ACT) = 49,400 lbs ww. The minimum size limit will remain at 14-inches FL (status quo).

Closed Season	Days Open	Trip Limit (ww)	Numbers	Total Projected Landings (ww)
Apr 1 through Aug 31	212	25 lbs	6 fish	37,996 lbs
Jan 1 through Apr 30	245	25 lbs	6 fish	48,182 lbs
Sep 1 through Dec 31	243	25 lbs	6 fish	44,474 lbs
Jul 1 through Dec 31	181	50 lbs	12 fish	46,551 lbs
Apr 1 through Sept 30	182	50 lbs	12 fish	49,122 lbs
Jan 1 through Jul 31	153	50 lbs	12 fish	47,734 lbs
Mar 1 through Sep 30	151	75 lbs	18 fish	49,543 lbs
Jan 1 through Aug 31	122	75 lbs	18 fish	45,808 lbs

Source: SERO-LAPP Gulf Amendment 37 2012.

Table 2.3.2.5. Examples of management criteria using the commercial decision model that achieve **Action 2, Preferred Alternative 4** commercial annual catch target (ACT) = 60,900 lbs ww. The minimum size limit will remain at 14-inches FL (status quo).

Closed Season	Days Open	Trip Limit (ww)	Numbers	Total Projected Landings (ww)
Jan 1 through Feb 28	306	25 lbs	6 fish	59,300 lbs
Jun 1 through Jul 31	304	25 lbs	6 fish	56,682 lbs
Aug 1 through Sep 30	304	25 lbs	6 fish	55,257 lbs
Nov 1 through Dec 31	304	25 lbs	6 fish	56,030 lbs
Aug 1through Dec 31	212	50 lbs	12 fish	55,562 lbs
Apr 1 through Aug 31	212	50 lbs	12 fish	58,063 lbs
Jan 1 through Jun 15	199	50 lbs	12 fish	60,764 lbs
May 1 through Sept 30	212	50 lbs	12 fish	57,721 lbs
Mar 1 through Jul 31	212	50 lbs	12 fish	60,376 lbs
May 1 through Oct 31	181	75 lbs	18 fish	58,507 lbs
Jul 20 through Dec 31	192	75 lbs	18 fish	59,675 lbs
Jan 1 through Jul 31	153	75 lbs	18 fish	58,671 lbs
Apr 1 through Sept 30	182	75 lbs	18 fish	59,355 lbs

Source: SERO-LAPP Gulf Amendment 37 2012.

2.4 Action 4 - Recreational Management Measures

*** Note: A preferred alternative may be selected under each sub-action.**

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

Alternative 1: No Action – do not establish a fixed closed season for the recreational sector.

Alternative 2: Establish a fixed closed season for gray triggerfish during peak harvest from (May 1 through June 30).

Preferred Alternative 3: Establish a fixed closed season for gray triggerfish during peak spawning (June 1 through July 31).

Alternative 4: Establish a fixed closed season for gray triggerfish the month of June.

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

Alternative 1: No Action – maintain gray triggerfish as part of the 20-reef fish aggregate bag limit.

Alternative 2: Establish a 4-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit.

Preferred Alternative 3: Establish a 2-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit.

Alternative 4: Establish a 1-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit.

Discussion for Section 2.4: Action 4 - Recreational Management Measures:

The decision tool for gray triggerfish recreational scenarios (SERO-LAPP Gulf Amendment 37 2012) was developed to allow the Council to examine a range of options after establishing ACLs and ACTs in Action 2. The recreational decision tool for gray triggerfish provides estimates of total projected landings under the various management scenarios, but unlike other decision models, this one does not produce estimates of total removals. An estimate of total removals incorporates discard mortality. However, gray triggerfish are unlike many other reef fish species the Council manages, because this species is considered less susceptible to discard mortality (SEDAR 9 2006a; SEDAR 9 Update 2011b). The assessments of this species determined discard mortality was minimal and discard mortality was modeled at 0% (SEDAR 9 2006a; SEDAR 9 Update 2011b). Following this assumption, discard mortality was modeled at 0% in the recreational decision tool (SERO-LAPP Gulf Amendment 37 2012).

The gray triggerfish recreational decision model estimates reductions in landings associated with various management measures (i.e., bag limits, size limits, and closed seasons) necessary to achieve the ACTs summarized in Action 2. Reductions in landings for bag limits and minimum size limits were determined using Marine Recreational Fisheries Survey and Statistics (MRFSS), headboat survey (HBS), and Texas Parks and Wildlife Department (TPWD) data from 2009 through 2011. These reductions were applied to 2013 monthly projected landings to determine how much harvest would be reduced by implementing new management regulations. The impacts of seasonal closures were modeled by converting the number of days closed into a percentage of days closed for a given month, and then applied the percentage to 2013 monthly projected recreational landings. Projected 2013 recreational landings were generated from a seasonal auto-regressive integrated moving average model (Box and Jenkins 1976), which uses a combination of historical landings data and past, present, and future exploitable abundances to predict future landings.

With regard to the model, the Deepwater Horizon MC252 oil spill caused gray triggerfish landings to decline in 2010 (Figure 2.4.1.1); however, the length and numbers of gray triggerfish per trip from 2010 had similar distributions to 2009 and 2011. Therefore, 2010 data was included in the analysis.

The model can evaluate different size limit options as a way to reduce landings; however, the Council decided at their June 2012 meeting to maintain the 14-inch FL minimum size limit[4]. Therefore, the 14-inch size limit was held constant in the model runs when evaluating different season closure and bag limit alternatives.

The recreational decision tool does not account for effort shifting that may take place during season closures, nor does it consider any changes in the average size of gray triggerfish during rebuilding. Future angler behavior is unknown and the model is based on past behavior and economic environments; however, effort shifting and changes in average size may affect the total number of pounds harvested. Further, the model also does not account for increases in numbers of trips taken to compensate for implemented effort controls such as aggregate bag limits and closed seasons because it is largely unknown how management measures considered in the model will impact angler behavior. Finally, changes in recreational effort levels or catch-per-effort are not considered in the model. As such, management reductions projected by the model may be overestimated, and caution should be taken in their interpretation and use.

Discussion for Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

Action 4.1 would establish a recreational fixed closed season for gray triggerfish. In 2008, 2009, and 2011, peak gray triggerfish landings occurred during the months of May and June. Recreational gray triggerfish landings then decreased in July and August, but remained greater than other monthly landings throughout the year (Figure 2.4.1.1). In 2010, the pattern of landings may have shifted because of fishing closures due to the Deepwater Horizon MC252 oil spill (http://sero.nmfs.noaa.gov/fishery_bulletins/bulletin_archives/2010/index.html). Thus, peak 2010 landings of gray triggerfish were in the fall (i.e., September and October) likely related to the 2010 weekend-only re-opening of the recreational red snapper season from October 1

[4] See Appendix C. Alternatives considered but rejected.

through November 22, 2010 (http://sero.nmfs.noaa.gov/fishery_bulletins/bulletin_archives/2010/index.html). Red snapper and gray triggerfish are found on the same reefs in the northern Gulf of Mexico (Ingram and Patterson 2001; Lingo and Szedlmayer 2006), and thus are expected to be harvested together.

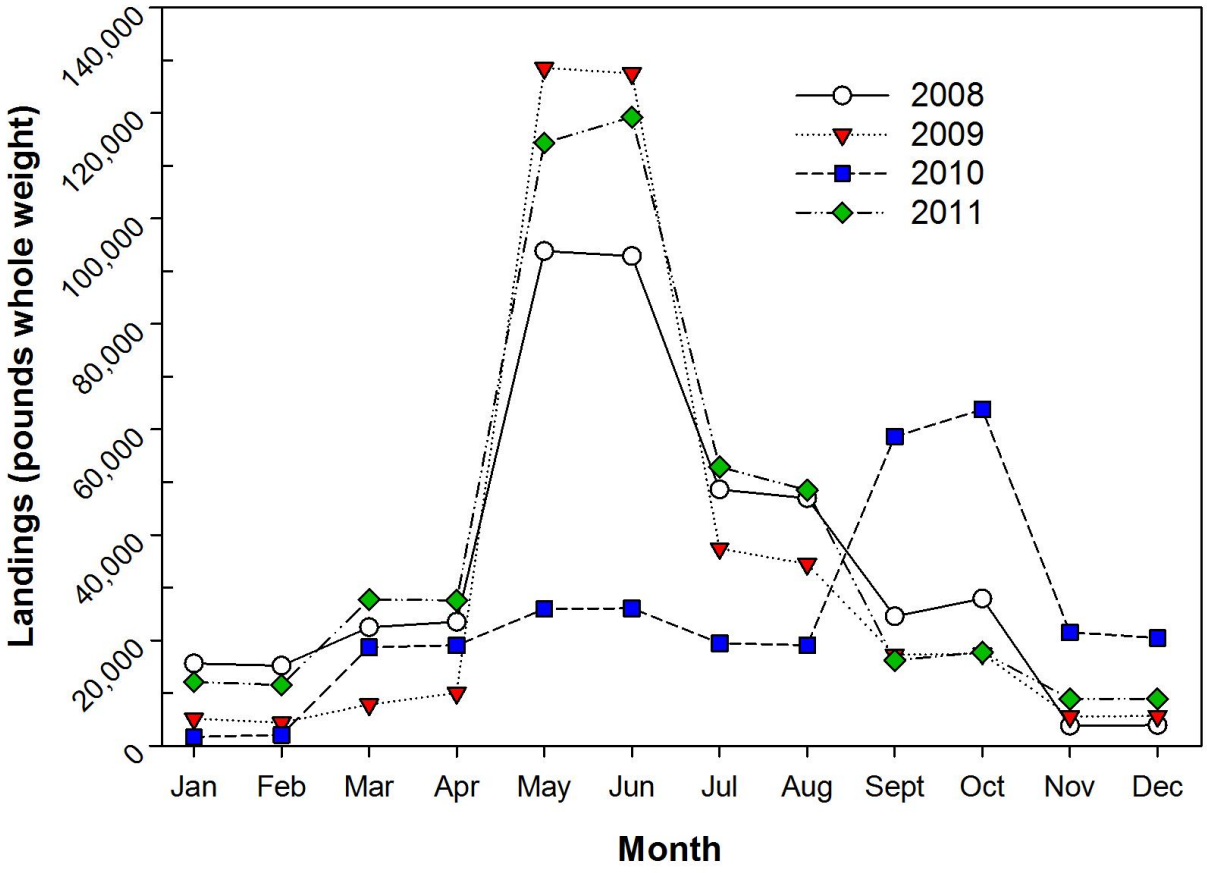

Figure 2.4.1.1. Recreational landings of gray triggerfish in the Gulf of Mexico by month from 2008 through 2011. Source: SERO-Annual Catch Limits dataset.

Recreational landings need to be reduced by 46% based on the ACT selected in Action 2. **Alternative 1** would not establish a fixed closed season for the recreational sector; therefore, other recreational measures would be needed to meet the necessary reduction in landings. Without establishing a fixed closed season or modifying the aggregate bag limit, recreational gray triggerfish landings are projected to meet the ACT around the middle of June. When landings are projected to reach the ACT, the recreational sector would be closed the rest of the year. **Alternative 1** is projected to have 163 fishing days based on the recreational decision tool, SERO-LAPP Gulf Amendment 37 2012; however, as the stock rebuilds this projected closure could fluctuate annually.

Landings in 2008, 2009 and 2011 of gray triggerfish were the greatest in May and June. Closing these months individually is expected to achieve a 26% reduction in May and a 27% reduction in June (Table 2.4.1.1). Conversely, if the Council wanted to leave recreational gray triggerfish

open during the months of May and June while maintaining the other management measures status quo, the remaining months of the year would need to be closed to achieve a 46% reduction (ACT = 217,100 lbs ww). Alternatively, either part of June or part of May would need to be closed in addition to the remaining months to achieve a 54% reduction if **Alternative 3** (ACT = 188,100 lbs ww) had been selected as preferred in Action 2.

Alternative 2 would establish a fixed closed season for gray triggerfish during the period of peak landings (i.e., May and June) and would overlap with the peak June through July spawning season (Figure 2.4.1.1). Currently, the recreational red snapper season is open during June so fishers in the northern and eastern Gulf of Mexico may also catch gray triggerfish while fishing for red snapper (Ingram and Patterson 2001; Lingo and Szedlmayer 2006). Discarded gray triggerfish are estimated to have a minimal mortality (SEDAR 9 2006a; SEDAR 9 Update 2011b); therefore, closing gray triggerfish fishing during part of the red snapper season is not expected to increase dead discards. **Alternative 2** is expected to slow harvest and reduce landings by 53% achieving the greatest reduction in landings compared to closing other months (Table 2.4.1.1). This alternative alone would meet the necessary reduction in landings needed for either **Alternative 3**, ACT = 188,100 lbs ww or **Preferred Alternative 4**, ACT = 217,100 lbs ww in **Action 2**.

Preferred Alternative 3 would establish a fixed recreational closed season for gray triggerfish during the months of peak spawning from June through July (Ingram 2001; Moore 2001; Simmons and Szedlmayer 2012). Gray triggerfish are fecund as early as May and as late as August, but peak spawning was recorded in June and July in the northern Gulf of Mexico and South Atlantic Bight (Wilson et al. 1995; Hood and Johnson 1997; Ingram 2001; Moore 2001; MacKichan and Szedlmayer 2007; Simmons and Szedlmayer 2012). **Preferred Alternative 3** is estimated to achieve a 37% reduction in landings and is not sufficient to achieve the needed 46% reductions in harvest by itself (Table 2.4.1.1). Therefore, **Preferred Alternative 3** would need to be combined with another recreational management measure to keep the sector open for the remainder of the year. Depending on which recreational AM alternative is selected as preferred in Action 5, an in-season closure during the current fishing year would be required if either the ACL or ACT is met. If **Alternative 1** (no action) is taken in Action 5, then the season length would be adjusted in the following year if the ACL is exceeded.

Alternative 4 would establish a fixed recreational closed season for gray triggerfish during the month of June. May and June are the months with the greatest recreational landings. A June closure would overlap with the gray triggerfish spawning season and would close the recreational sector during one of the months of peak landings. The 2012 recreational red snapper season was open during the entire month of June and part of July. Red snapper and gray triggerfish co-occur on many of the same reefs in the northern and eastern Gulf of Mexico; therefore closing gray triggerfish when red snapper is open may increase regulatory discards of gray triggerfish. However, as mentioned previously, gray triggerfish are considered to be hardy fish and discard mortality is estimated to be minimal (0%) (SEDAR 9 2006a; SEDAR 9 Update 2011b). **Alternative 4** is estimated to achieve a 27% reduction in landings and is not sufficient to achieve the needed reductions in harvest. If this alternative is selected as preferred it would need to be combined with other recreational management measures for the sector to remain open for the remainder of the year as discussed above for **Preferred Alternative 3**.

Table 2.4.1.1. The total recreational projected landings and percent reduction expected by closing single months or a combination of months while maintaining the status quo minimum size limit (14 inches FL) and aggregate bag limit. **Alternatives 1-4** are currently listed as options as well as other options available in the recreational decision tool.

Action 4.1	Closed Month(s)	Total Projected Landings (ww)	Percent Reduction
Alternative 1	**None (status quo)**	**412,631 lbs**	**0%**
	January	403,810 lbs	2%
	February	404,795 lbs	2%
	March	390,946 lbs	5%
	April	390,311 lbs	5%
	May	303,647 lbs	26%
Alternative 4	**June**	**301,755 lbs**	**27%**
	July	369,440 lbs	10%
	August	372,667 lbs	10%
	September	394,733 lbs	4%
	October	393,412 lbs	5%
	November	406,836 lbs	1%
	December	406,590 lbs	1%
	March through April	368,627 lbs	11%
	April through May	281,327 lbs	32%
Alternative 2	**May through June**	**192,771 lbs**	**53%**
Preferred Alternative 3	**June through July**	**258,565 lbs**	**37%**
	July through August	329,477 lbs	20%
	August through December	323,713 lbs	22%

Source: SERO-LAPP Gulf Amendment 37 2012.

Discussion for Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

Action 4.2 would modify the recreational bag limit for gray triggerfish. Gray triggerfish is currently part of the 20-reef fish aggregate bag limit that includes: vermilion snapper, lane snapper, almaco jack, tilefish (golden), goldface tilefish, and blueline tilefish.

The number of gray triggerfish landed per angler per trip is low. Overall, a greater percentage of the trips that landed gray triggerfish were less than one fish per angler because there are typically more anglers on a vessel than landed gray triggerfish. For example, if two gray triggerfish are landed on a vessel with four anglers, the number of landed gray triggerfish is a fraction (0.5 fish per angler). Based on 7,000^{+} fishing trips from 2009 through 2011, when all data sources are combined (MRFSS, HBS, and TPWD) only 3.6% landed 1 gray triggerfish per angler per trip, and less than 1% of the anglers landed 2-20 gray triggerfish per angler per trip (Table 2.4.2.1). The MRFSS dataset has only one trip out of 826 trips that landed 20-gray triggerfish per angler per trip. The TPWD trip data showed a greater percentage of gray triggerfish landed per angler compared to the other data sources (Table 2.4.2.1). Over 5% of the TPWD trips landed 5-10 gray triggerfish per angler and approximately 2% of the TPWD trips landed 10-20 gray triggerfish per angler. However, the number of trips (n = 86) reported from the TPWD is low and has a smaller contribution to the overall recreational gray triggerfish landings.

Table 2.4.2.1. The percent of Gulf of Mexico gray triggerfish landed per angler per trip from three recreational datasets: MRFSS (n = 826 trips), HBS (n = 6,402 trips), TPWD (n = 86 trips) and total (n = 7,314 trips) from 2009 through 2011.

Number of gray triggerfish landed per angler per trip	Data Source			
	MRFSS	Headboat	TPWD	Total
< 1	81.84	97.42	52.33	95.13
1	12.23	2.11	29.07	3.57
2	3.51	0.37	8.14	0.81
3	0.97	0.05	2.33	0.18
4	0.48	0.05	0.0	0.10
5-10	0.61	0.00	5.81	0.14
10-20	0.36	0.00	2.32	0.07
Total	100	100	100	100

Source: SERO-LAPP Gulf Amendment 37 2012.

A more in-depth analysis of the MRFSS data set showed only three trips (0.2%) reached the 20-reef fish aggregate bag limit when all seven species in the aggregate were included (Figure 2.4.2.1). Therefore, the other species should not be impacted by removing gray triggerfish from the aggregate group as the 20-reef fish aggregate is not currently constraining harvest.

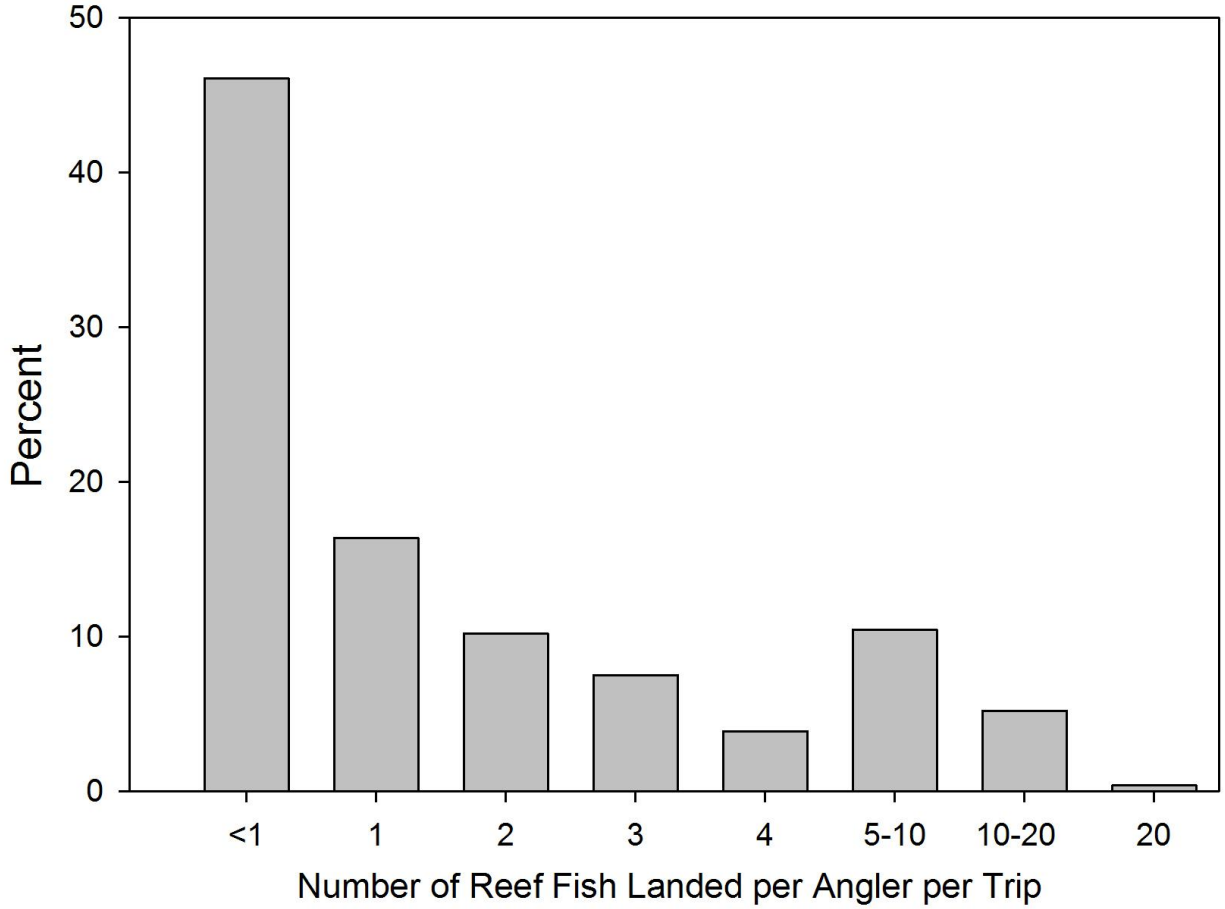

Figure 2.4.2.1. Number of reef fish per angler per trip (expressed as a percentage) landed within the 20-reef fish aggregate bag limit from the Gulf of Mexico (n = 825 trips). The 20 reef fish aggregate consist of gray triggerfish, vermillion snapper, lane snapper, almaco jack, tilefish (golden), goldface tilefish, and blueline tilefish. Source: SERO- MRFSS, HBS, and TPWD.

Leaving gray triggerfish in the aggregate bag limit is functionally the same as not having an aggregate bag limit, since 99.9% of all trips sampled did not harvest 20-gray triggerfish per angler per trip. Therefore, the bag limit percent reduction values were calculated with the assumption that all reef fish landed were gray triggerfish. Based on these caveats and maintaining all other management measures at status quo, the total projected landings and percent reduction expected from reducing the 20-reef fish aggregate bag limit by 1 fish at a time are listed in Table 2.4.2.2. Little reductions in landings are achieved until the aggregate bag limit is reduced to 4 gray triggerfish per angler per trip or less, achieving a 13-34% reduction in landings (Table 2.4.2.2). Recreational landings need to be reduced by 46% based on the ACT selected in Preferred Alternative 4 in Action 2. **Alternative 1** would not modify the 20-reef fish aggregate bag limit; therefore, other recreational management measures would be needed to meet the necessary reductions. **Alternative 2** would establish a 4-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit and is projected to achieve a 13% reduction in landings (Table 2.4.2.2). **Preferred Alternative 3** would establish a 2-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit and is projected to achieve a 22%

reduction in landings (Table 2.4.2.2). **Alternative 4** would establish a 1-gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit and is projected to achieve a 34% reduction in landings (Table 2.4.2.2). Alternatives in this action (**Action 4.2**) would need to be combined with an alternative in Action 4.1 to meet the necessary reductions in landings based on the preferred ACT. If the bag limit is reduced to 1 gray triggerfish per angler (**Alternative 4**) the total projected landings are estimated to be 270,803 lbs ww, which exceeds the preferred ACT. Therefore, some type of closed season or in-season closure would be necessary. Further, depending on which recreational accountability measure alternative is selected as preferred in Action 5, an in-season closure during the current fishing year would be required if either the ACL or ACT is met.

Table 2.4.2.2. The total recreational projected landings and percent reduction expected from modifying the 20-reef fish aggregate bag limit while maintaining the status quo minimum size limit (14 inches FL) and no fixed closed season. **Alternatives 1-4** are currently listed as options as well as other options available in the recreational decision tool.

Action 4.2	Bag Limit (gray triggerfish per angler)	Total Projected Landings (ww)	Percent Reduction
Alternative 1	**20 (status quo)**	**412,631 lbs**	**0%**
	19	411,186 lbs	<1%
	18	409,741 lbs	<1%
	17	408,296 lbs	1%
	16	406,850 lbs	1%
	15	405,405 lbs	2%
	14	403,960 lbs	2%
	13	402,515 lbs	3%
	12	401,069 lbs	3%
	11	399,095 lbs	3%
	10	396,025 lbs	4%
	9	392,910 lbs	5%
	8	389,795 lbs	6%
	7	386,680 lbs	6%
	6	383,130 lbs	7%
	5	372,285 lbs	10%
Alternative 2	**4**	**359,622 lbs**	**13%**
	3	345,547 lbs	16%
Preferred Alternative 3	**2**	**321,678 lbs**	**22%**
Alternative 4	**1**	**270,803 lbs**	**34%**

Source: SERO-LAPP Gulf Amendment 37 2012.

The eastern Gulf of Mexico (Florida, Alabama, and Mississippi) is the primary area where recreational anglers landed gray triggerfish compared to the western Gulf of Mexico (Louisiana and Texas) (SEDAR 9 2006a; SEDAR 9 Update 2011b). The percent reduction in the gray triggerfish bag limit by state from 2009 through 2011 landings data show similar trends as the total recreational projected landings (Table 2.4.2.2). It should be noted during 2009 through 2011, some anglers on trips in Texas and Alabama landed as many as 10 gray triggerfish as part of the 20-reef fish aggregate bag limit. However, this should be viewed with some caution due

to the inclusion of HBS landings with 40-60 anglers per vessel. Overall, similar to the total recreational landings, little to no reduction is achieved until the bag limit is reduced to 4-fish per angler per trip or less (Table 2.4.2.3).

Table 2.4.2.3. Bag limit percent reductions for each state applied to Gulf of Mexico recreational landings of gray triggerfish for the years 2009 through 2011. The recreational decision tool includes an option to establish a 1 to 20 gray triggerfish bag limit within the 20-reef fish aggregate bag limit. The estimated percent reductions by state are listed below.

Bag Limit	Texas	Louisiana	Mississippi	Alabama	Florida
20	0%	0%	0%	0%	0%
19	0%	0%	0%	0%	0%
18	0%	0%	0%	0%	0%
17	0%	0%	0%	0%	0%
16	0%	0%	0%	0%	0%
15	0%	0%	0%	0%	0%
14	0%	0%	0%	0%	0%
13	0%	0%	0%	0%	0%
12	0%	0%	0%	0%	0%
11	0%	0%	0%	0%	0%
10	<1%	0%	0%	<1%	0%
9	<1%	0%	0%	<1%	0%
8	<1%	0%	0%	<1%	0%
7	<1%	0%	0%	<1%	0%
6	<1%	0%	0%	<1%	0%
5	<1%	0%	0%	<1%	<1%
4	1%	2%	0%	<1%	<1%
3	2%	6%	0%	1%	<1%
2	2%	12%	0%	3%	1%
1	6%	25%	10%	10%	4%

Source: The landings came from MRFSS, TPWD, and HBS datasets.

A comparison of the two recreational management measures **Action 4.1:** Establish fixed closed seasons (**Alternatives 1-4**) and **Action 4.2:** Modify the recreational bag limit for gray triggerfish (**Alternatives 1-4**), show which alternatives achieve the necessary reduction in the ACT = 217,100 lbs ww (**Action 2, Preferred Alternative 4**) or if that series of alternatives would exceed the ACT (Table 2.4.2.4). The minimum size limit alternative was moved to Considered, but Rejected at the June 2012 Council meeting (Appendix D).

Table 2.4.2.4. Comparison of the two recreational management measures **Action 4.1:** Establish fixed closed seasons (**Alternatives 1-4**) and **Action 4.2:** Modify the recreational bag limit for gray triggerfish (**Alternatives 1-4**). This table shows what combination of alternatives is projected to achieve the ACT = 217,100 lbs ww (**Preferred Alternative 4** in **Action 2**) or is projected exceeds the ACT. Results are reported in pounds whole weight.

	Action 4.1: Establish a fixed recreational closed season			
	Alternative 1 None	**Alternative 2** May through June 304 days	**Pref. Alternative 3** **June through July** **304 days**	**Alternative 4** June 335 days
Action 4.2: Modify the recreational bag limit for gray triggerfish				
Alt. 1: No action – Maintain gray triggerfish as part of the 20-reef fish aggregate	412,631	192,771	258,565	301,755
Alt. 2: Establish a 4-gray triggerfish per angler bag limit within the 20-reef fish aggregate	359,622	181,552	236,765	277,257
Pref. Alt. 3: Establish a 2-gray triggerfish per angler bag limit within the 20-reef fish aggregate	321,678	165,870	**206,965**	244,700
Alt.4: Establish a 1-gray triggerfish per angler bag limit within the 20-reef fish aggregate	270,803	136,868	171,506	203,357

Note: Cells shaded in gray indicate that the ACT of 217,100 lbs ww is expected to be exceeded. Source: SERO-LAPP Gulf Amendment 37 2012.

Combinations of Recreational Management Measures that meet the various reductions of each alternative listed in Action 2.

Different combinations of alternatives in recreational management measures listed in Actions 4.1-4.2 result in different landings estimates and expected season lengths (number of days open). Tables 2.4.2.5.-2.4.2.7 compare various combinations of alternatives that meet the necessary reductions in landings based on the ACT alternatives in Action 2. These tables provide some examples that achieve various reductions in landings for each alternative using the recreational decision tool (SERO-LAPP Gulf Amendment 37 2012) and are not intended to be exhaustive. Note Action 2, Alternative 2 is not included because it sets the ACT and ACL at zero and this would effectively prohibit recreational harvest of gray triggerfish.

Table 2.4.2.5. Action 2, **Alternative 1**, annual catch target (ACT) = 405,000 lbs ww. This is the recreational ACT after the interim rule expires if other management actions are not taken.

Closed Season	Days Open	Bag limit	Total Projected Landings (ww)
Nov 21 through Dec 31	324	20 fish/person (status quo)	404,658 lbs

Source: SERO-LAPP Gulf Amendment 37 2012.

Table 2.4.2.6. Examples of management criteria using the recreational decision model that achieve **Action 2, Alternative 3** recreational annual catch target (ACT) = 188,100 lbs ww. The minimum size limit will remain at 14 inches FL (status quo).

Closed Season	Days Open	Bag limit	Total Projected Landings (ww)
May 1 through Jun 30	304	5 fish/person	184,754 lbs
Jun 1 through Jul 31	304	1 fish/person	171,506 lbs
Jun 1 through Sept 30	243	4 fish/person	181,087 lbs
May 1 through Jul 31	273	20 fish/person (status quo)	149,580 lbs
Mar 1 through Jun 30 (Open Jan 1 through Feb 28 & Jul 1 through Dec 31)	243	20 fish/person (status quo)	148,766 lbs
Jan 1 through Apr 30 & Jul 1 through Dec 31 (Open May 1 through Jun 30)	61	2 fish/person	155,808 lbs
Jan 1 through Apr 30 & Aug 1 through Dec 31 (Open May 1-Jul 31)	92	1 fish/person	165,786 lbs

Source: SERO-LAPP Gulf Amendment 37 2012.

Table 2.4.2.7. Examples of management criteria using the recreational decision model that achieve **Action 2, Preferred Alternative 4** recreational annual catch target (ACT) = 217,100 lbs ww. The minimum size limit will remain at 14 inches FL (status quo).

Closed Season	Days Open	Bag limit	Total Projected Landings (ww)
May 1 through Jun 30	304	20 fish/person (status quo)	192,771 lbs
Jun 1 through Jul 31	304	2 fish/person	206,965 lbs
Jun 1 through 30	335	1 fish/person	203,357 lbs
Jun 1 through Aug 31	273	4 fish/person	198,780 lbs
Jan 1 through Mar 31 & Aug 1 through Dec 31 Open (Apr 1 through Jul 31)	122	2 fish/person	211,954 lbs
Jan1 through Mar 31 & Sept 1 through Dec 31 Open (April1 through Aug 31)	153	1 fish/person	211,797 lbs
Jan 1through Apr 30 & Jul 1 through Dec 31 Open (May1 through June 30)	61	18 fish/person	216,970 lbs
Mar 1through May 31	273	2 fish/person	207,096 lbs
Jun1through Aug 31	273	8 fish/person	216,255 lbs
Jan 1through May 31 Open (Jun 1 through Dec 31)	214	5 fish/person	212,927 lbs
Jun 1 through Sep 30 Open (Jan1 through May 31 & Oct 1 through Dec 31)	243	20 fish/person (status quo)	200,702 lbs

Source: SERO-LAPP Gulf Amendment 37 2012.

2.5 Action 5 - Modify Recreational Accountability Measures

Note: Alternative 4 may be selected in addition to Alternatives 1, 2, or 3.

Alternative 1: No Action – Do not change the current accountability measure for the recreational sector. The accountability measure is:

If recreational landings, as estimated by the Southeast Fisheries Science Center, exceed the applicable ACL, the Assistant Administrator for Fisheries will file a notification with the Office of the Federal Register reducing the length of the following recreational fishing season by the amount necessary to ensure recreational landings do not exceed the recreational target total allowable catch (equivalent to an ACT) for the following fishing year. Recreational landings will be evaluated relative to the ACL based on a moving multi-year average of landings, as described in the FMP.

Preferred Alternative 2: Replace the current accountability measure with an in-season closure authority for gray triggerfish based on the recreational ACT. The in-season closure authority will act as the accountability measure. The accountability measure is:

If the recreational gray triggerfish ACT is reached or projected to be reached within a fishing year, the Assistant Administrator for Fisheries shall file a notification with the Office of the Federal Register to prohibit the recreational sector from harvesting gray triggerfish. If the ACT has been met, the closure will occur immediately; otherwise the closure will occur on the date the ACT is projected to be met. If, after reviewing landings data, it is determined the ACT was not met, the Assistant Administrator for Fisheries may file a notification with the Office of the Federal Register to reopen the recreational fishing season so the recreational sector can catch the remaining harvest allowed by the ACT.

Alternative 3: Replace the current accountability measure with an in-season closure authority for gray triggerfish based on the recreational ACL. The in-season closure authority will act as the accountability measure. The accountability measure is:

If the recreational gray triggerfish ACL is reached or projected to be reached within a fishing year, the Assistant Administrator for Fisheries shall file a notification with the Office of the Federal Register to prohibit the recreational sector from harvesting gray triggerfish. If the ACL has been met, the closure will occur immediately; otherwise the closure will occur when the ACL is projected to be met. If, after reviewing landings data, it is determined the ACL was not met, the Assistant Administrator for Fisheries may file a notification with the Office of the Federal Register to reopen the recreational fishing season so the recreational sector can catch the remaining harvest allowed by the ACL.

Preferred Alternative 4: Add an overage adjustment to the accountability measure. The overage adjustment is:

If the recreational gray triggerfish ACL is exceeded, at or near the beginning of the following fishing year, the Assistant Administrator for Fisheries shall file a notification with the Office of

the Federal Register to reduce the ACL (and the ACT if Alternative 2 is selected as preferred) for that following year by the amount of the ACL overage in the prior fishing year, unless the best scientific information available determines that a greater, lesser, or no overage adjustment is necessary. The overage adjustment will be applied:

> **Option a:** Anytime the ACL is exceeded.
> **Preferred Option b:** Only if the ACL is exceeded and the gray triggerfish stock is overfished.

Discussion: Alternative 1, no action, would maintain the current AMs, which are triggered should landings exceed the recreational ACL. The AMs allow the Assistant Administrator for Fisheries to reduce the length of the fishing season in the following fishing year to the date when the ACT is projected to be met. Because the comparison of the landings to the ACL does not occur until after the fishing year is complete, these types of measures are called post-season measures. One problem with post-season measures is that they allow the harvest within a given year to continue after the ACL is met. This could lead to overfishing if the harvest exceeds the overfishing limit.

Preferred Alternative 2 and **Alternative 3** would replace the current post-season AMs with in-season measures. An in-season AM is applied within the fishing year instead of waiting until the fishing year to end. **Preferred Alternative 2** and **Alternative 3** would allow the Assistant Administrator for Fisheries to prohibit the recreational harvest of gray triggerfish if a certain level of landings is reached or projected to be reached within the fishing year. This in-season measure is intended to prevent overfishing from occurring. The two alternatives differ in that **Preferred Alternative 2** uses the ACT as the trigger to close the sector while **Alternative 3** uses the ACL as a trigger to close the sector. Because the ACT is less than the ACL, **Preferred Alternative 2** would afford a greater protection from overfishing and is more precautionary than **Alternative 3**. However, because the rebuilding plan is based on not exceeding the ACL, **Alternative 3** conforms to the rebuilding plan provided that the in-season closure date is accurately projected. If the closure is based on landings projections, the closure would begin on the date that either the ACT (**Preferred Alternative 2**) or the ACL (**Alternative 3**) is projected to be harvested. Should the projections underestimate the harvest, both **Preferred Alternative 2** and **Alternative 3** give the Assistant Administrator for Fisheries the option to re-open the recreational fishing season so the remaining poundage of either the ACT or ACL can be harvested. The decision of whether to re-open the recreational fishing season to gray triggerfish harvest would most likely be based on the magnitude of the underestimated landings and the number of fishing days the additional catch could support. **Preferred Alternative 2** is consistent with the interim rule.

If either **Preferred Alternative 2** or **Alternative 3** is selected by the Council, the current method for determining if the recreational gray triggerfish ACL has been exceeded would change. Currently, a multi-year averaging system of landings, developed in Amendment 30A (GMFMC 2008), is used in the post-season measures. Because in-season closures of the recreational harvest were not considered practical at the time, it was thought that the flexibility of such a system would allow for year-to-year fluctuations in landings and recruitment. However, averaging catches is complicated to implement and difficult to explain to the public. In addition,

a single large overage could continue to cause the AM to be triggered over multiple years until it is no longer used as part of the average. Finally, because the ACL changes every year in the gray triggerfish rebuilding plan after the first two years, the sequence of calculating the ACL is continually restarted and never allows the three-year moving average to be used. Given **Preferred Alternatives 2** and **Alternative 3** would provide an in-season closure authority and require in-season monitoring of the recreational harvest, the multiyear averaging system is no longer needed.

Preferred Alternative 4 would add an overage adjustment to any of the AMs described in **Alternatives 1-3**. The purpose of an overage adjustment is to protect the stocks from becoming overfished should an ACL be exceeded for a series of years, or ensure the stock rebuilds as anticipated if a stock is in a rebuilding plan. National Standard 1 Guidance (50 CFR 600.310(g)(3)) recommends that overage adjustments reduce the ACL (and the ACT if **Alternative 2** is selected as preferred) by the overage amount "unless the best scientific information available shows that a reduced overage adjustment, or no adjustment, is needed to mitigate the effects of the overages." This overage adjustment would simply subtract the overage amount from the ACL (and the ACT if **Alternative 2** is selected as preferred) in the subsequent year with the caveat that the ACL (and the ACT if **Alternative 2** is selected as preferred) reduction could be more or less if scientific information indicated otherwise.

Preferred Alternative 4 has two options. **Option 4a** would apply the overage adjustment any time the ACL is exceeded. **Preferred Option 4b** would apply the adjustment only if the ACL is exceeded and the gray triggerfish stock is overfished. **Preferred Option 4b** follows the National Standard 1 Guidance that overage adjustments should be included in the AMs when a stock is in a rebuilding plan. The determination of whether a stock is overfished would be based on the most recent Status of U.S. Fisheries Report to Congress.

ACLs and ACTs and their use in quota management: A quota caps the harvest of different stocks and sectors for the fishing year. When the harvest cap is reached, the harvest of the stock is prohibited for the remainder of the year. If either ACLs or ACTs are used as triggers for in-season AMs to close the sector, then whichever is used as the trigger effectively acts as a quota. For the commercial sector, Amendment 30A used the commercial ACT as an in-season AM. As such, it is effectively a quota and appears in the codified text as such.

The recreational sector has an effective quota for 2012 because of the interim rule that closed the sector on June 11. If either **Preferred Alternative 2** (ACT trigger) or **Alternative 3** (ACL trigger) is approved, then either the ACT or the ACL would act as a recreational quota. The quota would be equal to the trigger for the in-season AM. However, if **Alternative 1** is selected as preferred, then there would be no recreational quota after the interim rule expires.

CHAPTER 3. AFFECTED ENVIRONMENT

The actions considered in this environmental assessment (EA) would affect fishing in federal waters of the Gulf of Mexico. Harvest rates in state waters will also be affected through the implementation of these regulations. Descriptions of the physical, biological, economic, social, and administrative environments were completed in the environmental impact statement (EIS) for Reef Fish Amendment 30A: Gray Triggerfish – Establish Rebuilding Plan, End Overfishing, Accountability Measures, Regional Management, Management Thresholds and Benchmarks that was implemented in 2008. The information from that EIS is being incorporated herein by reference and the reader is directed to the 2008 EIS to obtain the information http://www.gulfcouncil.org/docs/amendments/Amend-30A-Final%20208.pdf. New information is summarized below.

3.1 Description of the Fishery

Gray triggerfish is primarily landed by recreational anglers (Figure 1.1.1). Amendment 30A established an interim allocation for gray triggerfish of 79% recreational and 21% commercial (GMFMC 2008). Landings of gray triggerfish by the commercial sector consisted of the following gear types: vertical line, longline, and trap. Based on 2001 through 2011commercial landings, 90% of the landings were caught by vertical line, 5.4% were from longline and 4.6% were from traps (Figure 3.1.1). Traps were phased out over a ten-year period through the Amendment 14 to the Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) and on February 7, 2007, it became illegal to use this gear to commercially harvest reef fish in the Gulf of Mexico (GMFMC 1996).

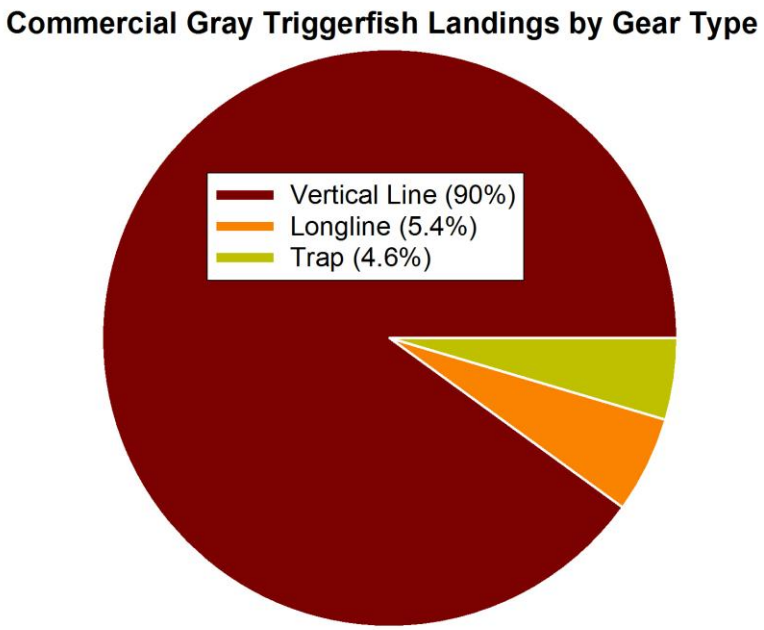

Figure 3.1.1. Commercial landings of gray triggerfish by gear type from 2001 through 2011. Source: SEDAR 9 Update 2011 and SERO-Annual Catch Limits dataset for 2011 landings.

Analysis of recreational landings by mode from 2007 through 2011 showed 55% of the gray triggerfish landings are from private vessels, 34% from charter vessels, and 11% from headboats (Figure 3.1.2).

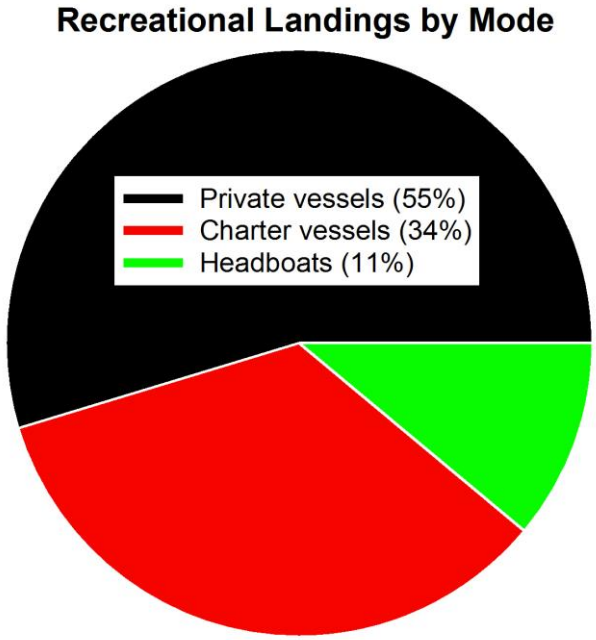

Figure 3.1.2. Recreational landings of gray triggerfish by mode from 2007 through 2011. Source: SEDAR 9 Update 2011 and SERO-Annual Catch Limits dataset for 2011 landings.

Landings of gray triggerfish by the recreational sector consisted of the following two gear types: hook-and-line and spear. Based on recreational landings from 2001 through 2011, 97% of the landings were from hook-and-line fishing and 3% were from spear fishing (Figure 3.1.3). All landings from charter vessels were assumed to be caught with hook-and-line gear. Texas Parks and Wildlife Department (TPWD) does not record gear type, therefore, all landings from this source were assumed to be hook-and-line. Recreational landings from the Marine Recreational Fisheries Survey and Statistics (MRFSS) program could be separated by gear type to identify spear from hook-and-line caught fish (SERO 2012).

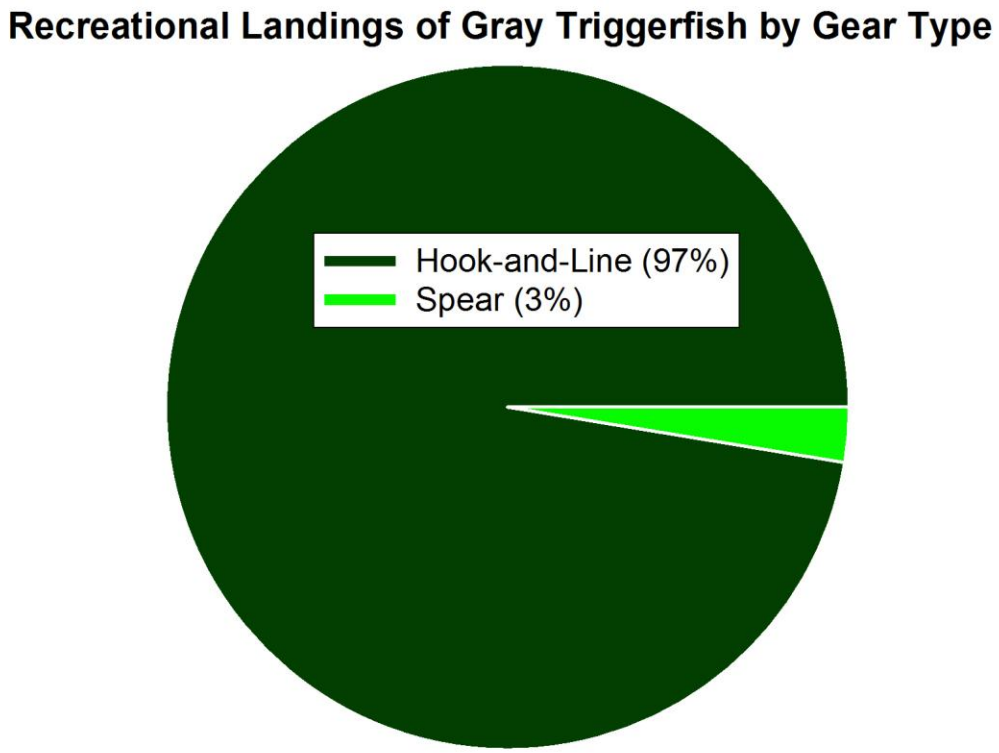

Figure 3.1.3. Recreational landings of gray triggerfish by gear type from 2001 through 2011. Source: SEDAR 9 Update 2011 and SERO-Annual Catch Limits dataset for 2011 landings.

3.2 Description of the Physical Environment

The physical environment for reef fish, including gray triggerfish, has been described in detail in the EIS for the Generic Essential Fish Habitat (EFH) Amendment and the Generic Annual Catch Limits/Accountability Measures Amendment, and is incorporated here by reference (GMFMC 2004a; GMFMC 2011a). The Gulf of Mexico 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. Oceanic conditions are primarily affected by the Loop Current (Figure 3.2.1), the discharge of freshwater into the northern Gulf of Mexico, and a semi-permanent, anti-cyclonic gyre in the western Gulf of Mexico.

The Gulf of Mexico is both a warm temperate and a tropical body of water (McEachran and Fechhelm 2005). Based on satellite derived measurements from 1982 through 2009, mean annual sea surface temperature ranged from 73 through 83º F (23-28º C) including bays and bayous (Figure 3.2.1). In general, mean sea surface temperature increases from north to south depending on time of year with large seasonal variations in shallow waters (NODC 2012: http://accession.nodc.noaa.gov/0072888).

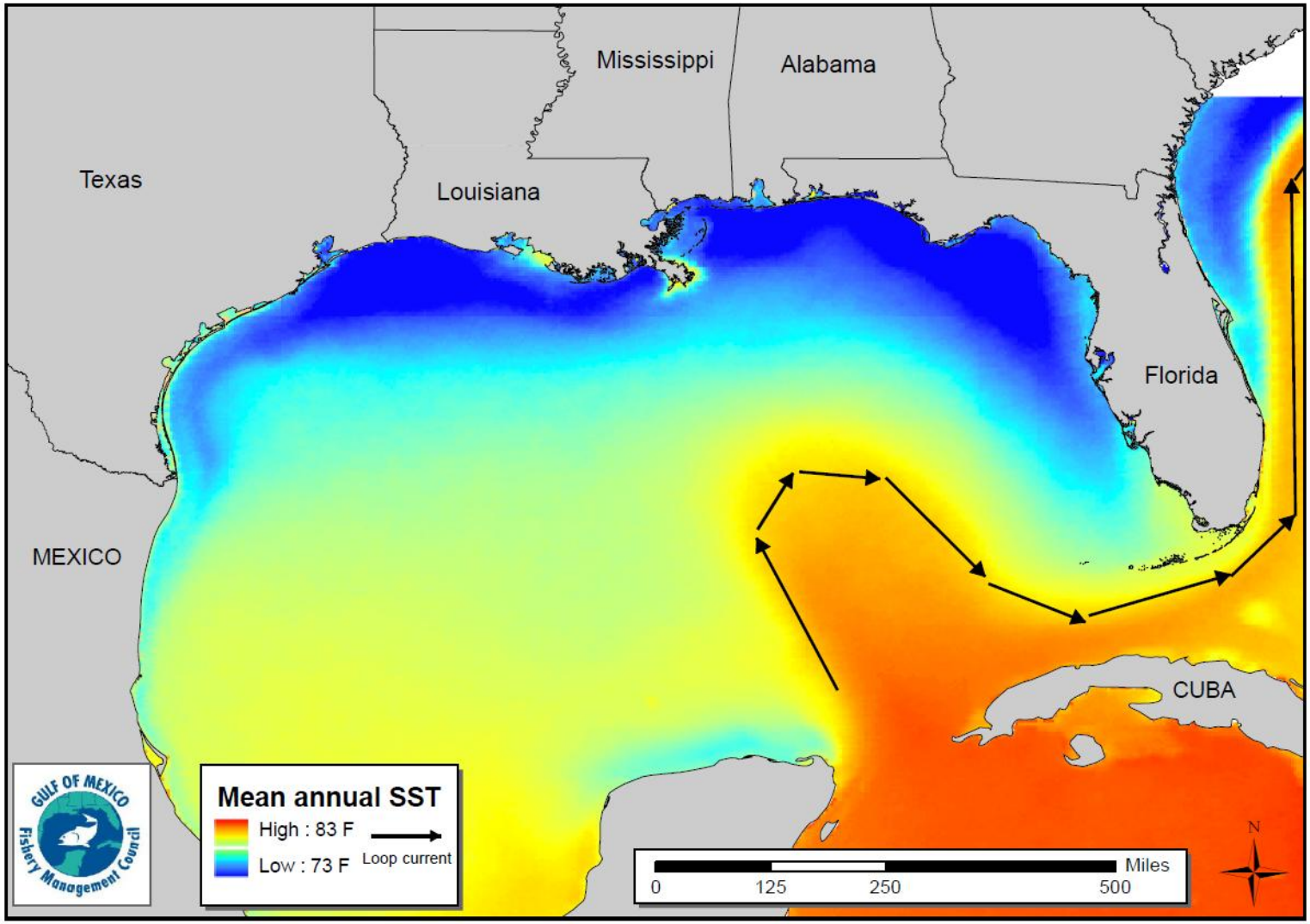

Figure 3.2.1. Mean annual sea surface temperature derived from the Advanced Very High Resolution Radiometer (AVHRR) Pathfinder Version 5 sea surface temperature data set (http://pathfinder.nodc.noaa.gov).

Environmental Sites of Special Interest Relevant to Gray Triggerfish (Figure 3.2.2)

Longline/Buoy Gear Area Closure – Permanent closure to use of these gears for reef fish harvest inshore of 20 fathoms (36.6 meters) off the Florida shelf and inshore of 50 fathoms (91.4 meters) for the remainder of the Gulf of Mexico and encompasses 72,300 square nautical miles (nm^2) or 133,344 km^2. Bottom longline gear is prohibited inshore of 35 fathoms (54.3 meters) during the months of June through August in the eastern Gulf of Mexico, but is not depicted in Figure 3.2.2.

Madison-Swanson and Steamboat Lumps Marine Reserves - No-take marine reserves sited on gag spawning aggregation areas where all fishing is prohibited except surface trolling from May through October is prohibited (219 nm^2 or 405 km^2).

The Edges Marine Reserve – All fishing is prohibited from January through April and possession of any fish species is prohibited, except for such possession aboard a vessel in transit with fishing gear stowed as specified. The provisions of this do not apply to highly migratory species (390 nm^2 or 1,338 km^2).

Tortugas North and South Marine Reserves - No-take marine reserves cooperatively implemented by the state of Florida, National Ocean Service, the Gulf of Mexico Fishery Management Council (Council), and the National Park Service (see jurisdiction on chart) (185 square nautical miles). In addition, Generic Amendment 3 (GMFMC 2005a) for addressing EFH requirements, Habitat Areas of Particular Concern (HAPC), and adverse effects of fishing in the following FMPs of the Gulf of Mexico: Shrimp, Red Drum, Reef Fish, Coral and Coral Reefs in the Gulf of Mexico and Spiny Lobster and the Coastal Migratory Pelagic resources of the Gulf and South Atlantic prohibited the use of anchors in these HAPCs.

Individual reef areas and bank HAPCs of the northwestern Gulf of Mexico including: East and West Flower Garden Banks, Stetson Bank, Sonnier Bank, MacNeil Bank, 29 Fathom, Rankin Bright Bank, Geyer Bank, McGrail Bank, Bouma Bank, Rezak Sidner Bank, Alderice Bank, and Jakkula Bank - Pristine coral areas protected by preventing the use of some fishing gear that interacts with the bottom (263.2 nm^2 or 487.4 km^2). Subsequently, three of these areas were made in marine sanctuaries (i.e., East and West Flower Garden Banks and Stetson Bank). Bottom anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots on coral reefs are prohibited in the East and West Flower Garden Banks, McGrail Bank, and on the significant coral resources on Stetson Bank.

Florida Middle Grounds HAPC - Pristine soft coral area protected from use of any fishing gear interacting with the bottom (348 nm^2 or 644.5 km^2).

Pulley Ridge HAPC - A portion of the HAPC where deepwater hermatypic coral reefs are found is closed to anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots (2,300 nm^2 or 4,259 km^2).

Alabama Special Management Zone - In the Alabama Special Management Zone, fishing by a vessel operating as a charter vessel or headboat, a vessel that does not have a commercial permit for Gulf of Mexico reef fish, or a vessel with such a permit fishing for Gulf of Mexico reef fish,

is limited to hook-and-line gear with no more than 3 hooks. Nonconforming gear is restricted to bag limits, or for reef fish without a bag limit, to 5% by weight of all fish aboard.

Additionally, Generic Amendment 3 for addressing EFH requirements (GMFMC 2005a) requires a weak link in the tickler chain of bottom trawls on all habitats throughout the Gulf of Mexico exclusive economic zone (EEZ). A weak link is defined as a length or section of the tickler chain that has a breaking strength less than the chain itself and is easily seen as such when visually inspected. Also, the amendment establishes an education program on the protection of coral reefs when using various fishing gears in coral reef areas for recreational and commercial fishermen.

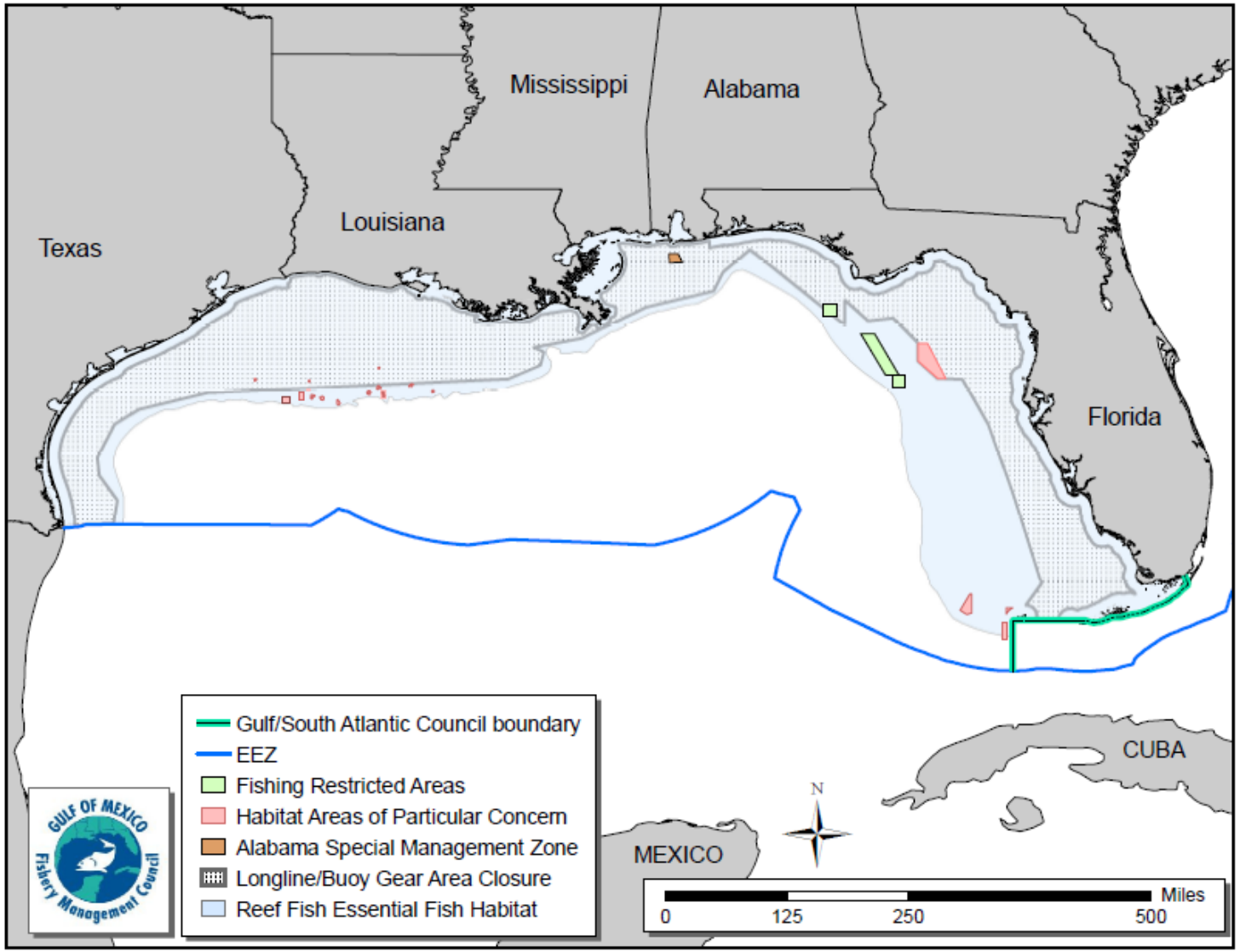

Figure 3.2.2. Map of most fishery management closed areas in the Gulf of Mexico.

The Deepwater Horizon MC252 oil spill affected at least one-third of the Gulf of Mexico from western Louisiana east to the Florida panhandle and south to the Campeche Bank of Mexico. Oil flowed from the ruptured wellhead at a rate of 52,700 – 62,200 barrels/day for a total of 4,928,100 barrels (restorethegulf.gov 2010). The impacts of the Deepwater Horizon MC252 oil spill on the physical environment may be significant and long-term. Oil was dispersed on the surface, and because of the heavy use of dispersants (both at the surface and at the wellhead), oil was also documented as being suspended within the water column (Camilli et al. 2010; Kujawinski et al. 2011). Floating and suspended oil washed onto coastlines in several areas of the Gulf of Mexico along with non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are persistent in the environment and can be transported hundreds of miles (Goodman 2003).

Surface or submerged oil during the Deepwater Horizon MC252 oil spill event could have restricted the normal processes of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column, thus affecting the long-standing hypoxic zone located west of the Mississippi River on the Louisiana continental shelf (NOAA 2010). Research by Hazen et al. (2010), however, has indicated that microbial biodegradation of hydrocarbons in the water column may have occurred without substantial oxygen drawdown. Residence time of hydrocarbons in sediments is also a point of interest. Among the indices developed for past oil spills (Harper 2003) and oil spill scenarios (National Environmental Research Institute 2011) is the "oil residence index"; however, this index does not appear to have been utilized during the assessment of the Deepwater Horizon MC252 oil spill.

Most recently, the Associated Press reported on September 6, 2012 that researchers from Louisiana State University had linked oil discovered on Elmer's Island and Grand Isle to the Deepwater Horizon MC252 oil spill after the landfall and dissipation of Hurricane Isaac (Burdeau and Reeves 2012)

3.3 Description of the Biological/Ecological Environment

There have been relatively few age and growth studies on gray triggerfish; however, this species is estimated to live up to 11 years, with 16 being the maximum age recorded (Hood and Johnson 1997; Wilson et al. 1995; Ingram 2001; Panama City National Marine Fisheries Service (NMFS) Database, accessed 2012). Gray triggerfish is estimated to grow rapidly within the first year of life (K = 0.39), then growth slows and is estimated at K = 0.152-0.183 year $^{-1}$ for both sexes combined (Hood and Johnson 1997; Ingram 2001; Wilson et al. 1995; SEDAR 9 2006a). The maximum length of gray triggerfish recorded was 27-28 inches fork length (697-725 mm FL) by Hood and Johnson (1997) and samples processed from 2003 through 2010 at the Panama City Laboratory from both fishery-dependent and fishery-independent samples in the Gulf of Mexico. The maximum weight document from the Panama City NMFS Database, accessed in 2012 was 13.8 lbs gutted weight (6.26 kg gw). Male gray triggerfish reach significantly larger sizes than females (Hood and Johnson 1997; Ingram 2001; Simmons and Szedlmayer 2012).

Gray triggerfish spawn as early as May and as late as August, with peak spawning in June and July in the Gulf of Mexico and South Atlantic Bight (Wilson et al. 1995; Hood and Johnson 1997; Ingram 2001; Moore 2001; MacKichan and Szedlmayer 2007; Simmons and Szedlmayer 2012). Both sexes are reproductively mature by age-2, 10 inches FL (250 mm FL). At this size

(~10 inches FL), some males are age-1 and all females are age-2 (Wilson et al. 1995; Ingram 2001). Male and female gray triggerfish have a combination of atypical spawning behaviors compared to most marine fishes (i.e., pelagic broadcast spawners) managed by the Council. Male gray triggerfish establish territories, build demersal nests, and form harems during the spawning season (Simmons and Szedlmayer 2012). Gray triggerfish form harems (one male and several females) 50% of the time at sites with active nests, a mean sex ratio of 1:4.2 male to females on the reef. While at other reefs without spawning (lack of active nests) the mean sex ratio is 1:1.3 male to females. After fertilization of the eggs, female gray triggerfish provide parental care of the eggs, while the male defends his territory and courts other female gray triggerfish on the reef (Simmons and Szedlmayer 2012).

After hatching from demersal nests, gray triggerfish larvae move up into the plankton and large numbers of larval and juvenile gray triggerfish are found associated with *Sargassum* spp. mats in late summer and fall (Dooley 1972; Bortone et al. 1977; Wells and Rooker 2004). After 4 to 7 months in the pelagic zone, juvenile gray triggerfish recruit to benthic substrate (Simmons and Szedlmayer 2011). Adult gray triggerfish are closely associated with both natural and artificial reefs (Johnson and Saloman 1984; Frazer and Lindberg 1994; Vose and Nelson 1994; Kurz 1995; Ingram 2001; Lingo and Szedlmayer 2006; Simmons and Szedlmayer 2011). Diet studies on juvenile and adult gray triggerfish, after recruitment to benthic structure, determined they consume a wide variety of invertebrates such as: barnacles, bivalves, polychaetes, crustaceans, echinoderms, and isopods (Vose and Nelson 1994; Kurz 1995). Adult gray triggerfish (mean size tagged = 13.6 inches FL (347 mm FL)) are estimated to have high site fidelity (Ingram and Patterson 2001). In a mark-recapture study completed in the northern Gulf of Mexico, 28 out of the 42 recaptures were made at the site of release (n = 206 tagged gray triggerfish; Ingram and Patterson 2001).

Status of the Stock Gray Triggerfish

See Section 1.1 under the Introduction.

General Information on Reef Fish Species

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

In general, reef fish are widely distributed in the Gulf of Mexico, occupying both pelagic and benthic habitats during their life cycle. Habitat types and life history stages are summarized in Table 3.3.1 and can be found in more detail in GMFMC (2004a). In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Exceptions to these generalizations include the gray triggerfish that lay their eggs in depressions in the sandy bottom, and gray snapper whose larvae are found around submerged aquatic vegetation. Juvenile and adult reef fish are typically demersal and are usually associated with bottom topographies on the continental shelf greater than 328 ft (about 100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard bottom substrates, ledges and caves, sloping soft bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. Juvenile red snapper are common on mud bottoms in the northern Gulf of Mexico, particularly off Texas through Alabama. Also, some juvenile snappers (e.g. mutton, gray, red, lane, and yellowtail snappers) and groupers (e.g. goliath grouper, red, gag, and yellowfin groupers) have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems (GMFMC 1981). More detail on hard bottom substrate and coral can be found in the FMP for Corals and Coral Reefs (GMFMC and SAFMC 1982).

Table 3.3.1. Summary of habitat utilization by life history stage for species in the Reef Fish FMP. This table was adapted from Table 3.2.7 in the final draft of the EIS from the Council's EFH generic amendment (GMFMC 2004a) and consolidated in this document.

Common name	Eggs	Larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Red snapper	Pelagic	Pelagic	Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Reefs	Sand/ shell bottoms
Queen snapper	Pelagic	Pelagic	Unknown	Unknown	Hard bottoms	
Mutton snapper	Reefs	Reefs	Mangroves, Reefs, SAV, Emergent marshes	Mangroves, Reefs, SAV, Emergent marshes	Reefs, SAV	Shoals/ Banks, Shelf edge/slope
Blackfin snapper	Pelagic		Hard bottoms	Hard bottoms	Hard bottoms, Shelf edge/slope	Hard bottoms, Shelf edge/slope
Cubera snapper	Pelagic		Mangroves, Emergent marshes, SAV	Mangroves, Emergent marshes, SAV	Mangroves, Reefs	Reefs
Gray snapper	Pelagic, Reefs	Pelagic, Reefs	Mangroves, Emergent marshes, Seagrasses	Mangroves, Emergent marshes, SAV	Emergent marshes, Hard bottoms, Reefs, Sand/ shell bottoms, Soft bottoms	
Lane snapper	Pelagic		Mangroves, Reefs, Sand/ shell bottoms, SAV, Soft bottoms	Mangroves, Reefs, Sand/ shell bottoms, SAV, Soft bottoms	Reefs, Sand/ shell bottoms, Shoals/ Banks	Shelf edge/slope
Silk snapper	Unknown	Unknown	Unknown	Unknown	Shelf edge	
Yellowtail snapper	Pelagic		Mangroves, SAV, Soft bottoms	Reefs	Hard bottoms, Reefs, Shoals/ Banks	
Wenchman	Pelagic	Pelagic			Hard bottoms, Shelf edge/slope	Shelf edge/slope
Vermilion snapper	Pelagic		Hard bottoms, Reefs	Hard bottoms, Reefs	Hard bottoms, Reefs	

Common name	Eggs	Larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Gray triggerfish	Reefs	Drift algae, *Sargassum*	Drift algae, *Sargassum*	Drift algae, Reefs, *Sargassum*	Reefs, Sand/ shell bottoms	Reefs, Sand/ shell bottoms
Greater amberjack	Pelagic	Pelagic	Drift algae	Drift algae	Pelagic, Reefs	Pelagic
Lesser amberjack			Drift algae	Drift algae	Hard bottoms	Hard bottoms
Almaco jack	Pelagic		Drift algae	Drift algae	Pelagic	Pelagic
Banded rudderfish		Pelagic	Drift algae	Drift algae	Pelagic	Pelagic
Hogfish			SAV	SAV	Hard bottoms, Reefs	Reefs
Blueline tilefish	Pelagic	Pelagic			Hard bottoms, Sand/ shell bottoms, Shelf edge/slope, Soft bottoms	
Tilefish (golden)	Pelagic, Shelf edge/ Slope	Pelagic	Hard bottoms, Shelf edge/slope, Soft bottoms	Hard bottoms, Shelf edge/slope, Soft bottoms	Hard bottoms, Shelf edge/slope, Soft bottoms	
Goldface tilefish	Unknown					
Speckled hind	Pelagic	Pelagic			Hard bottoms, Reefs	Shelf edge/slope
Yellowedge grouper	Pelagic	Pelagic		Hard bottoms	Hard bottoms	
Goliath grouper	Pelagic	Pelagic	Mangroves, Reefs, SAV	Hard bottoms, Mangroves, Reefs, SAV	Hard bottoms, Shoals/ Banks, Reefs	Reefs, Hard bottoms
Red grouper	Pelagic	Pelagic	Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	Hard bottoms, Reefs	

Common name	Eggs	Larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Warsaw grouper	Pelagic	Pelagic		Reefs	Hard bottoms, Shelf edge/slope	
Snowy grouper	Pelagic	Pelagic	Reefs	Reefs	Hard bottoms, Reefs, Shelf edge/slope	
Black grouper	Pelagic	Pelagic	SAV	Hard bottoms, Reefs	Hard bottoms, Mangroves, Reefs	
Yellowmouth grouper	Pelagic	Pelagic	Mangroves	Mangroves, Reefs	Hard bottoms, Reefs	
Gag	Pelagic	Pelagic	SAV	Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	
Scamp	Pelagic	Pelagic	Hard bottoms, Mangroves, Reefs	Hard bottoms, Mangroves, Reefs	Hard bottoms, Reefs	Reefs, Shelf edge/slope
Yellowfin grouper			SAV	Hard bottoms, SAV	Hard bottoms, Reefs	Hard bottoms

Status of Reef Fish Stocks

The Reef Fish FMP currently encompasses 31 species (Table 3.3.2). Eleven other species were removed from the FMP in 2012 by the Council in their Generic ACL/AM Amendment (GMFMC 2011a). Stock assessments and stock assessment reviews can be found on the Council (www.gulfcouncil.org) and Southeast Data Assessment and Review (SEDAR) (www.sefsc.noaa.gov/sedar) websites and have been conducted for 13 species:

- red snapper (SEDAR 7 2005; SEDAR 7 Update 2009)
- vermilion snapper (Porch and Cass-Calay 2001; SEDAR 9 2006c; SEDAR 9 Update 2011a)
- yellowtail snapper (Muller et al. 2003; SEDAR 3 2003; O'Hop et al. 2012)
- mutton snapper (SEDAR 15A 2008)
- gray triggerfish (Valle et al. 2001; SEDAR 9 2006a; SEDAR 9 Update 2011b)
- greater amberjack (Turner et al. 2000; SEDAR 9 2006b; SEDAR 9 Update 2010)
- hogfish (Ault et al. 2003; SEDAR 6 2004b)
- red grouper (NMFS 2002; SEDAR 12 2007; SEDAR 12 Update 2009)
- gag grouper (Turner et al. 2001; SEDAR 10 2006; SEDAR 10 Update 2009)
- black grouper (SEDAR 19 2010)
- yellowedge grouper (Cass-Calay and Bahnick 2002; SEDAR 22 2011b)
- tilefish (golden) (SEDAR 22 2011a)
- goliath grouper (Porch et al. 2003; SEDAR 6 2004a; SEDAR 23 2011)

The NMFS Office of Sustainable Fisheries updates its Status of U.S. Fisheries Report to Congress on a quarterly basis utilizing the most current stock assessment information. The most recent update can be found at: (http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm). The status of both assessed and unassessed stocks is shown in Table 3.3.2.

Table 3.3.2. Species of the reef fish FMP grouped by family.

Common Name	Scientific Name	Stock Status
Family Balistidae – Triggerfishes		
gray triggerfish	*Balistes capriscus*	Overfished, overfishing
Family Carangidae – Jacks		
greater amberjack	*Seriola dumerili*	Overfished, overfishing
lesser amberjack	*Seriola fasciata*	Unknown
almaco jack	*Seriola rivoliana*	Unknown
banded rudderfish	*Seriola zonata*	Unknown
Family Labridae - Wrasses		
Hogfish	*Lachnolaimus maximus*	Unknown
Family Malacanthidae - Tilefishes		
tilefish (golden)	*Lopholatilus chamaeleonticeps*	Not overfished, no overfishing
blueline tilefish	*Caulolatilus microps*	Unknown
goldface tilefish	*Caulolatilus chrysops*	Unknown
Family Serranidae - Groupers		
gag	*Mycteroperca microlepis*	Overfished, overfishing
red grouper	*Epinephelus morio*	Not overfished, no overfishing
scamp	*Mycteroperca phenax*	Unknown
black grouper	*Mycteroperca bonaci*	Not overfished, no overfishing
yellowedge grouper	*Epinephelus flavolimbatus*	Not overfished, no overfishing
snowy grouper	*Epinephelus niveatus*	Unknown
speckled hind	*Epinephelus drummondhayi*	Unknown
yellowmouth grouper	*Mycteroperca interstitialis*	Unknown
yellowfin grouper	*Mycteroperca venenosa*	Unknown
warsaw grouper	*Epinephelus nigritus*	Unknown
**goliath grouper	*Epinephelus itajara*	Unknown
Family Lutjanidae - Snappers		
queen snapper	*Etelis oculatus*	Unknown
mutton snapper	*Lutjanus analis*	Not overfished, no overfishing
blackfin snapper	*Lutjanus buccanella*	Unknown
red snapper	*Lutjanus campechanus*	Overfished, no overfishing
cubera snapper	*Lutjanus cyanopterus*	Unknown
gray snapper	*Lutjanus griseus*	Unknown
lane snapper	*Lutjanus synagris*	Unknown
silk snapper	*Lutjanus vivanus*	Unknown
yellowtail snapper	*Ocyurus chrysurus*	Not overfished, no overfishing
vermilion snapper	*Rhomboplites aurorubens*	Not overfished, no overfishing
wenchman	*Pristipomoides aquilonaris*	Unknown

Note: **Goliath grouper is a protected grouper and benchmarks do not reflect appropriate stock dynamics.

Protected Species

There are 28 different species of marine mammals that may occur in the Gulf of Mexico. All 28 species are protected under the Marine Mammal Protection Act (MMPA) and six are also listed as endangered under the Endangered Species Act (ESA) (i.e., sperm, sei, fin, blue, humpback and North Atlantic right whales). Other species protected under the ESA occurring in the Gulf of Mexico include five sea turtle species (Kemp's Ridley, loggerhead, green, leatherback, and hawksbill); two fish species (Gulf sturgeon and smalltooth sawfish), and two coral species (elkhorn coral and staghorn coral). Information on the distribution, biology, and abundance of these protected species in the Gulf of Mexico is included in final EIS to the Council's Generic EFH Amendment (GMFMC 2004a) and the February 2005, October 2009, and September 2011 ESA biological opinions on the reef fish fishery (NMFS 2005; NMFS 2009; NMFS 2011a). Marine Mammal Stock Assessment Reports and additional information are also available on the NMFS Office of Protected Species website: http://www.nmfs.noaa.gov/pr/species/.

The MMPA 2012 List of Fisheries (76 FR 73912) considers vertical line gear and longline gear as Category III gears. These gears are the dominant gear used in the Gulf of Mexico reef fish fishery - vertical line (90%) and longline (5.4%) gear. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. Dolphins are the only species documented as interacting with these fisheries. Bottlenose dolphins prey upon on the bait, catch, and/or released discards of fish from the reef fish fishery. They are also a common predator around reef fish vessels, feeding on the discards.

All five species of sea turtles are adversely affected by the Gulf of Mexico reef fish fishery. Incidental captures are relatively infrequent, but occur in all commercial and recreational hook-and-line components of the reef fishery. Captured sea turtles can be released alive or can be found dead upon retrieval of the gear as a result of forced submergence. Sea turtles released alive may later succumb to injuries sustained at the time of capture or from exacerbated trauma from fishing hooks or lines that were ingested, entangling, or otherwise still attached when they were released. Sea turtle release gear and handling protocols are required in the commercial and for-hire reef fish fisheries to minimize post-release mortality.

Smalltooth sawfish also interact with the Gulf of Mexico reef fish fishery, but to a much lesser extent. Smalltooth sawfish primarily occur in the Gulf of Mexico off peninsular Florida. Incidental captures in the commercial and recreational hook-and-line components of the reef fish fishery are rare events, with only eight smalltooth sawfish estimated to be incidentally caught annually, and none are expected to result in mortality (NMFS 2005). Fishermen in this fishery are required to follow smalltooth sawfish safe handling guidelines. The long, toothed rostrum of the smalltooth sawfish causes this species to be particularly vulnerable to entanglement in fishing gear.

3.4 Description of the Economic Environment

3.4.1 Commercial Sector

A description of the economic environment for the commercial sector of the reef fish fishery is contained in the Generic ACL/AM Amendment (GMFMC 2011a) and is incorporated herein by reference. Select updated statistics relevant to the harvest of gray triggerfish are provided in the following sections.

3.4.1.1 Vessel Activity

Tables 3.4.1.1.1 and 3.4.1.1.2 contain summary vessel and trip counts, landings, and revenue information from vessels landing at least one pound of gray triggerfish from 2005 through 2010. Although available, data for 2010 were not included in computing the average annual performance estimates as to be used as an indication of normal sector performance. Commercial fishing in 2010 was not typical due to the extensive closures and general decline in fishing that occurred as a result of the Deepwater Horizon MC252 oil spill. For information on the Deepwater Horizon MC252 oil spill and associated closures, see: http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm. Data for 2010 are, nevertheless, provided and readers are urged to use caution using the 2010 data. Final harvest and revenue data for 2011 were not available at the time of this assessment.

The tables contain vessel and trip counts and landings totals from the NMFS Southeast Fisheries Science Center (SEFSC) logbook (logbook) data. Dockside values were generated using landings information from logbook data and price information from the NMFS SEFSC Accumulated Landings System (ALS) data. The gray triggerfish landings totals may differ from those derived from different sources because of potential differences in species identification or summation algorithms.

On average, during the period 2005 through 2009, 382 vessels per year landed gray triggerfish (Table 3.4.1.1.1). These vessels collectively averaged 2,181 trips per year with at least one pound of landed gray triggerfish and 3,958 trips without gray triggerfish (Table 3.4.1.1.1). The average annual total dockside revenue (2010 dollars) from gray triggerfish was approximately $107,000, approximately $13.87 million from other species co-harvested with gray triggerfish (on the same trip), and approximately $19.06 million from other species harvested on trips that did not harvest gray triggerfish (Table 3.4.1.1.2). Total average annual revenues were approximately $33.04 million, or approximately $87,000 per vessel (Table 3.4.1.1.2). It is noted that, although fewer than 400 vessels per year harvested gray triggerfish, any vessel with a commercial reef fish permit can harvest gray triggerfish. On July 9, 2012, 903 vessels had a valid (non-expired) or renewable reef fish commercial permit. A renewable permit is an expired permit that may not be actively fished, but is renewable for up to one year after expiration.

Table 3.4.1.1.1. Summary of vessel counts, trips, and landings (pounds gutted weight (lbs gw)) for vessels landing at least one pound of gray triggerfish, 2005 through 2010.

Year	Number of Vessels	Number of Trips that Caught Gray Triggerfish	Gray Triggerfish Landings (lbs gw)	'Other Species' Landings Jointly Caught with Gray Triggerfish (lbs gw)	Number of Trips that Only Landed Other Species	'Other Species' Landings on Trips without Gray Triggerfish (lbs gw)
2005	459	2,835	145,452	5,162,630	4,960	7,770,118
2006	416	2,707	94,852	4,941,214	4,741	7,595,981
2007	337	1,799	94,799	4,522,359	3,129	5,555,514
2008	344	1,789	87,779	4,764,285	3,289	6,778,858
2009	353	1,777	79,804	4,692,876	3,671	6,639,919
2005 through 2009 Average	382	2,181	100,537	4,816,673	3,958	6,868,078
2010	276	1,427	49,578	3,507,983	2,115	4,148,134

Source: SERO-Coastal Fisheries Logbook dataset.

Table 3.4.1.1.2. Summary of vessel counts and revenue (2010 dollars) for vessels landing at least one pound of gray triggerfish, 2005 through 2010).

Year	Number of Vessels	Dockside Revenue from Gray Triggerfish (2010 $)	Dockside Revenue from 'Other Species' Jointly Caught with Gray Triggerfish (2010 $)	Dockside Revenue from 'Other Species' Caught on Trips without Gray Triggerfish (2010 $)	Total Dockside Revenue (2010 $)	Average Total Dockside Revenue per Vessel (2010 $)
2005	459	$170,750	$14,563,106	$20,684,085	$35,417,941	$77,163
2006	416	$96,822	$14,676,352	$20,473,184	$35,246,358	$84,727
2007	337	$91,881	$13,705,028	$16,866,638	$30,663,547	$90,990
2008	344	$87,253	$13,908,560	$19,534,423	$33,530,236	$97,472
2009	353	$88,377	$12,495,739	$17,733,150	$30,317,266	$85,885
2005 through 2009 Average	382	$107,017	$13,869,757	$19,058,296	$33,035,070	$87,247
2010	276	$98,836	$10,238,187	$12,282,365	$22,578,483	$81,806

Source: SERO-Coastal Fisheries Logbook dataset and ALS data.

3.4.1.2 Business Activity

Estimates of the business activity (economic impacts) in the U.S. associated with the Gulf of Mexico commercial gray triggerfish harvests were derived using the model developed for and applied in NMFS (2011b) and are provided in Table 3.4.1.2.1. Business activity for the commercial sector is characterized in the form of full-time equivalent (FTE) jobs, income impacts (wages, salaries, and self-employed income), and output (sales) impacts (gross business sales). Income impacts should not be added to output (sales) impacts because this would result in double counting. The estimates of economic activity include the direct effects (effects in the sector where an expenditure is actually made), indirect effects (effects in sectors providing goods and services to directly affected sectors), and induced effects (effects induced by the personal consumption expenditures of employees in the direct and indirectly affected sectors).

Table 3.4.1.2.1. Average annual business activity associated with the harvests of vessels that harvest gray triggerfish, 2005-2009.

Species	Average Dockside Revenue[1] (millions)	Total Jobs	Harvester Jobs	Output (Sales) Impacts (millions)	Income Impacts (millions)
Gray Triggerfish	$0.11	20	3	$1.41	$0.60
All Species[2]	$33.04	6,226	812	$440.52	$187.75

[1]2010 dollars.
[2]Includes dockside revenues and economic activity associated with the average annual harvests of all species harvested by vessels that harvested gray triggerfish.

As shown in Table 3.4.1.2.1, because the commercial sector does not harvest much gray triggerfish, little business activity is associated with the sale of this species. Vessels that harvest gray triggerfish also harvest other species. All revenues from all species on all trips contribute towards making these vessels economically viable and contribute to the economic activity associated with these vessels. The average annual total ex-vessel revenues from all species (including gray triggerfish) harvested during 2005 through 2009 by vessels that harvested gray triggerfish was approximately $33.04 million (2010 dollars). The economic activity associated with these revenues is estimated to support 6,226 FTE jobs (812 in the harvesting sector) and generate approximately $440.52 million in output (sales) impacts and approximately $187.75 million in income impacts.

3.4.1.3 Dealers

Federally permitted commercial vessels landing reef fish, including gray triggerfish, can only sell their catch to a dealer with a federal dealer permit. On November 21, 2012, 198 entities had a federal reef fish dealer permit. No income or minimum sales requirement exists to obtain a federal dealer permit. As a result, the total number of dealers can vary during a year and from year to year.

3.3.1.4 Imports

Information on U.S. imports of all marine species, either fresh or frozen, are available at: http://www.st.nmfs.noaa.gov/st1/trade/cumulative_data/TradeDataProduct.html. Information on the imports of gray triggerfish or reef fish in general, is not available. However, information on imports of snapper and grouper species is available and may be informative to the relative magnitude of imports versus domestic harvest of reef fish in general as well as for gray triggerfish. In 2010, imports of all snapper and grouper species (fresh and frozen) were approximately 44,750,000 lbs ww valued at approximately $112.98 million (2010 dollars). These amounts are contrasted with the domestic harvest of all snapper and grouper in the U.S. in 2010 of approximately 13,350,000 lbs ww valued at approximately $37.38 million (data available at: http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html). The levels of domestic production and imports are not perfectly comparable for several reasons, including considerations of different product form, such as fresh versus frozen and possible product mislabeling. The difference in the magnitude of imports relative to amount of domestic harvest, however, is indicative of the dominance of imports in the domestic market.

3.4.2 Recreational Sector

A description of the economic environment for the recreational sector of the reef fish fishery is contained in the Generic ACL/AM Amendment (GMFMC 2011a) and is incorporated herein by reference. Select updated statistics relevant to fishing for gray triggerfish are provided in the following sections.

3.4.2.1 Angler Effort

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

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

Other measures of effort are possible, such as the number of harvest trips (the number of individual angler trips that harvest a particular species regardless of target intent), and directed trips (the number of individual angler trips that either targeted or caught a particular species), among other measures. Estimates of target and catch effort for gray triggerfish in the Gulf of Mexico for the period 2005 through 2010 are provided in Table 3.4.2.1.1. As previously discussed with respect to the commercial sector, although available, data for 2010 were not included in computation of the average annual performance estimates for the recreational sector. The Deepwater Horizon MC252 oil spill resulted in extensive closures and a general decline in

fishing. For information on the Deepwater MC252 oil spill and associated closures, see: http://sero.nmfs.noaa.gov/deepwater_horizon_oil_spill.htm. Data for 2010 are, nevertheless, provided and readers are urged to use caution using the 2010 data. Final data for 2011 were not available at the time of this assessment.

As shown in Table 3.4.2.1.1, very few trips target gray triggerfish (on average, less than one tenth of 1% of total trips taken for all species), while approximately 15 times as many trips catch gray triggerfish per year. Gray triggerfish could obviously, therefore, be classified as a bycatch species harvested while targeting other species or on a general fishing trip on which no particular species is sought.

Table 3.4.2.1.1. Recreational target effort (individual angler trips), 2005 through 2010. [1]

Species	2005	2006	2007	2008	2009	2005-2009 Average	2010
Target Trips	12,314	4,804	16,675	18,089	9,243	12,203	24,306
Catch Trips	238,279	215,694	239,645	170,318	141,616	191,818	135,913
Total Trips, All Species	21,906,426	23,862,890	24,267,431	24,108,842	22,296,834	23,633,999	20,766,690

[1]These results do not include Texas or headboat effort.
Source: SERO-MRFSS data.

Target intent is not collected in the NMFS Headboat Survey, so estimation of target effort in the headboat sector is not possible with current available data. Table 3.4.2.1.2 contains estimates of the number of headboat angler days (normalized 12-hour days) for the Gulf states for 2005 through 2010. Mississippi is not included in the table because headboat data was not collected in Mississippi prior to 2010. In 2010, 498 headboat trips were recorded in Mississippi. As previously discussed for the estimates of target and catch trips, caution is advised in the use of 2010 statistics.

Table 3.4.2.1.2. Headboat angler days.

	Florida/Alabama	Louisiana	Texas	Total
2005	130,233	*	59,857	190,090
2006	124,049	5,005	70,789	199,843
2007	136,880	2,522	63,764	203,166
2008	130,176	2,945	41,188	174,309
2009	142,438	3,268	50,737	196,443
2005 through 2009 Average	132,755	3,435	57,267	192,770
2010	111,018	217	47,154	158,389

*Unavailable. Headboat data not collected in Louisiana in 2005.
Source: SERO-Headboat Survey.

3.4.2.2 Permits

The for-hire sector is comprised of charter vessels and headboats (party boats). Although charter vessels tend to be smaller, on average, than headboats, the key distinction between the two types of operations is how the fee is determined. On a charter trip, the fee charged is for the entire vessel, regardless of how many passengers are carried, whereas the fee charged for a headboat trip is paid per individual angler.

A federal for-hire vessel permit has been required for reef fish since 1996 and the sector currently operates under a limited access system. On November 21, 2012, there were 1,364 valid (non-expired) or renewable Gulf of Mexico reef fish for-hire permits. Although the permit does not distinguish between headboats and charterboats, based on the number of vessels on the NMFS Headboat Survey active survey list on January 24, 2012, an estimated 69 headboats operate in the Gulf of Mexico.

Information on Gulf of Mexico headboat and charter vessel operating characteristics, including average fees and net operating revenues, is included in Savolainen et al. (2012) and is incorporated herein by reference.

No specific permitting requirements exist for recreational anglers who fish for or harvest gray triggerfish. Instead, anglers are required to possess either a state recreational fishing license that authorizes saltwater fishing in general, or be registered in the federal National Saltwater Angler Registry system, subject to appropriate exemptions. As a result, it is not possible with available data to identify how many individual anglers fish for gray triggerfish and may be affected by this amendment.

3.4.2.3 Business Activity

Estimates of the business activity (economic impacts) associated with recreational angling for gray triggerfish were derived by using average impact coefficients for recreational angling for all species, as derived from an add-on survey to the MRFSS. This add-on survey collected economic expenditure information, and is described and utilized in NMFS (2011b). Estimates of these coefficients for target or catch behavior for individual species are not available. Estimates of the average expenditures by recreational anglers are also provided in NMFS (2011b) and are incorporated herein by reference.

Business activity for the recreational sector is characterized in the form of FTE jobs, output (sales) impacts (gross business sales), and value-added impacts (difference between the value of goods and the cost of materials or supplies). Job and output (sales) impacts are equivalent metrics across both the commercial and recreational sectors. Income impacts (commercial sector) and value-added impacts (recreational sector) are not equivalent, though similarity in the magnitude of multipliers generated and used for the two metrics may result in roughly equivalent values. Similar to income impacts, value-added impacts should not be added to output (sales) impacts because this would result in double counting.

Estimates of the average target effort (2005 through 2009) and associated business activity (2010

dollars) are provided in Table 3.4.2.3.1. The estimates of the business activity provided in these tables only apply at the state level. National-level estimates are not available. Addition of the state-level estimates to produce either a regional or national total will underestimate the actual total amount of business activity because summing the state estimates will not capture business activity that leaks outside the individual states. A state estimate only reflects activities that occur within that state and not related activity that occurs in another state. For example, if a good is produced in Alabama but sold in Florida, the measure of business activity in Florida associated with the sale of the product in Florida does not include the production process that occurred in Alabama. Assessment of business activity at the national (or regional) level would capture activity in both states and include all activity except that which leaks into other nations (or regions).

Table 3.4.2.3.1. Summary of gray triggerfish target trips (2005 through 2009 average) and associated business activity (2010 dollars). Output and value added impacts are not additive.

	Alabama	West Florida	Louisiana	Mississippi	Texas
	Shore Mode				
Target Trips	0	0	0	0	*
Output Impact	$0	$0	$0	$0	*
Value Added Impact	$0	$0	$0	$0	*
Jobs	0	0	0	0	*
	Private/Rental Mode				
Target Trips	4,141	2,884	448	0	*
Output Impact	$244,010	$132,612	$37,001	$0	*
Value Added Impact	$133,590	$78,856	$18,198	$0	*
Jobs	3	1	0	0	*
	Charter Mode				
Target Trips	2,405	2,347	0	0	*
Output Impact	$1,268,177	$746,397	$0	$0	*
Value Added Impact	$698,089	$442,537	$0	$0	*
Jobs	17	8	0	0	*
	All Modes				
Target Trips	6,546	5,231	448	0	*
Output Impact	$1,512,187	$879,009	$37,001	$0	*
Value Added Impact	$831,679	$521,393	$18,198	$0	*
Jobs	20	9	0	0	*

*Because target information for Texas is unavailable, associated business activity cannot be calculated. Source: effort data from the MRFSS, economic impact results calculated by SERO using the model developed for NMFS (2011b).

Estimates of the business activity (economic impacts) associated with headboat effort are not available. The headboat sector in the Southeast is not covered by the MRFSS, so estimation of the appropriate business activity coefficients for the headboat sector was not conducted in the

development of NMFS (2011b). Although appropriate business activity coefficients are available for the charterboat sector, potential differences in certain factors in the two sectors, such as the for-hire fee, rate of tourist versus local participation rates, and expenditure patterns, may result in significant differences in the business activity associated with the head boat sector relative to the charterboat sector.

3.5 Description of the Social Environment

A description of the social environment is included in the Generic ACL/AM Amendment (GMFMC 2011a) and Reef Fish Amendment 30A (GMFMC 2008). These documents are incorporated herein by reference. The description focuses on available geographic and demographic data to identify communities with a strong relationship to fishing for species in the reef fish complex in the Generic ACL/ AM Amendment (GMFMC 2011a) and gray triggerfish more specifically in Amendment 30A (GMFMC 2008). A strong relationship is defined as having significant landings and revenue for managed species. Thus, impacts from regulatory change are more likely to occur in places with greater landings of these species. For gray triggerfish, Panama City and Destin, Florida have the greatest commercial landings of all Gulf of Mexico communities, followed by Golden Meadow, Louisiana with substantially less landings. For the recreational sector, there are many communities spread throughout the Gulf of Mexico, from Florida to Texas that serve as a launching point for trips that target reef fish species including gray triggerfish, but the majority of the landings are in Alabama and the Florida Panhandle.

Gray triggerfish are part of a multi-species fishing strategy rather than a directed fishery. Most commercially caught gray triggerfish are landed by vertical line (90%, Figure 3.1.1) alongside other species. Furthermore, some commercial fishermen fish throughout the Gulf of Mexico and unload in various locations, making it difficult to identify communities that would be most affected by these regulations. Fish processors who buy gray triggerfish take in multiple reef fish species so they are not totally dependent on gray triggerfish landings. Depending on what percentage gray triggerfish constitutes their total landings, the processors may or may not be heavily impacted by any reduction in landings of gray triggerfish. It is thus difficult to isolate potential impacts on communities arising from the actions in this amendment. However, communities may be affected by changes in fishing regulations generally, and by changes to fishing for gray triggerfish, specifically. The number of fishing trips taken may not be affected by closing the harvest of gray triggerfish, yet social impacts would still be expected. Although gray triggerfish may still be caught, prohibiting the landing and harvest of gray triggerfish results in a qualitatively different fishing experience.

3.5.1 Environmental Justice Considerations

Executive Order 12898 requires that federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. The main

focus of 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).

The implementation of the proposed actions of this amendment would not discriminate against any group based on their race, ethnicity, or national origin because the proposed actions would be applied to all participants in the fishery. Thus, the actions of this amendment are not expected to result in adverse or disproportionate environmental or public health impacts to EJ populations. Nevertheless, it is not possible to determine the social impacts on populations with EJ concerns (e.g., minorities and the poor) from implementing these management restrictions, because data are not available concerning the use or reliance on the gray triggerfish stock by EJ populations. Information on the race and income status for groups at the different participation levels (captains, crew, dealers, processors, persons employed in recreational fishing and associated support industries, etc.) is not available. Gray triggerfish is caught offshore requiring a fishing vessel for harvest. Thus, populations in poverty are not likely to be impacted by the proposed measures. The use of or reliance on gray triggerfish by ethnic or racial minorities, or by Native American tribes, is unknown. There is no known subsistence fishing for gray triggerfish. Reef Fish Amendment 35 includes an EJ analysis of Gulf coastal counties and is incorporated here by reference (GMFMC 2012). The analysis used 2010 Census Bureau data to identify counties in which populations of EJ concern may reside (minorities or those in poverty). As summarized in Section 3.5, the communities with the strongest relationship to gray triggerfish fishing are Destin and Panama City, Florida, and Golden Meadow, Louisiana. None of these communities are located within counties which exceed the EJ threshold with regard to minorities or poverty. Although no EJ issues have been identified or are expected to arise, 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 Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.), originally enacted in 1976 as the Fishery Conservation and Management Act. The Magnuson-Stevens Act claims sovereign rights and exclusive fishery management authority over most fishery resources within the EEZ. The EEZ is defined as an area extending 200 nautical miles from the seaward boundary of each of the coastal states. The Magnuson-Stevens Act also claims authority over U.S. anadromous species and continental shelf resources that occur beyond the EEZ.

Responsibility for federal fishery management decision-making is divided between the Secretary of Commerce (Secretary) and eight regional fishery management councils that represent the expertise and interests of constituent states. Regional councils are responsible for preparing, monitoring, and revising management plans for fisheries needing management within their jurisdiction. The Secretary is responsible for promulgating regulations to implement proposed plans and amendments after ensuring management measures are consistent with the Magnuson-

Stevens Act and with other applicable laws summarized in Appendix E. In most cases, the Secretary has delegated this authority to NMFS.

The Gulf of Mexico Fishery Management Council is responsible for fishery resources in federal waters of the Gulf of Mexico. These waters extend to 200 nautical miles (370 kilometers (km)) offshore from the nine nautical mile (16.7 km) seaward boundary of the states of Florida and Texas, and the three nautical mile (5.5 km) seaward boundary of the states of Alabama, Mississippi, and Louisiana. The length of the Gulf of Mexico coastline is approximately 1,631 miles (2,625 km). Florida has the longest coastline of 770 miles (1,239 km) along its Gulf coast, followed by Louisiana (397 miles or 639 km), Texas (361 miles or 581 km), Alabama (53 miles or 85 km), and Mississippi (44 miles or 71 km).

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

Regulations contained within FMPs are enforced through actions of the NMFS's Office of Law Enforcement, the U.S. Coast Guard, and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. These activities are being coordinated by the Council's Law Enforcement Advisory Panel and the Gulf States Marine Fisheries Commission's Law Enforcement Committee have developed a two year "Gulf Cooperative Law Enforcement Strategic Plan – 2011 - 2012."

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 of Mexico 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 in Amendment 22 (GMFMC 2004b).

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

4.1 Action 1: Modify the Gray Triggerfish Rebuilding Plan

4.1.1 Direct and Indirect Effects on the Physical Environment

Impacts of these alternatives on the physical environment would depend on the resulting reduction in the level of fishing effort by the commercial and recreational sectors. The commercial sector is currently allocated 21% of the stock annual catch limit (ACL) and the recreational sector is currently allocated 79% of the stock ACL. Using gray triggerfish landings history from 2001 through 2011, commercial longlines landed 5.4% of the gray triggerfish and vertical lines (i.e., electric reel, bandit rig, hook-and-line, and trolling) landed 90% of the gray triggerfish (Figure 3.1.1). The remaining fish were landed with fish traps that are no longer allowed in the reef fish fishery. The recreational sector (headboat, charter, and private modes) primarily uses vertical gear (hook-and-line) to fish for gray triggerfish (97%; Figure 3.1.3). Gray triggerfish is also harvested by recreational fishermen using spearguns (3%).

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. Lack of gear shifting even in strong currents was attributed to setting anchors at either end of the longline to prevent movement (Grimes et al. 1982), which is the standard in the longline component of the commercial sector of the reef fish fishery. Based on the direct observations, it is logical to assume that bottom longline gear would have a minor impact on sandy or muddy habitat areas. However, due to the vertical relief that hard bottom and coral reef habitats provide, it would be expected that bottom longline gear may become entangled, resulting in potential negative 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 global positioning technology. The cumulative effects of repeated anchoring could damage the hard bottom areas where fishing for gray triggerfish and other reef fish 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.

Spearguns are used by both the recreational and commercial sector to harvest gray triggerfish, 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).

The effects on the physical environment from the different rebuilding plan alternatives are based on fishing effort. This effort is related to the level of landings allowed in a rebuilding plan - the greater the landings, the greater the fishing effort. **Alternative 1**, no action would allow the greatest amount of landings and so would be expected to cause gray triggerfish fishing to affect the physical environment the most. **Alternative 2**, which would set the fishing mortality rate (F) to zero, would allow no harvest, thus the effects from gray triggerfish fishing would be the least. **Preferred Alternative 3** and **Alternative 4** would allow harvests between **Alternatives 1** and **2** and so their effects would be intermediate. **Alternative 4**, with a higher F, would allow a greater harvest than **Preferred Alternative 3**, and consequently is less beneficial to the physical environment.

There are two considerations to these analyses that need to be taken into account when evaluating this action. One is that the above analysis is true over the short-term. After the stock has returned to equilibrium, the harvest and the effects on the physical environment should stabilize regardless of which alternative is selected. The difference between the alternatives is how long it takes to achieve equilibrium levels. The other consideration is any effects of changes to gray triggerfish fishing should have minimal effects on the physical environment. As described in Sections 2.3 and 2.4, gray triggerfish are not targeted by the reef fish fishery, but are more of a valued catch that are retained when targeting other species like red snapper, gag, and red grouper. This statement is supported by the relatively high number of commercial and recreational trips with no or few gray triggerfish caught (Tables 3.4.1.1.1 and 3.4.2.1.1; Figures 2.3.2.1 and 2.4.2.1).

4.1.2 Direct and Indirect Effects on the Biological/Ecological Environment

Gray triggerfish management actions that affect the biological/ecological environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size. Fishing gears have different selectivity patterns, which refer to a fishing methods' ability to target and capture organisms by size and species. For other reef fish 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. However, due to the hardiness of gray triggerfish, as discussed in Sections 2.3 and 2.4, this is not a major concern.

Maximum sustainable yield (MSY) is the largest average catch that can be taken at a sustained level of harvest from a stock in average environmental conditions, and for gray triggerfish, is also considered the overfishing limit. Associated with MSY is a fishing mortality (F) and stock biomass (B) that would sustain this harvest (F_{MSY} and B_{MSY}, respectively) from which the acceptable biological catch (ABC), annual catch limits (ACL), optimum yield (OY), minimum stock size threshold (MSST), and maximum fishing mortality threshold (MFMT) are generally derived. If fishing is allowed to exceed MFMT (overfishing) for several years, then the stock size will decline to a level where the harvest can no longer be sustained. This overfishing can manifest itself in two ways. The first is growth overfishing where the fishing pressure on smaller fish is too great to allow the fishery to produce MSY. The second is recruitment overfishing where the fishing pressure is so great that the population is no longer able to replace itself. Recruitment overfishing for an extended period of time can lead to the collapse of the stock, or a condition where all fishing effort including bycatch from non-directed fisheries would need to be severely curtailed or ended for the stock to rebuild. Taken to its extreme, recruitment overfishing can result in the biological extinction of a population or at least a reduction of the stock size where it cannot support a fishery.

Fishing can affect life history characteristics of reef fish such as growth and maturation rates. Although these trends have not been observed for gray triggerfish in the Gulf of Mexico, it has been noted in other reef fish species such as vermilion snapper (Zhao et al. 1997, Hood and Johnson 1999).

Changes in the abundance from fishing (e.g., changing fishing selectivities) are likely to have ecological effects. However, the relationships among species in marine ecosystems are complex and poorly understood. As a result, the nature and magnitude of ecological effects are difficult to predict with any accuracy. Recent advances in ecosystem modeling may provide some insight into the cascading effects of gray triggerfish management measures. Currently, the only model for the Gulf of Mexico that could address these issues is an Ecopath model being developed by the Florida Fish and Wildlife Research Institute and the National Marine Fisheries Service (NMFS) (Behzad Mahmoudi, fisheries biologist, pers. comm.). The development of this model is ongoing and it would be impractical to apply at this time. Without knowing how an increase or decrease in the abundance of gray triggerfish would affect other populations or that it would even be detectable, the ecological effects of the various alternatives cannot be distinguished at this time.

Even though current models that can examine the linkages between species are not yet adequate to look at the effects of management measures, it is important to note that some species such as red snapper, greater amberjack, red grouper, and gag are being managed to improve their stock condition. Other species (e.g., vermilion snapper and deepwater grouper) are being managed to maintain a certain stock condition. Therefore, the effects of improving the gray triggerfish stock to avoid overfishing could have an adverse effect on these stocks. These effects could come about through competition for food or space. For example, adult gray triggerfish feed primarily on benthic invertebrates (Frazer et al. 1991; Kurz 1995; Pattengill et al. 1997). Less of these

prey items may be available to other reef fish species if the gray triggerfish stock is allowed to increase.

The reef fish fishery can affect species outside the reef fish complex. Specifically, sea turtles have been observed to be directly affected by the use of bottom longlines in the Gulf of Mexico. These effects occur when sea turtles interact with fishing gear and result in an incidental capture injury or mortality and are summarized in Reef Fish Amendment 31 (GMFMC 2009). A variety of factors may affect the likelihood and frequency of sea turtles being caught in reef fish bottom longline gear. The spatial overlap between fishing effort and sea turtles is one such factor. The more abundant sea turtles are in a given area where the fishing gear is set, the greater probability a sea turtle would be incidentally caught on the gear. However, for sea turtles and other projected species, the most recent biological opinion for the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico concluded authorization of the Gulf of Mexico reef fish fishery managed in the reef fish plan is not likely to jeopardize the continued existence of sea turtles, smalltooth sawfish, or *Acropora* species (NMFS 2009). The NMFS' 2012 List of Fisheries (see Section 3.3) considers vertical line gear and longline gear, the dominant gear used in the Gulf of Mexico reef fish fishery, as Category III gears. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

The setting of a biomass target and date has no direct impact on the biological/ecological environment. However, establishing a target biomass level may result in management actions expected to rebuild the gray triggerfish stock from its present level (Actions 3 and 4). This would indirectly affect the gray triggerfish stock by rebuilding it to a level where it can support higher removals without becoming overfished. In addition, it can better resist periodic environmental impacts.

Given that the more quickly a stock is rebuilt provides the least adverse biological/ecological effects to the gray triggerfish stock (based on the reasons discussed above), **Alternative 2**, which would be expected to rebuild the stock in 4 years is expected to provide the least adverse effect to the gray triggerfish biological/ecological environment. However, the more quickly a stock size increases, the more adverse the effects on other fish species through competition for food or space, or to prey species through predation. In terms of effects, **Alternative 2** would be followed by **Preferred Alternative 3**, which would be expected to rebuild the stock in 5 years, and then by **Alternative 4**, which would be expected to rebuild the stock in 6 years. **Alternative 1**, the no-action alternative, would continue a rebuilding plan that is not projected to allow the stock to recover in 10 years. Based on Southeast Data, Assessment, and Review (SEDAR) 9 Update (2011b) the stock is still undergoing overfishing and is overfished. Therefore, **Alternative 1** would be expected to have the most adverse effect on the gray triggerfish stock, but the least adverse effect on other fish and prey species.

4.1.3 Direct and Indirect Effects on the Economic Environment

Alternative 1, which would maintain the rebuilding plan established in Reef Fish Amendment 30 A, would not be expected to result in direct economic effects. However, based on the 2011 SEDAR 9 Update (2011b), the stock would still be overfished and undergoing overfishing. Therefore, **Alternative 1** would be expected to result in long-term adverse indirect economic effects due to the restrictive corrective measures that would be required to rebuild the stock in the future. However, because gray triggerfish are generally not targeted by the fishery but are more of an incidental harvest, any effects from this alternative would be expected to be minor

Alternative 2, **Preferred Alternative 3**, and **Alternative 4** would establish rebuilding plans that are expected to rebuild the stock in 4.1 years, 5.0 years, and 6.3 years, respectively. In general, all else equal, rebuilding plans with shorter rebuilding times would be expected to result in greater short-term adverse economic effects due to the more restrictive measures that would be necessary to rebuild within the shorter timeframe. Therefore, relative to **Alternative 1**, the short-term adverse economic effects would be expected to be the least under **Alternative 4**, followed by **Preferred Alternative 3** and **Alternative 2**. However, shorter rebuilding times would also be expected to result in a speedier rebuilding of the stock and quicker receipt of the economic benefits of a recovered stock. Although **Alternative 2** would be expected to rebuild the stock the quickest, the ACL would need to be reduced to zero during the recovery period, and the economic benefits of a recovered stock would be expected to be exceeded by the adverse economic effects of zero harvest.

It is important to note that quantitative estimates of neither the short-term adverse economic effects, nor the longer-term economic benefits are available. Estimates of these effects have not been computed because the necessary projected yield streams under all of the alternative rebuilding plans are not available. However, as indicated above, gray triggerfish are generally not targeted by the fishery and so any effects to the economic environment from this action would be expected to be minor. Rebuilding plans considered in **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** are all based on a gray triggerfish ACL of 305,300 pounds whole weight (lbs ww), as recommended by the SSC.

4.1.4 Direct and Indirect Effects on the Social Environment

Direct impacts are not expected from modifying the rebuilding plan. Rather, indirect effects would result and be related to the selected alternatives in subsequent actions taken to meet the timeline of the adopted rebuilding plan. However, given that most fishermen do not target gray triggerfish but rather, catch them alongside other reef fish species, the indirect adverse effects to the social environment are expected to be relatively minor. For those fishermen who do target gray triggerfish, impacts will be related to how much harvests are reduced from the current amount of fish allowed to be landed under the status quo rebuilding plan (**Alternative 1**, no action). A shorter rebuilding period would generally involve greater adverse short-term impacts due to greater restrictions on fishing behavior to achieve required reductions in removals. But, these restrictions would be eased and positive long-term impacts would be realized sooner. A longer rebuilding period would be expected to involve less disruption to fishing activity in the

short-term, as more severe effort restrictions are not needed to reduce landings, but it will take longer for the long-term benefits of a rebuilt stock to be realized.

No impacts are expected from **Alternative 1** as no change would be made to the existing rebuilding plan. However, overfishing is still occurring, warranting the adoption of a new rebuilding plan. While **Alternative 2** should rebuild the stock in the shortest period of time (4.1 years), it would effectively reduce the allowable harvest to zero. This is the most restrictive option and would incur the greatest adverse impacts to fishing activity in the short-term.

Alternative 4 provides for the longest rebuilding timeframe (6.3 years), and would likely result in the least short-term impacts. However, it is possible that the rebuilding plan would not be sufficient to end overfishing and rebuild the stock, meaning that long-term benefits would not be realized until later. The rebuilding time frame of **Preferred Alternative 3** (5.0 years) is expected to require less than a year longer to rebuild the stock (resulting in long-term benefits) than closing the harvest of gray triggerfish entirely (**Alternative 2**, 4.1 years), meaning that **Preferred Alternative 3** should result in less short-term impacts than a complete closure (**Alternative 2**). Short-term adverse impacts from **Preferred Alternative 3** would be greater than **Alternative 4**, but enable long-term benefits of a rebuilt stock to be realized sooner.

4.1.5 Direct and Indirect Effects on the Administrative Environment

The setting of a rebuilding target for biomass within a specific time frame is expected to have administrative effects. The act of setting a target, whether it be 4, 5 or 6 years, is a one-time event, and thus **Alternatives 2**, **4**, and **Preferred Alternative 3** have equivalent though minor direct administrative impacts. **Alternative 1**, the no-action alternative, is not compliant with the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requirement to end overfishing immediately and rebuild the stock in 10 years or less. Therefore, it will trigger additional administrative actions by the Council and NMFS to bring gray triggerfish management into compliance. Thus, **Alternative 1** has a greater negative effect on the administrative environment than **Alternatives 2**, **4**, and **Preferred Alternative 3**, albeit minor.

Indirect effects include more restrictive management measures, which may require increased enforcement. From this aspect, **Alternative 2** is the most restrictive rebuilding time period and will require the most active enforcement. **Alternative 1**, **4**, and **Preferred Alternative 3** would likely require less restrictive rebuilding actions and enforcement. Therefore, indirect effects on the enforcement, from greatest to least, result progressively from **Alternative 2**, **Preferred Alternative 3**, **Alternative 4**, and **Alternative 1**. However, given that enforcement activities address the reef fish fishery in general, most enforcement activities would be covered in day-to-day operations, thus any adverse effects on enforcement from this action would be expected to be minor.

4.2 Action 2: Establish Annual Catch Limits and Annual Catch Targets for Gray Triggerfish

4.2.1 Direct and Indirect Effects on the Physical Environment

Setting ACLs and ACTs should not directly affect the physical environment because it is an administrative action. However, setting the ACLs and ACTs can indirectly affect the physical environment by limiting the amount of fishing effort through other actions. As described in Section 4.1.1, the higher the effort, the more adverse the effects on the physical environment. Generally, as fishing effort goes up, so do the landings. Therefore, landings were used as a proxy for fishing effort and are presented in Table 4.2.1.1. It should be noted that the same caveats described in Section 4.1.1 regarding stock rebuilding and the non-targeted nature of gray triggerfish fishing also applies here and suggest any indirect effects from this action would be expected to be minor.

Alternative 1, regardless of whether the ACLs or ACTs are used to limit the harvest, would allow the highest level of landings (595,000 and 511,000 lbs ww, respectively). Therefore, **Alternative 1** would be expected to have the greatest adverse affect on the physical environment. On the other hand, **Alternative 2** would not allow any harvest of gray triggerfish and so should have the least adverse effects on the physical environment. Harvest levels allowed by **Alternative 3** and **Preferred Alternative 4** are less than **Alternative 1**.

Depending on which alternative in Action 5 is selected as preferred determines whether **Preferred Alternative 4** more adversely affects the physical environment than **Alternative 3**. If Action 5, Alternatives 1 or 3 is selected as preferred, then the recreational ACL would trigger the accountability measures (AMs). Because the recreational ACLs for **Alternative 3** and **Preferred Alternative 4** are equal (241,200 lbs ww), then the effects on the physical environment would be the same. If Action 5, Preferred Alternative 2 is selected, then the ACT would be the trigger for the recreational AMs. In this case, the recreational ACT for **Alternative 3** (188,100 lbs ww) is less than the recreational ACT for **Preferred Alternative 4** (217,100 lbs ww), and so **Alternative 3** would have less of an effect on the physical environment.

Table 4.2.1.1. Commercial, recreational, and combined annual catch limits (ACLs) and annual catch targets (ACTs) in pounds whole weight for **Action 2, Alternatives 1-4**.

Alternative	Commercial ACL	Recreational ACL	Sum of ACLs	Commercial ACT	Recreational ACT	Sum of ACTs
1	138,000	457,000	595,000	106,000	405,000	511,000
2	0	0	0	0	0	0
3	64,100	241,200	305,300	49,400	188,100	237,400
4	64,100	241,200	305,300	60,900	217,100	278,000

4.2.2 Direct and Indirect Effects on the Biological/Ecological Environment

The effects of fishing on the biological/ecological environment are described in Section 4.2.1 and incorporated here by reference. Alternatives that limit harvest the most provide the least adverse effect on the gray triggerfish stock because it would rebuild more quickly. However, as described in Section 4.2.1, a larger gray triggerfish stock would likely have adverse effects on prey and other reef fish species. Regardless of whether the ACLs or ACTs are used to limit the harvest, **Alternative 1**, would allow the highest level of landings (595,000 and 511,000 lbs ww, respectively). Therefore, **Alternative 1** would impede the stock from rebuilding the most and have the greatest adverse affect on the gray triggerfish stock. However, it would have the least adverse effects on prey and other reef fish species. On the other hand, **Alternative 2**, would not allow any harvest of gray triggerfish allowing the stock to rebuild more quickly. Thus, this alternative is expected to be the least adverse to the gray triggerfish stock, but more adverse to prey and other reef fish species. Harvest levels allowed by **Alternative 3** and **Preferred Alternative 4** are less than **Alternative 1**.

Depending on which alternative in Action 5 is selected as preferred determines whether **Preferred Alternative 4** more adversely affects the biological/ecological environment than **Alternative 3**. If Action 5, Alternatives 1 or 3 are selected as preferred, then the recreational ACL would trigger the recreational AMs. Because the ACLs for **Alternative 3** and **Preferred Alternative 4** are equal (241,200 lbs ww), then the effects on the biological/ecological environment would be the same. However, because Alternative 2 of Action 5 was selected as preferred, then the ACT would be the trigger for the recreational AMs. In this case, the recreational ACT for **Alternative 3** (188,100 lbs ww) is less than the recreational ACT for **Preferred Alternative 4** (217,100 lbs ww), and so **Alternative 3** would be expected to have less of an effect on the biological/ecological environment.

4.2.3 Direct and Indirect Effects on the Economic Environment

Effects on the Commercial Sector

The potential economic effects of the alternatives on the commercial sector considered in this action were evaluated by measuring the expected changes in annual ex-vessel revenues from commercial gray triggerfish harvests. Total ex-vessel values were calculated by multiplying the expected change in commercial quotas by an average ex-vessel price. The estimated average Gulf-wide ex-vessel price used was $0.95 (2010 dollars) per pound of gray triggerfish (whole weight), as derived from the NMFS's Statistics website data[5]. Table 4.2.3.1 contains estimates of the expected changes (relative to **Alternative 1**) in commercial quotas (ACTs) and ex-vessel revenues for **Alternative 2**. Changes relative to the interim rule currently in effect are also reported in Table 4.2.3.1.

[5] http://www.st.nmfs.noaa.gov/st1/commercial/index.html (accessed July 11, 2012)

Table 4.2.3.1. Alternative 2 - Changes in gray triggerfish commercial quota and ex-vessel value; quotas and ex-vessel values are in pounds whole weight and $2010, respectively.

Commercial ACT			Changes relative to			
			Alternative 1		Interim Rule	
Alternative 1	Interim Rule	Alternative 2	Pounds	Value	Pounds	Value
106,000	60,900	0	-106,000	-$100,700	-60,900	-$57,855

Alternative 1 would maintain the current commercial gray triggerfish ACT. Therefore, **Alternative 1** would not be expected to result in any change in total ex-vessel revenue received from gray triggerfish harvests. The interim rule currently in effect has already reduced the commercial gray triggerfish ACT to 60,900 lbs ww. Therefore, relative to the interim rule, **Alternative 1** would increase the commercial gray triggerfish ACT by 45,100 lbs, ww, adding $42,845 in ex-vessel revenues. **Alternative 2** would prohibit the commercial harvest of gray triggerfish, decreasing the commercial ACT by 106,000 lbs ww relative to **Alternative 1**. The expected potential economic effects, measured by annual losses in ex-vessel revenues[6], are estimated to be $100,700. Relative to the interim rule, lower reductions in ACT and associated ex-vessel values losses would be expected under **Alternative 2**.

Alternative 3 would set a 49,400-pound ww commercial gray triggerfish ACT, reducing the ACT by 56,600 lbs ww relative to **Alternative 1**. Table 4.2.3.2 provides estimates of the expected changes (relative to **Alternative 1** and to the interim rule) in commercial quotas (ACTs) and ex-vessel revenues for **Alternative 3**. The expected potential economic effects, measured by losses in annual ex-vessel revenues relative to **Alternative 1**, are estimated to be $53,770. Similar to the discussion for **Alternative 2**, lower reductions in ACT and associated losses in ex-vessel values would be expected under **Alternative 3** compared to the interim rule.

Table 4.2.3.2. Alternative 3 - Changes in gray triggerfish commercial quota and ex-vessel value; quotas and ex-vessel values are in pounds whole weight and $2010, respectively.

Commercial ACT			Change relative to			
			Alternative 1		Interim Rule	
Alternative 1	Interim Rule	Alternative 3	Pounds	Value	Pounds	Value
106,000	60,900	49,400	-56,600	-$53,770	-11,500	-$10,925

Preferred Alternative 4 would decrease the commercial gray triggerfish ACT by 45,100 lbs ww relative to **Alternative 1**. Table 4.2.3.3 provides estimates of the expected changes (relative to **Alternative 1** and to the interim rule) in commercial quotas (ACTs) and ex-vessel revenues for **Preferred Alternative 4**. The expected potential economic effects, measured by losses in annual ex-vessel revenues relative to **Alternative 1**, are estimated to be $42,845. **Preferred Alternative 4** would not change the ACT established by the interim rule and therefore would not result in changes in ex-vessel value relative to the interim rule.

[6] All ex-vessel values are reported in 2010 dollars

Table 4.2.3.3. Preferred Alternative 4 - Changes in gray triggerfish commercial quota and ex-vessel value; quotas and ex-vessel values are in pounds whole weight and $2010, respectively.

Commercial ACT			Change relative to			
Alternative 1	Interim Rule	Preferred Alternative 4	Alternative 1		Interim Rule	
			Pounds	Value	Pounds	Value
106,000	60,900	60,900	-45,100	-$42,845	0	0

Table 4.2.3.4. Changes in gray triggerfish commercial quota and ex-vessel value relative to Alternative 1. Quotas and ex-vessel values are in pounds whole weight and $2010, respectively.

	Pounds	Value
Alternative 2	-106,000	-$100,700
Alternative 3	-56,600	-$53,770
Preferred Alternative 4	-45,100	-$42,845

The estimated changes in ex-vessel revenues are sufficient to provide an ordinal ranking of the economic effects expected to result from the management alternatives considered (Table 4.2.3.4). However, these changes are likely to approximate maximum adverse economic effects because fishermen prosecute gray triggerfish as a small part of a multi-species reef fish fishery and gray triggerfish are mainly a bycatch species. It is plausible to assume that, to offset a decrease in the commercial gray triggerfish quota, fishermen would increase their harvest of other reef fish, thus mitigating potential adverse economic effects.

Effects on the Recreational Sector

The economic effects expected to result from decreases in the recreational ACTs considered in this action are measured by changes in consumer surplus to anglers and in producer surplus to for-hire operators. A detailed discussion of the use of consumer and producer surpluses in the measurement of economic effects expected to result from changes in fishery management measures is provided in Reef Fish Amendment 32 (GMFMC 2011b) and is incorporated herein by reference.

Table 4.2.3.5 contains estimates of the expected changes (relative to **Alternative 1**) in consumer and producer surpluses for each alternative considered. The estimated changes in consumer surplus and producer surplus were computed based on an average consumer surplus of $11.46 per fish harvested and an average producer surplus of $145.63 per target charter angler trip (D. Carter, NMFS SEFSC, pers. comm.). Projections of the expected change in producer surplus for headboats were not estimated because estimates of gray triggerfish target effort for headboat anglers were not available and it is assumed that headboat anglers do not specifically target gray triggerfish.

Alternative 1 would maintain the current recreational gray triggerfish ACT. Therefore, **Alternative 1** would not be expected to result in any changes in consumer or producer surplus. For **Alternatives 2-4**, changes in recreational gray triggerfish ACTs, consumer and producer surpluses relative to **Alternative 1** are provided in Table 4.2.3.5. The ACT changes and dollar values are expressed in pounds (ww) and 2010 dollars ($2010), respectively.

Table 4.2.3.5. Changes in recreational quota, consumer and producer surpluses relative to Alternative 1. Dollar values are in $2010; quotas are in pounds whole weight.

	ACT Pounds	**Consumer** Surplus	**Producer** Surplus	**Total**
Alternative 2	-405,000	-$2,284,800	-$610,974	-$2,895,773
Alternative 3	-216,900	-$1,223,637	-$327,210	-$1,550,848
Preferred Alternative 4	-187,900	-$1,060,034	-$283,462	-$1,343,496

Alternative 2 would suspend the recreational harvest of gray triggerfish and therefore decrease the recreational gray triggerfish ACT (equivalent to the quota) by 405,000 lbs ww. Reductions in consumer and producer surpluses expected to result from **Alternative 2** are estimated to be approximately $2.285 million and $0.611 million, respectively, relative to **Alternative 1**. **Alternative 3** would decrease the recreational gray triggerfish ACT by 216,900 lbs ww. Reductions in consumer and producer surpluses expected to result from **Alternative 3** are estimated to be approximately $1.224 million and $0.327 million, respectively, relative to **Alternative 1**. **Preferred Alternative 4** would decrease the recreational gray triggerfish ACT (equivalent to the quota) by 187,000 lbs ww. Reductions in consumer and producer surpluses expected to result from **Preferred Alternative 4** are estimated to be approximately $1.060 million and $0.283 million, respectively, relative to **Alternative 1**. Comparisons between changes in recreational gray triggerfish ACT considered in this amendment and the ACT set in the interim rule currently in effect would result in much smaller quota changes. Therefore, it follows that consumer and producer surpluses reductions relative to the interim rule would be smaller than the estimates reported relative to **Alternative 1**.

The estimated reductions in consumer and producer surpluses provided in this section are sufficient for an ordinal ranking of the economic effects expected to result from the management alternatives. However, these reductions are likely to approximate maximum adverse economic effects on the recreational sector because anglers prosecute gray triggerfish as a small part of a multi-species reef fish fishery and gray triggerfish are mainly a non-targeted species. It is plausible to assume that, to offset a decrease in the recreational gray triggerfish quota, anglers would increase their harvest of other reef fish, thus mitigating potential adverse economic effects.

4.2.4 Direct and Indirect Effects on the Social Environment

Similar to Action 1, this action will impact the human environment relative to how much the amount of fish allowed to be landed is decreased from the current amount of fish allowed to be landed (**Alternative 1**, no action), as fishing behavior is affected. However, because gray triggerfish are generally not targeted by either sector, the adverse effects from this action would be expected to be relatively minor. No impacts are expected from **Alternative 1** as no change would be made to the total amount of fish either sector is allowed to catch (the ACL and ACT). The remaining alternatives propose reductions to the amount of fish allowed to be landed from no action. The greatest impacts to fishing behavior would be expected from selection of **Alternative 2,** which would prohibit the harvest of gray triggerfish.

Alternative 3 and **Preferred Alternative 4** use different approaches to configuring the ACL and ACT. Impacts do not result from the method used to determine the amount of fish available for harvest. Rather, short-term impacts would be related to the amount of fishing activity that is restricted as a result of decreasing the ACL and ACT and the triggering of any AMs. On the other hand, long-term benefits are expected from ending overfishing and rebuilding the stock, when fishing activity is allowed to resume under an increased ACL.

Alternative 3 and **Preferred Alternative 4** each propose the same sector ACLs meaning the same amount of fish is allowed to be landed. However, the ACT of **Alternative 3** proposes a greater buffer than the ACT of **Preferred Alternative 4**, which restricts fishing more, resulting in greater impacts. For the recreational sector under status quo, these alternatives would incur equivalent impacts because the ACT does not have an in-season function. The preferred alternative of Action 5, however, would create an in-season closure AM for the ACT, for the recreational sector. Thus, the greater buffer of **Alternative 3** would be expected to result in greater in-season impacts should the AM be triggered and the recreational season closed, compared to **Preferred Alternative 4**. Because the commercial sector already uses the ACT to trigger an in-season closure, greater short-term impacts can be expected for the commercial sector from **Alternative 3** than **Preferred Alternative 4**. The commercial sector has not exceeded its ACT since its implementation in 2008 suggesting that a stricter ACT (**Alternative 3**) may not be necessary. On the other hand, the proposed ACL of all the alternatives is less than current commercial landings, requiring a reduction in landings. Thus, the ACT is expected to help prevent the commercial sector from exceeding its new ACL and thus avoid post-season AMs.

4.2.5 Direct and Indirect Effects on the Administrative Environment

Alternatives 2-3 in **Action 2** should not result in any substantial direct or indirect effects to the administrative environment. The type of regulations needed to manage the reef fish fishery would remain unchanged regardless of the choice of harvest levels. The NMFS's Office for Law Enforcement, in cooperation with state agencies, would continue to monitor regulatory compliance with existing regulations and NMFS would continue to monitor both recreational and commercial landings to determine if landings are meeting or exceeding specified ACTs and ACLs. The enforcement and administrative environments were recently enhanced with the individual fishing quota (IFQ) program and vessel monitoring system (VMS) in the commercial sector. As a part of this program, the commercial sector is required to report when and where they are landing their fish if IFQ species are aboard. This makes it easier for enforcement agents to meet vessels when they come to the dock. The VMS requirements have reduced the burden of monitoring compliance with commercial fishing regulations, particularly for closed areas.

Although the same conclusions could be made about **Alternative 1** (no-action), the harvest limits are not compatible with ending overfishing immediately and rebuilding the stock within the specified time period. Therefore, it is not compliant with the Magnuson-Stevens Act and would trigger additional administrative actions by the Council and NMFS to bring gray triggerfish management into compliance.

4.3 Action 3: Commercial Management Measures

4.3.1 Direct and Indirect Effects on the Physical Environment

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

The effects of fishing on the physical environment are described in Section 4.1.1 and are incorporated here by reference. **Alternative 1 (**no action) would close the commercial sector when the ACT (quota) is reached or projected to be reached. This alternative provides the commercial sector an estimated 229 fishing days and an estimated closure date of August 18, based upon Preferred Alternative 4 from Action 2. This closure is not expected to vary the overall reef fish fishing effort and would not have any additional direct or indirect effects on the physical environment. This is because gray triggerfish is mostly caught incidentally when fishing for other reef fish species, fishing effort would likely not change much even if gray triggerfish harvest is closed.

Neither **Preferred Alternative 2 (**June 1 through July 31) or **Alternatives 3 (**August 1 through December 31) and **Alternative 4** (April 1 through August 31) would reduce the harvest enough to comply with the rebuilding plan. An additional season closure would be needed to constrain landings to the ACT of 60,900 lbs ww (Action 2, Preferred Alternative 4). Thus, the direct and indirect effects of these alternatives on the physical environment are likely to be similar. In addition, gray triggerfish is mostly caught incidentally while fishing for other reef fish species. Therefore, overall fishing effort would likely not change much even if the commercial gray triggerfish harvest was completely closed.

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

Establishing a commercial trip limit is expected to result in a longer fishing season, which would have more negative effects to the physical environment than not having a commercial trip limit. **Alternative 1** (no action) would be expected to result in reaching the ACT in 229 days. **Alternative 2** would establish a trip limit of 6 gray triggerfish and is expected to result in the longest fishing season by reaching the ACT in 329 days. **Preferred Alternative 3** would establish a trip limit of 12 gray triggerfish and is expected to result in 212 fishing days. **Alternative 4** would establish a trip limit of 18 gray triggerfish is expected to result in 181 days of fishing before reaching the ACT. Based upon the numbers of days in the fishing season, **Alternative 4** would be expected to result in the least negative direct or indirect effects while **Alternative 2** would be expected to result in the most negative effects based upon the number of days in the fishing season. However, any affects on the physical environment would be minor because gray triggerfish are more of an incidentally caught species in the commercial reef fish sector. Therefore, it is unlikely that fishermen would modify their trips or fishing practices given they are targeting other species.

Combined Effects of Action 3.1 and 3.2

The individual actions by themselves, such as establishing a commercial fixed closed season (**Action 3.1**), and establishing a commercial trip limit (**Action 3.2**), would not provide the

commercial harvest reductions required to maintain fishing at or below the 60,900 lbs ww ACT. However, in combination with each other, several of the alternatives are expected to provide the reductions needed in the commercial sector to maintain harvest below the ACT (Table 2.3.2.2).

Table 2.3.2.2 compares the two commercial management measures and provides five alternative combinations that meet or exceed the ACT of 60,900 lbs ww. The no action alternatives and the 18 gray triggerfish trip limit (**Action 3.2**, **Alternative 4**) are not projected to meet the ACT of 60,900 lbs ww (Table 4.3.1.1). In comparing the alternatives, landings are used as a proxy for fishing effort to examine the direct and indirect effects on the physical environment. For the combination of **Acton 3.1** and **Action 3.2** alternatives, projected landings are ranked from lowest to highest in Table 4.3.1.1. Higher projected landings would suggest more adverse effects on the physical environment.

The commercial trip limit of 12 gray triggerfish (**Action 3.2**, **Alternative 2**) and a fixed closed season of either August through December (**Action 3.1**, **Alternative 3**) or April through August (**Action 3.1**, **Alternative 4**) would provide the needed reductions. Establishing a trip limit of 6 gray triggerfish (**Action 3.2**, **Alternative 2**) is projected to achieve the needed commercial harvest reductions in combination with any of the fixed closed season alternatives (**Action 3.1**, **Alternatives 2-4**). The combined effects of the two commercial sub-actions that meet the necessary reductions are expected to provide positive benefits to the physical environment compared to the combinations of alternatives that do not meet the necessary reductions. Due to gray triggerfish being incidentally caught, it is difficult to quantify the benefits to the physical environment because fishermen may continue to fish for other reef fish species after the gray triggerfish trip limit is met, and during any of the fixed closed seasons.

Any of the alternatives that project landings in excess of the 60,900 lbs ww ACT would likely have a second season closure when the ACT is met. Therefore, the effects on the physical environment for these alternative combinations (ranked 6-16 in Table 4.3.1.1) would likely be similar. This includes the combination of the preferred alternatives: June through July commercial season closure (**Action 3.1, Preferred Alternative 2**) and a trip limit of 12 gray triggerfish (**Action 3.2, Preferred Alternative 3**) ranked 9th in Table 4.3.1.1. As with the individual Action 3.1 and 3.2 alternatives, any effects from these combinations of alternatives would be expected to be minor because overall reef fish effort is unlikely to change due to the non-targeted harvest of gray triggerfish.

Table 4.3.1.1 Ranking based on projected landings of Action 3 combined commercial management measures that are estimated to meet (rank 1-5) or exceed (rank 6-16) the ACT = 60,900 lbs ww.

Action 3.1	Action 3.2	Landings (lbs)	Rank
Alternative 3	Alternative 2	37,328	1
Alternative 4	Alternative 2	37,996	2
Alternative 3	Preferred Alternative 3	55,652	3
Preferred Alternative 2	Alternative 2	56,682	4
Alternative 4	Preferred Alternative 3	58,063	5
Alternative 3	Alternative 4	66,530	6
Alternative 1	Alternative 2	68,136	7
Alternative 4	Alternative 4	70,399	8
Preferred Alternative 2	**Preferred Alternative 3**	**86,427**	**9**
Alternative 3	Alternative 1	95,945	10
Alternative 1	Preferred Alternative 3	103,386	11
Alternative 4	Alternative 1	103,614	12
Preferred Alternative 2	Alternative 4	105,049	13
Alternative 1	Alternative 4	125,201	14
Preferred Alternative 2	Alternative 1	151,637	15
Alternative 1	Alternative 1	178,692	16

Note: Cells shaded in gray indicate that the ACT of 60,900 lbs ww is projected to be exceeded.
Source: SERO-LAPP Gulf Amendment 37 2012.

4.3.2 Direct and Indirect Effects on the Biological/Ecological Environment

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

Because gray triggerfish is mostly caught incidentally while fishing for other reef fish species, fishing effort would likely not change much even if gray triggerfish harvest is closed. However, closing the commercial harvest of gray triggerfish during the spawning season is expected to provide beneficial effects to the stock. Gray triggerfish is fecund as early as May and as late as August, but peak spawning was recorded in June and July in the northern Gulf of Mexico and South Atlantic Bight (Wilson et al. 1995; Hood and Johnson 1997; Ingram 2001; Moore 2001; Simmons and Szedlmayer 2012). **Preferred Alternative 2** (June 1 through July 31) and **Alternative 4** (April 1 through August 31) are expected to provide the greatest positive direct effects to the stock because they close the gray triggerfish commercial sector to harvest during the peak spawning period and throughout the entire spawning season, respectively. **Alternative 3** (August 1 through December 31) would be expected to provide some beneficial biological effects as this alternative would close the season during the month of August when gray triggerfish may still be spawning (Hood and Johnson 1997; Ingram 2001; Moore 2001).

Because gray triggerfish is typically caught as a secondary species on most commercial fishing trips, implementing a trip limit would limit the number of gray triggerfish commercial fishermen land while targeting other species. It would not likely reduce the number or duration of commercial reef fish fishing trips. Thus, any differences between the alternatives on the biological environment as a whole (e.g., other reef fish and protected species) should be similar.

In addition, none of the alternatives reduce the projected landings below the ACT of 60,900 lbs ww, so an additional season closure later in the year is likely. Fortunately, any adverse effects to the gray triggerfish stock from discard mortality associated with seasonal closures should be minimal. The survival of gray triggerfish after release is high, so most fish released would likely survive.

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

Alternative 1, (no action) would maintain the status quo and not establish a commercial trip limit, which would close the commercial fishing season when the ACT has been met or exceeded. Gray triggerfish commercial fishing season closures will not likely stop fishermen from ending their trip after the trip limit is met because most commercial trips are targeting more economically valuable species, such as snappers and groupers.

Alternative 2 would establish a trip limit of 6 gray triggerfish. This trip limit is estimated to reduce commercial landings by 62% (SERO-LAPP Gulf Amendment 37 2012). **Preferred Alternative 3** would establish a trip limit of 12 gray triggerfish. This trip limit is estimated to reduce commercial landings by 42% (SERO-LAPP Gulf Amendment 37 2012). **Alternative 4**, would establish a trip limit of 18 gray triggerfish, and is estimated to reduce landings by 30% (SERO-LAPP Gulf Amendment 37 2012). Because gray triggerfish is typically caught as a secondary species on most commercial fishing trips, implementing a trip limit will limit the number of gray triggerfish commercial fishermen land while targeting other species. The majority (73%) of the Gulf of Mexico commercial trips from 2009 through 2011 landed less than 50 lbs ww or 12 gray triggerfish on any particular trip (Figure 2.3.2.1). The data can also be explored with the maximum pounds of gray triggerfish harvested per trip by each vessel (Figure 2.3.2.2). For example, 58% of the Gulf of Mexico vessels (n = 469) that harvested gray triggerfish from 2009 through 2011 had a maximum per trip gray triggerfish landing between 1-25 lbs ww (Figure 2.3.2.2). While 42% of the vessels had at least one trip with over 50 lbs ww, and 33% of the commercial vessels had at least one trip with greater than 75 lbs ww or 18-fish (Figure 2.3.2.2). The commercial sector typically lands a relatively small number of pounds per trip, because gray triggerfish is one of the many species that is part of the reef fish component. A trip limit of 12 gray triggerfish is not likely to cause fishermen to end their trip after the trip limit is met because most commercial trips are targeting more economically valuable species, such as snappers and groupers. Therefore, the trip limit is expected to reduce fishing mortality by requiring commercial fishermen to release gray triggerfish after the trip limit is reached. Because survival after release is high, most fish released in excess of the trip limit would survive (SEDAR 9 2006a; SEDAR 9 Update 2011b). **Preferred Alternative 3** is expected to have similar effects on the biological environment as **Alternative 2** and **Alternative 4.** Fortunately, any adverse effects to the gray triggerfish stock from discard mortality associated with trip limits should be minimal. The survival of gray triggerfish after release is high, so most fish released would likely survive.

Combined Effects of Action 3.1 and 3.2

The individual actions, by themselves, such as establishing a commercial fixed closed season (**Action 3.1),** and establishing a commercial trip limit **(Action 3.2)**, would not provide the

commercial harvest reductions required to maintain fishing at or below the 60,900 lbs ww ACT. However, in combination with each other, several of the alternatives would provide the reductions needed in the commercial sector to maintain harvest below the ACT (Table 4.3.1.1).

The combined effects of the two commercial sub-actions that meet the necessary reductions and projected landings below the ACT are expected to provide the most beneficial effects to the gray triggerfish biological environment compared to the combinations of alternatives that do not meet the necessary reductions. Due to gray triggerfish being landed incidentally, it is difficult to quantify the effects to the biological environment as a whole, because fishermen may continue to fish for other reef fish species after the gray triggerfish trip limit is met and during any of the fixed closed seasons. The expected beneficial effects on the biological environment would be to rebuilding the gray triggerfish stock.

4.3.3 Direct and Indirect Effects on the Economic Environment

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

The potential economic effects of the alternative closures are evaluated by measuring the expected changes in annual ex-vessel revenues from commercial gray triggerfish harvests. Total ex-vessel values were calculated by multiplying the expected change in commercial landings by an average ex-vessel price. The estimated average Gulf-wide ex-vessel price used was $0.95 (2010 dollars) per pound of gray triggerfish (whole weight), as derived from the NMFS's Statistics website data[7].

Alternative 1 would not establish a fixed closed season and would thus not be expected to result in any direct economic effects. However, **Alternative 1** would not contribute to a speedy rebuilding of gray triggerfish. Therefore, adverse indirect economic effects may be expected to result from the no action alternative **(Alternative 1)** due to more restrictive corrective measures that may be required in the future to assist in the rebuilding of gray triggerfish. Table 4.3.3.1 contains estimates of the expected changes in commercial landings and ex-vessel values relative to **Alternative 1**.

Preferred Alternative 2 would establish a two-month fixed closed season in June through July for gray triggerfish for the commercial sector. **Preferred Alternative 2** would be expected to result in a reduction in gray triggerfish landings estimated at 27,055 lbs ww valued at $25,702. **Alternatives 3** and **4** would prohibit the commercial harvest of gray triggerfish between August 1 and December 31 and between April 1 and August 31, respectively.

[7] http://www.st.nmfs.noaa.gov/st1/commercial/index.html (accessed July 11, 2012)

Table 4.3.3.1. Action 3.1 -Landings and ex-vessel value changes relative to **Alternative 1**; Landings and values are in pounds whole weight and 2010 dollars ($2010), respectively

	Closed Months	Changes	
		Landings	Value
Alternative 1	None		
Preferred Alternative 2	Jun through Jul	-27,055	-$25,702
Alternative 3	Aug through Dec	-82,747	-$78,610
Alternative 4	Apr through Aug	-75,078	-$71,324

Reductions in landings that would be expected to result from **Alternatives 3** and **4** are estimated at 82,747 lbs ww and 75,078 lbs ww, respectively. **Alternatives 3** and **4** would be expected to result in reductions in ex-vessel values estimated at $78,610 and $71,324, respectively. It is important to note that estimates provided are maxima. Reductions in gray triggerfish landings and ex-vessel values are likely to be smaller than the estimates provided because fishermen could simply shift some of the effort to months during which the commercial harvest of gray triggerfish is allowed. To comply with the closure, each fisherman has to adjust the optimal species mix typically harvested. These adjustments would be expected to result in additional adverse economic effects due to potential increases in search and targeting costs. However, these costs are expected to be very small because gray triggerfish are essentially a bycatch species.

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

The potential economic effects of commercial trip limits under consideration in this amendment are evaluated by measuring the expected changes in annual ex-vessel revenues from commercial gray triggerfish harvests. Total ex-vessel values were calculated by multiplying the expected change in commercial landings by an average ex-vessel price. The estimated average Gulf-wide ex-vessel price used was $0.95 (2010 dollars) per pound of gray triggerfish (ww), as derived from the NMFS's Statistics website data[8].

Alternative 1 would not establish a trip limit and, therefore, would not be expected to result in direct economic effects. However, **Alternative 1** would not contribute to the rebuilding of gray triggerfish. In the long-term, adverse indirect economic effects may be expected to result from **Alternative 1** due to more restrictive corrective measures that may be implemented in the future to foster the rebuilding of gray triggerfish. Table 4.3.3.2 contains estimates of the expected changes in commercial landings and ex-vessel values relative to **Alternative 1**. While trip limits considered in this amendment are expressed in number of fish, economic effects presented, as measured by changes in ex-vessel values, were estimated using trip limits expressed in pounds of fish. Therefore estimates provided would be expected to fluctuate as the average weight of gray triggerfish harvested per trip varies.

[8] http://www.st.nmfs.noaa.gov/st1/commercial/index.html (accessed July 11, 2012)

Alternative 2 would establish a 6-fish (25-lb ww) commercial trip limit, resulting in reductions in landings and ex-vessel values estimated at 110,556 lbs ww and $105,028, respectively. All else equal, greater commercial trip limits would be expected to result in smaller reductions in commercial landings and ex-vessel values.

Table 4.3.3.2. Action 3.2- Landings and ex-vessel value changes relative to **Alternative 1**; Landings and values are in pounds whole weight (ww) and 2010 dollars ($2010), respectively

	Trip Limit	Changes	
		Pounds	Value
Alternative 1	None		
Alternative 2	6	-110,556	-$105,028
Preferred Alternative 3	12	-75,306	-$71,541
Alternative 3	18	-53,491	-$50,816

Preferred Alternative 3, which would establish a 12-fish (50-lb ww) commercial trip limit, and would be expected to result in annual landings reductions estimated at 75,306 lbs ww. Adverse economic effects measured by losses in ex-vessel value would be expected to reach $71,541. As expected, a higher trip limit would result in fewer adverse economic effects. **Alternative 4** would establish an 18-fish (75-lb ww) trip limit, resulting in reductions in landings and ex-vessel values estimated at 53,491 lbs ww and $50,816, respectively. It is plausible to infer that commercial fishermen could mitigate the adverse effects of a trip limit by simply taking more fishing trips. However, such a scenario is very unlikely for gray triggerfish because it is essentially a bycatch species.

Combined Effects of Action 3.1 and 3.2

Regardless of the alternatives selected, neither the establishment of a commercial fixed season (**Action 3.1**) nor the implementation of a commercial trip limit (**Action 3.2**) would be sufficient on its own to limit commercial gray triggerfish landings to a commercial ACT of 60,900 lbs ww (Action 2, Preferred Alternative 4). Table 2.3.2.2 provides commercial gray triggerfish landings estimates for alternative combinations of trip limits and seasonal closures. With a 6-fish commercial trip limit, all of the alternative commercial fixed closed seasons considered would result in estimated landings below the Council's preferred commercial ACT of 60,900 lbs ww. With a 12-fish trip limit, the only two scenarios that would result in estimated landings below the Council's preferred commercial ACT would implement an August through December or April thru August fixed closed season. With a 12-fish trip limit, an August through December fixed closed season would be expected to result in landings and ex-vessel value reductions estimated at 123,040 lbs ww and $116,888, respectively. A 12-fish trip limit paired with an April through August commercial closure would be expected to result in landings and ex-vessel value reductions estimated at 120,629 lbs ww and $114,598, respectively. Combinations of alternatives that would establish shorter fixed seasons and/or greater trip limits would lessen the adverse economic effects but would not be sufficient to constrain commercial landings below the ACT. For example, none of the combinations including an 18-fish trip limit would constrain landings below the Council's preferred ACT, regardless of the fixed closed season implemented. In addition, the Council's preferred combination of commercial management measures, which would implement a June through July fixed closed season and establish a 12-fish trip limit,

would be expected to result in a reduction in ex-vessel values estimated at $87,651. However, this combination of alternatives would not be expected to constrain landings below the selected ACT and would result in a 25,527-lb ww harvest overage. Therefore, should the Council's preferred combination be implemented, an additional closure of the gray triggerfish component of the commercial reef fish fishery would be required to further restrict commercial landings. This additional closure would occur at the end of the year once the commercial ACT is met.

4.3.4 Direct and Indirect Effects on the Social Environment

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

Currently, there is no fixed closed season for the commercial harvest of gray triggerfish, but an in-season AM is in place that enables the Assistant Administrator to close the gray triggerfish season when the ACT is projected to be met. The triggering of an in-season AM effectively creates a closed season for the rest of the year, the beginning date of which is not known in advance. Such emergency closures may be implemented with little to no warning, causing disruptions to fishing activity. Given the reduction to the ACL currently in place under the interim rule (equivalent to Action 2's Preferred Alternative 4), it is likely that in-season closures will be triggered during the rebuilding plan, as has already occurred in 2012. Thus, while impacts are not normally expected from the no action **Alternative 1**, greater adverse impacts may be expected from in-season closures implemented with short notice, compared with the adoption of a fixed closed season around which fishermen can plan. However, given that fishermen do not typically target gray triggerfish, these impacts would be expected to be relatively minor to the reef fish fishery.

The remaining alternatives consist of different times for a fixed closed season, none of which on their own, is sufficient to reduce expected landings to below the currently selected ACT (Action 2). Thus, the selection of a closed season is considered alongside a trip limit (Action 3.2). Generally, impacts would relate to the amount of time available for harvesting gray triggerfish where a shorter duration of the fixed closed season would result in fewer impacts and a longer closed season would result in greater impacts. Thus, greater impacts would be expected from adopting a five-month closure (**Alternatives 3** or **4)** compared to a two-month closed season (**Preferred Alternative 2**). A two-month fixed closed season, however, is not expected to sufficiently reduce landings to below the selected ACT (Action 2 Preferred Alternative 4, 60,900 lbs ww) and avoid triggering an in-season closure. Thus, adverse impacts similar to **Alternative 1** are likely to result.

Given the equivalent duration of the proposed fixed closed seasons under **Alternatives 3** and **4**, similar impacts to **Preferred Alternative 2** may be expected. Figure 2.3.1.1 provides the commercial landings by month for the years 2008 through 2011. Unlike recreational landings, which show a clear peak during May and June (Figure 2.4.1.1), there is no discernible trend in monthly landings for the commercial sector. A possible reason for higher landings (peak harvest) occurring from August through December in 2011 may reflect effort shifting among commercial fishermen once available quota of other species had been landed, including species managed under IFQ programs. However, given that few trips land more than 200 lbs of gray triggerfish per trip (Figure 2.3.2.1), it is likely only a few fishermen are employing this strategy.

So, establishing a fixed closed season at the end of the year (**Alternative 3**) would impact these fishermen, yet prevent an end of the year increase in effort. On the other hand, an April through August closure (**Alternative 4**) overlaps the spawning period. Fishermen are generally supportive of spawning closures, recognizing the biological need to protect reproducing stocks on which they depend.

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

Alongside the increase to the minimum size limit implemented through Amendment 30A (GMFMC 2008), and the proposed fixed closed season (Action 2.3.1), a trip limit is the only remaining effort restricting option. Adopting a commercial trip limit would impact only those commercial fishermen whose fishing activity results in landings that exceed the selected trip limit. Impacts are not expected from adopting the no action **Alternative 1**, as fishing activity would not be restricted by a trip limit. However, by not reducing projected landings to remain below the selected ACT selected in Action 2 (and equivalent to the interim rule, 60,900 lbs ww), all fishermen may be adversely impacted by the triggering of an in-season closure. In-season closures are disruptive to fishing because they are implemented with little notice to fishermen. However, these impacts would be expected to be relatively minor to the reef fish fishery because fishermen do not typically target gray triggerfish.

Among trips landing at least one pound of gray triggerfish, 83.2% landed less than 75 lbs ww per trip, 73.5% landed less than 50 lbs ww per trip, and 55.1% landed less than 25 lbs ww of gray triggerfish on a single trip (Figure 2.3.2.1). These weight categories are approximately equal to the trip limits based on number of fish, such that 18 fish approximate a 75-lb ww trip limit (**Alternative 4**); 12 fish approximate a 50-lb ww trip limit (**Preferred Alternative 3**); and 6 fish approximate a 25-lb ww trip limit (**Alternative 2**). Assuming these landings are representative of future effort, under **Alternative 4**, about 17% of trips would be impacted, 26.5% of trips under **Preferred Alternative 3**, and approximately 45% of trips under **Alternative 2**. In terms of the number of vessels, Figure 2.3.2.2 provides the proportion of vessels landing varying quantities of gray triggerfish from 2009 through 2011. Assuming these landings are representative of future effort, under **Alternative 4**, 33.5% of vessels would be impacted, 42.4% of vessels under **Preferred Alternative 3**, and 58% of vessels under **Alternative 2**. Thus, a greater number of fishermen will be impacted by a smaller trip limit. However, a trip limit would not affect fishing activity for all fishermen and would actually allow the entire fleet to harvest some gray triggerfish over a longer season. Additionally, these impacts are expected to be relatively minor because fishermen do not typically target gray triggerfish.

Combined Effects of Action 3.1 and 3.2

Given the parameters of the alternatives for the commercial sector, adoption of both a fixed closed season and trip limit are required to constrain removals below the selected ACT (60,900 lbs ww) (Table 2.3.2.2) to reduce the likelihood that in-season AMs would be triggered. The current preferred alternatives for a fixed closed season and trip limit are not projected to reduce removals below the ACT. Adopting the 12-fish (approximately 50-lb ww) trip limit (the current preferred alternative) is only expected to reduce removals to below the selected ACT if selected alongside one of the options for a five-month fixed closed season. Adopting the June through

July fixed closed season (the current preferred alternative) is only expected to reduce removals to below the selected ACT if selected alongside a 6-fish (approximately 25-lb ww) trip limit. The combination of alternatives expected to result in removals that comes closest to the ACT without exceeding it would be an April through August fixed closed season and a 12-fish (approximately 50-lb ww) trip limit. From the perspective of allowing the greatest amount of fish to be landed, this combination of alternatives would be expected to result in the least social impacts given the options available to reduce removals to below the ACT. As discussed above, the impacts are expected to be relatively minor because fishermen do not typically target gray triggerfish.

4.3.5 Direct and Indirect Effects on the Administrative Environment

Action 3.1: Establish a Commercial Fixed Closed Season for Gray Triggerfish

In **Action 3.1**, **Alternative 1** (no action) would not establish a closed season and could potentially result in ACTs or ACLs being exceeded which would increase the administrative burden through a season closure. However, these impacts would be minor given the protocols for an in-season closure has already been developed through Amendment 30A. **Preferred Alternative 2, Alternative 3,** and **Alternative 4** establish a fixed commercial closed season. The alternatives in this action should adversely affect enforcement and monitoring activities. The indirect implication is that management measures that reduce landings would have to be implemented, thus affecting enforcement and monitoring. However, after the fixed closed season is established and stakeholders have educated themselves about the regulatory change, the additional administrative burden would be minor.

Action 3.2: Establish a Commercial Trip Limit for Gray Triggerfish

In **Action 3.2**, **Alternative 1** (no action) would not establish a commercial trip limit and could potentially result in ACTs or ACLs being exceeded which would increase the administrative burden through a season closure. As with Action 3.1, these impacts would be minor given the protocols for a in-season closure have already been developed through Amendment 30A. **Preferred Alternative 3, Alternative 2,** and **Alternative 4** would be expected to alter the administrative burden. The implementation of a commercial trip limit would be expected to increase the enforcement and monitoring burden, but is expected to decrease the administrative burden by not having to implement a commercial season closure. Thus, any adverse effects would be minor.

Combined Effects of Action 3.1 and 3.2

As discussed above the administrative burden is expected to increase with the implementation of a commercial fishing closed season and commercial trip limit. The no action alternatives and the trip limit of 18 gray triggerfish are not projected to meet the 60,900-lbs ww ACT; therefore, are not discussed in these combined effects. The combined two preferred alternatives are estimated to result in a commercial harvest of 86,427 lbs ww, which will result in a commercial fishing season closure when the ACT is reached or projected to be reached. The fishing season closure will result in an increased administrative burden to NMFS, but is not expected to result in any administrative burden to the commercial fishing industry. In Table 2.3.2.2, the shaded

alternatives are expected to increase the administrative burden to NMFS as a result of the implementation of the required commercial fishing season closure when the ACT is reached or projected to be reached. The alternatives in Table 2.3.2.2 that are shaded are not expected to result in any change to the administrative burden.

4.4 Action 4: Recreational Management Measures

4.4.1 Direct and Indirect Effects on the Physical Environment

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

Information about gray triggerfish effects are based on landed catch including any information about other reef fish that are caught with gray triggerfish. The comparison of alternatives is based on the number of available fishing days. This comparison does not take into account fishing during the closed season or effort shifting outside of the closed season. The impacts to the physical environment may be underestimated in this analysis if effort shifting occurs outside the closed season; however, any effort shifting is expected to be minor because fishermen do not typically target gray triggerfish. Physical impacts to the environment could occur when gear such as weights, hooks, and anchors hit and damage the substrate and surrounding habitat. Thus, greater impacts can be expected from a longer fishing season, as there are more opportunities for gear interactions with the physical environment. On the other hand, it is not likely that many recreational fishermen target gray triggerfish exclusively on a fishing trip. Therefore, any beneficial effects to the physical environment from reducing the number of fishing days may be minimal as fishermen still take trips, but target other reef fish. Recreational fishers typically use rod-and-reel or spearguns to harvest gray triggerfish and often anchor their vessel over desired fishing locations; see Section 4.1.1 for a comparison of gear types and impacts to the physical environment.

Alternative 1 (no action) would exceed the ACT = 217,000 lbs ww (Preferred Alternative 4 in Action 2) if a closed season is not established. Therefore this alternative is projected to have the shortest recreational fishing season with a maximum of 163 fishing days for recreational gray triggerfish and is expected to result in the least impacts to the physical environment. Based on the number of fishing days, **Alternative 1** (163 days), **Alternative 2** and **Preferred Alternative 3** (304 days), and **Alternative 4** (335 days) are expected to provide the greatest to the least positive effects to the physical environment, respectively. However, **Alternative 2** is the only alternative in this action alone that meets the necessary reduction in landings consistent with the preferred action in Action 2 (ACT = 217,100 lbs ww). Whereas, the other alternatives (**Alternative 1**, **Preferred Alternative 3**, and **Alternative 4**) are projected to have a closure later in the fishing year depending on which alternative from Action 4.2 is selected as preferred (Table 2.4.2.4).

It is unknown if or how effort will shift with implementation of a fixed closed season, because gray triggerfish are often kept if caught, but may not necessarily be targeted by recreational anglers in all regions of the Gulf of Mexico. If the fishing season for other highly targeted and prized reef fish species are open, fishing trips would still occur and a fixed closed season for gray triggerfish would result in little or no reduction in gear interactions with the physical

environment. For example, fishermen would continue to fish for red snapper, a species often caught with gray triggerfish in the northern Gulf of Mexico (Ingram and Patterson 2001; Lingo and Szedlmayer 2006) even though gray triggerfish is closed.

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

The number of gray triggerfish landed per angler per trip is low. For example, based on landings data from 2009 through 2011 from the Marine Recreational Fisheries Survey and Statistics (MRFSS), headboat survey (HBS), and Texas Parks and Wildlife Department (TPWD), 95% of the trips landed less than 1 gray triggerfish per angler per trip (Table 2.4.2.1). In addition, only small reductions in landings are estimated to be achieved until catches are constrained to a 4-gray triggerfish per angler bag limit or less within the 20-reef fish aggregate bag limit suggesting minimal indirect differences in impacts in the physical environment between **Alternatives 1-4** (SERO-LAPP Gulf Amendment 37 2012). None of the alternatives in **Action 4.2** meet the necessary reduction in landings (ACT = 217,100 lbs ww) alone; therefore, they would have to be used in combination with alternatives in Action 4.1 to avoid a closure later in the year.

Based on the reduction in landings alone, **Alternative 4**, **Preferred Alternative 3**, **Alternative 2** and **Alternative 1** (no action) are expected to provide the greatest to least positive effects on the physical environment. It is assumed that fishers will fish longer at one spot or move to several more locations to reach the bag limits. However, based on the low percentage of gray triggerfish landed per angler on a trip, it is likely any adverse impacts to the physical environment between alternatives would be minimal. It is possible that there are regions in the Gulf of Mexico where gray triggerfish is more highly prized and may be more easily accessible to anglers. In those regions of the Gulf of Mexico anglers may more readily target gray triggerfish; however, evidence of this is not apparent by looking at percent reduction in bag limits by state (Table 2.4.2.3). The greatest reduction in landings is achieved by reducing the bag limit to 1-gray triggerfish per angler within the 20-reef fish aggregate bag limit. It is possible that reductions in landings by state could be masked by the inclusion of HBS data where a greater number of anglers (40-60) are fishing from a single vessel (Table 2.4.2.3).

Combined Effects of Action 4.1 and 4.2

Many of the **Action 4.1** and **Action 4.2** alternatives do not provide the harvest reductions required to maintain landings at or below the 217,100 lbs ww ACT. The exception to this is the fixed recreational closed season from May through June during peak recreational harvest (Figure 2.4.1.1). For example, if a closed season was established May through June no reduction in the gray triggerfish bag limit is unnecessary; however, the combination of a closed season and a bag limit is projected to reduce harvest even further (Table 2.4.2.4).

Combinations of alternatives that would meet the necessary reduction in ACT in addition to the current preferred alternatives (i.e., fixed closed season in June through July and a 2-gray triggerfish per angler bag limit within the 20 reef fish aggregate) include reducing the bag limit to 1 gray triggerfish per angler and establishing a fixed closed season either during the month of June or during the months of June through July (Table 4.4.1.1). Projected landings from the

combined effects of the recreational management measures are used as a proxy for fishing effort to provide a rank (Table 4.4.1.1).

Table 4.4.1.1. Ranking based on projected landings of Action 4 combined recreational management measures that are estimated to meet (rank 1-7) or exceed (rank 8-16) the ACT = 217,100 lbs ww.

Action 4.1	Action 4.2	Landings	Rank
Alternative 2	Alternative 4	136,868	1
Alternative 2	Preferred Alternative 3	165,870	2
Preferred Alternative 3	Alternative 4	171,506	3
Alternative 2	Alternative 2	181,552	4
Alternative 2	Alternative 1	192,771	5
Alternative 4	Alternative 4	203,357	6
Preferred Alternative 3	**Preferred Alternative 3**	**206,965**	**7**
Preferred Alternative 3	Alternative 2	236,765	8
Preferred Alternative 3	Alternative 4	244.700	9
Preferred Alternative 3	Alternative 1	258,565	10
Alternative 1	Alternative 4	270,803	11
Alternative 4	Alternative 2	277,257	12
Alternative 4	Alternative 1	301,755	13
Alternative 1	Preferred Alternative 3	321,678	14
Alternative 1	Alternative 2	359,622	15
Alternative 1	Alternative 1	412,631	16

Note: Cells shaded in gray indicate that the ACT of 217,100 lbs ww is expected to be exceeded.
Source: SERO-LAPP Gulf Amendment 37 2012.

The combined effects of the two recreational sub-actions that meet the necessary reductions are expected to provide the greatest benefits to the physical environment (ranks 1-7; Table 4.4.1.1) compared to the combinations of alternatives that do not meet the necessary reductions (ranks 8-16; Table 4.4.1.1). Combinations of alternatives or alternatives alone that do not meet the necessary reductions are expected to provide the least beneficial effects to the physical environment. However, because angler behavior is largely unpredictable, it is difficult to quantify the beneficial effects, likely small, to the physical environment. Anglers are likely to continue to fish for other reef fish species after the gray triggerfish bag limit is met, therefore impacts from the any of the combinations of alternatives would likely be minor because reef fish fishing effort would continue.

4.4.2 Direct and Indirect Effects on the Biological/Ecological Environment

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

Results of the update assessment determined gray triggerfish was not rebuilding on schedule. Therefore, more conservative management is needed to rebuild the stock by the end of 2017 (SEDAR 9 Update 2011b). It is unknown how angler behavior might change if a fixed closed season is established, particularly if there are other prized or targeted species open for harvest that occur in the same habitat as gray triggerfish. Therefore, this analysis is focused on landed

catch and information about gray triggerfish reproductive biology and behavior. Because gray triggerfish display unique reproductive behavior (Simmons and Szedlmayer 2012) compared to other marine fishes (i.e., pelagic broadcast spawners), closing recreational gray triggerfish during spawning or a portion of the spawning season (**Alternatives 2-4**) is expected to have beneficial effects for the stock compared to **Alternative 1**.

Gray triggerfish is fecund as early as May and as late as August, but peak spawning occurs in June and July in the northern Gulf of Mexico and South Atlantic Bight (Wilson et al. 1995; Hood and Johnson 1997; Ingram 2001; Moore 2001; Simmons and Szedlmayer 2012). **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** are expected to provide positive direct effects on the biological and ecological environment because they close the recreational sector to harvest of gray triggerfish for at least one month during the spawning season. During the spawning season, gray triggerfish may be more susceptible to harvest than during other periods of time. For example, Simmons and Szedlmayer (2012) found that if females were on an active nest with eggs, they were easily harvested by SCUBA divers with spear guns. For males, they found dominant fish display aggressive behaviors including chasing other male gray triggerfish and divers, especially if there were females present on active nests. This could make dominant male gray triggerfish more susceptible to spear fishing or hook-and-line harvest because of this behavior.

However, Ingram (2001) reported that catch-per-unit effort in the northern Gulf of Mexico was reduced during the summer months which were reflected in the aging analysis of the spines as a time period of slow growth. The period of slow growth could be attributed to lack of feeding during those months or to the substantial investment in spawning (Ingram 2001). Similarly, anecdotal evidence has been documented for other reef fish during spawning when the bite slows (J. Simms, commercial fishermen, pers. comm.). These results could be explained by a broad number of biological reasons other than the fish are spawning, such as additional food sources or changes in water temperatures at that time of year (Richards and Lindeman 1987; Robertson 1991; Shulman 1984; Solmundsson et al. 2003).

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

Alternative 4, **Preferred Alternative 3**, **Alternative 2 and Alternative 1** (no action) are expected to provide the greatest to the least positive effects on the biological environment based on reductions in landings (Table 2.4.2.2). **Alternative 1** (no action) would maintain gray triggerfish as part of the 20-reef fish aggregate bag limit providing no reduction in harvest (Table 2.4.2.2). Results of the update assessment determined gray triggerfish was not rebuilding on schedule therefore, **Alternative 1** would not reduce landings or provide management measures needed to rebuild the stock by the end of 2017 (SEDAR 9 Update 2011b). **Alternative 2** is projected to reduce landings by 13%, **Preferred Alternative 3** is projected to reduce landings by 22%, and **Alternative 4** is projected to reduce landings by 34%. The Council selected a fixed closed season in addition to a bag limit reduction because none of the bag limit alternatives alone reduce landings enough to meet the ACT of 217,100 lbs ww.

Limiting the number of gray triggerfish within the 20-reef fish aggregate could potentially cause effort to shift towards the other six species within the reef fish aggregate. However, the effects

on the other six species would be minimal. Only three trips (0.2%) reached the 20-reef fish aggregate bag limit (n = 826 trips) based on MRFSS landings from 2009 through 2011. Analysis of MRFSS recreational landings determined of the seven species within the 20-reef fish aggregate, the following four have been landed from most to least frequently in the last three years: vermilion snapper (80%), gray triggerfish (17.4%), lane snapper (1.6%), and almaco jack (1%) (SERO 2012). The tilefishes (i.e., golden, goldface and blueline) were not recorded on any of the recreational trips from 2009 through 2011 (SERO 2012). The benchmark assessment for tilefish (golden) only documented recreational landings for two years (2005 and 2008), from 2002 through 2011 (SEDAR 22 2011a). It is possible by reducing the bag limit for gray triggerfish within the 20 reef fish aggregate that effort could shift towards these other three species. However, taking a closer look at the biology and life history of these three other species makes the ease of effort shift unlikely. For example, adult almaco jacks are typically found on large offshore reefs and rigs (Randall 1996) and are typically targeted by recreational anglers using live bait while gray triggerfish are caught with cut bait from vessels drifting or anchored over an artificial or natural reef. Vermilion snapper may be caught on the same reefs as gray triggerfish, but their range extends from 82-1,000 ft (25-400 m) in deeper waters than gray triggerfish found at a maximum depth of 328 ft (100 m) (www.fishbase.org; McEachran and Fechhelm 2005). Lane snapper are more typically found on coral reefs or live bottom habitats (Randall 1996) and were caught less frequently in the last three years than gray triggerfish and vermilion snapper (SERO 2012). Tilefishes have a limited habitat range and distinct sediment type, depth, and temperature preferences (Nelson and Carpenter 1968; Able et al. 1982; Katz et al. 1983). Although, deep-drop fishing has become more popular with recreational anglers, the distance from shore alone may prohibit recreational anglers from reaching tilefishes fishing grounds.

Combined Effects of Action 4.1 and 4.2

The combined effects of the two recreational sub-actions that meet the necessary reductions are expected to provide the greatest beneficial effects to the gray triggerfish stock (rank 1-7; Table 4.4.1.1) compared to the combinations of alternatives that do not meet the necessary reductions (rank 8-16; Table 4.4.1.1). Combinations of alternatives or alternatives alone that do not meet the necessary reductions are expected to provide the least beneficial effects to stock. In fact, combinations of alternatives that do not meet the reductions would result in negative impacts to the stock because the ACL is more likely to be exceeded, likely disrupting the activities of anglers by shortening the fishing season the following year, and interrupting the gray triggerfish rebuilding plan.

The combination of **Action 4.1**, **Alternative 2** with **Action 4.2, Alternative 4** (Rank 1; Table 4.4.1.1) would provide the most beneficial effects to the biological environment because this combination of alternatives has the lowest projected landings level and is well below the ACT of 217,100 lbs. This combination is projected to rebuild the stock more quickly. Other combinations that keep the projected landings below the ACT including **Action 4.1**, **Preferred Alternative 3** with **Action 4.2, Preferred Alternative 3** (Ranks 2-7; Table 4.4.1.1) also are consistent with the rebuilding plan. Any of the alternative combinations that project landings in excess of the 217,100 lbs ACT would likely cause a closure at the end of the year when the ACT is met or projected to have been met. Therefore, the effects on the biological environment for

these alternative combinations (ranked 8-16 in Table 4.4.1.1) could adversely affect the gray triggerfish stock because landings are projected to exceed the ACT.

4.4.3 Direct and Indirect Effects on the Economic Environment

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

The economic effects expected to result from recreational fixed closed seasons considered in this amendment were measured by changes in consumer surplus to anglers and in producer surplus to for-hire operators. The estimated changes in consumer surplus and producer surplus were computed based on an average consumer surplus of $11.46 per fish harvested and an average producer surplus of $145.63 per target charter angler trip (D. Carter, NMFS SEFSC pers. comm.). Projections of the expected change in producer surplus for headboats were not estimated because estimates of gray triggerfish target effort for headboat anglers were not available and it is assumed that headboat anglers do not specifically target gray triggerfish.

Alternative 1 would not establish recreational fixed closed seasons. Therefore, **Alternative 1** would not be expected to result in any direct economic effects. However, **Alternative 1** would not contribute to the rebuilding of gray triggerfish. Adverse indirect economic effects may therefore be expected to result from the no-action alternative **(Alternative 1)** due to more restrictive corrective measures that may be required in the future to rebuild gray triggerfish. Table 4.4.3.1 contains estimates of the changes in consumer and producer surpluses expected to result from **Alternatives 2-4** relative to **Alternative 1**.

Table 4.4.3.1. Recreational closures and changes in landings and consumer and producer surpluses; Landings in pounds whole weight (ww), consumer and producer surpluses in 2010 dollars.

	Closed Month(s)	Landings Pounds	Consumer Surplus	Producer Surplus	Total
Alternative 2	May through Jun	-219,860	-$1,240,336	-$331,676	-$1,572,012
Preferred Alternative 3	Jun through Jul	-154,066	-$869,160	-$232,420	-$1,101,581
Alternative 4	June	-110,876	-$625,505	-$167,265	-$792,770

Alternative 2 would prohibit the recreational harvest of gray triggerfish during May and June and would be expected to result in landings reductions estimated at 219,860 lbs ww relative to **Alternative 1**. The reduction in consumer and producer surplus that would be expected to result from **Alternative 2** are estimated at $1.24 million and $0.33 million, respectively. Despite the expected short-term reduction in consumer and producer surplus under **Alternative 2**, in the long-term, the added protection to the gray triggerfish stock afforded by the closure would be expected to yield an increase in economic benefits as a result of larger sustainable harvests.

Preferred Alternative 3 would establish a fixed recreational closed season for gray triggerfish in June through July. Relative to **Alternative 1**, the reductions in recreational landings and consumer and producer surpluses that would be expected to result from **Preferred Alternative 3** are estimated at 154,066 lbs ww, $869,160 and $232,420, respectively. **Alternative 4** would prohibit the recreational harvest of gray triggerfish during the month of June and would be

expected to result in landings reductions estimated at 110, 876 lbs ww relative to **Alternative 1**. The reductions in consumer and producer surplus that would be expected to result from **Alternative 4** are estimated at $625,505 and $167,265, respectively. **Preferred Alternative 3** and **Alternative 4** would also be expected to result in long-term economic benefits due to the additional protection to the gray triggerfish stock provided by the closures.

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

The economic effects expected to result from changes to the recreational gray triggerfish bag limit are measured by changes in consumer surplus to anglers and in producer surplus to for-hire operators following the methodology described for Action 4.1. **Alternative 1** would not modify the current gray triggerfish bag limit. Therefore, **Alternative 1** would not be expected to result in any direct economic effects. However, harvest reductions accruing to Action 4.1 may be insufficient to achieve the necessary harvest reduction to sufficiently restrict recreational harvest and, as a result, the adoption of **Alternative 1** would not contribute to the rebuilding of gray triggerfish and result in an early closure due to the accountability measures. Therefore, adverse indirect economic effects may be expected to result from **Alternative 1** due to more restrictive corrective measures that may be required in the future to rebuild gray triggerfish. Table 4.4.3.2 provides estimates of the expected changes in consumer and producer surplus relative to **Alternative 1** for the alternative bag limits under consideration.

Table 4.4.3.2. Recreational bag limits and changes in landings and consumer and producer surpluses; Landings in pounds whole weight (ww), consumer and producer surpluses in 2010 dollars.

	Gray triggerfish per angler	Landings Pounds	Consumer Surplus	Producer Surplus	Total
Alternative 2	4	-53,009	-$299,049	-$79,968	-$379,017
Preferred Alternative 3	2	-90,953	-$513,110	-$137,210	-$650,319
Alternative 4	1	-141,828	-$800,120	-$213,958	-$1,014,078

Alternative 2 would establish a 4-gray triggerfish bag limit within the 20-reef fish aggregate bag limit and would be expected to result in landings reductions estimated at 53,009 lbs ww relative to **Alternative 1**. The reductions in consumer and producer surplus that would be expected to result from **Alternative 2** are estimated at $299,049 and $79,968, respectively.

Preferred Alternative 3 would establish a 2-gray triggerfish bag limit within the 20-reef fish aggregate bag limit. Relative to **Alternative 1**, the reductions in recreational landings and consumer and producer surplus that would be expected to result from **Preferred Alternative 3** are estimated at 90,953 lbs ww, $513,110 and $137,210, respectively.

Alternative 4 would set a 1-gray triggerfish bag limit within the 20- reef fish aggregate bag limit and would be expected to result in landings reductions estimated at 141,828 lbs ww relative to **Alternative 1**. The reductions in consumer and producer surplus that would be expected to result from **Alternative 4** are estimated at $800,120 and $213,958, respectively. **Preferred Alternative 2,** and **Alternatives 3** and **4** would also be expected to result in longer term

economic benefits due to the additional protection to the gray triggerfish stock afforded by bag limit reductions.

Combined Effects of Actions 4.1 and 4.2

Without the establishment of a fixed closed season, modifications to the recreational gray triggerfish bag limit would not be sufficient to limit recreational gray triggerfish landings to the recreational ACT of 217,000 lbs ww. Table 2.4.2.4 provides recreational gray triggerfish landings estimates for alternative combinations of seasonal closures and gray triggerfish bag limits. Several bag limit and closed season combinations would be expected to limit recreational landings to or below the ACT. In general, more restrictive seasonal closures and/or smaller bag limit would be expected to reduce recreational landings and increase the adverse short-term economic effects. The Council has already indicated that it intends to implement a June through July fixed closed season (**Action 4.1 - Preferred Alternative 3**) and establish a 2-gray triggerfish bag limit within the 20-reef fish aggregate limit (**Action 4.2 - Preferred Alternative 3**). Relative to **Alternative 1**, the Council's preferred combination would be expected to result in landings reductions of 205,666 lbs ww, which would be expected to generate short-term losses in consumer and producer surplus estimated at $1.16 million and $0.31 million, respectively.

4.4.4 Direct and Indirect Effects on the Social Environment

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

Although there is currently no fixed closed season for the recreational harvest of gray triggerfish, an in-season AM is in place through an interim rule. Under this authority, the gray triggerfish recreational fishing season was closed on June 11, 2012. An in-season closure effectively creates a closed season for the rest of the year, the beginning date of which is not known in advance. Such in-season closures may be implemented with little to no warning, causing disruptions to fishing activity, as triggerfish would have to be thrown back. Given the reduction to the ACL currently in place under the interim rule (equivalent to Action 2, Preferred Alternative 4), and the proposed adoption of an in-season AM in this amendment (Action 5, Preferred Alternative 2), it is likely that in-season closures will continue to be triggered during the rebuilding plan. Therefore, the impacts of not adopting a fixed closed season (**Alternative 1**, no action) are expected to be greater than the selection of a fixed closed season (**Preferred Alternative 3**, **Alternatives 2** or **4**). However, because gray triggerfish are not targeted by a majority of the recreational sector (see Sections 2.3.1 and 2.3.2), these impacts are expected to be minimal. Fishermen would likely still go fishing during a gray triggerfish closure as they target more desirable reef fish species.

The remaining alternatives propose different times for the fixed closed season, only one of which (**Alternative 2**) is sufficient to reduce expected landings to below the selected ACT (217,100 lbs ww) to avoid triggering an in-season closure, without also modifying the recreational bag limit. Thus, the selection of a closed season is considered alongside options for a bag limit reduction (Action 4.2). Impacts from implementing a fixed closed season generally relate to how much fishing activity is restricted by the closure, as fish that were previously allowed to be caught must be thrown back. A shorter duration of the fixed closed season would result in lesser short-

term impacts and a longer closed season would result in greater short-term impacts. Thus, greater impacts would be expected from adopting a two-month closure (**Alternative 2** or **Preferred Alternative 3)** compared to a one-month closed season (**Alternative 4**). Greater impacts may also be expected from a closure occurring during times of peak effort, as more anglers and trips would be restricted through the prohibition of landing gray triggerfish alongside other species. Recreational landings are greatest during May and June (**Alternative 2**, Figure 2.4.1.1), suggesting that the greatest impacts would result from a closure at this time because the most fishing activity would be affected. **Preferred Alternative 3** would coincide with the red snapper open season, negatively impacting those anglers who prefer the opportunity to land both species on the same fishing trip. Other anglers, especially those who are able to take trips year-round, prefer closed seasons be staggered such that there is always an open season for landing popular species. All three alternatives propose to include June in the closure, one of the two months when landings are greatest.

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

No impacts would result from selecting **Alternative 1** (no action), as it is extremely rare for recreational anglers to land 20 gray triggerfish per angler per trip. Thus, there is room to decrease the bag limit for gray triggerfish without resulting in impacts to fishermen. However, the lack of impacts also means that the amount of removals does not decrease quickly. For example, decreasing the bag limit by over half (from a maximum of 20 gray triggerfish per angler per trip, to 9 gray triggerfish per angler per trip) results in only an estimated 5% reduction in landings (Table 2.4.2.2).

The remaining alternatives propose reductions to the gray triggerfish bag limit where the greater the reduction to the bag limit, the greater the impacts as fishermen are allowed to keep fewer fish. Impacts would be relative to the expected percent reduction in landings, which approximates how much fishing behavior will be affected. Thus, for the proposed alternatives, the greatest impacts may be expected from reducing the bag limit to 1 gray triggerfish per angler per trip (**Alternative 4**, 34% reduction), lesser impacts may be expected from a 2-gray triggerfish bag limit (**Preferred Alternative 3**, 22% reduction), and the least from a 4-gray triggerfish bag limit (**Alternative 2**, 13% reduction). However, impacts would also result from an in-season closure which would be triggered with short notice should landings reach the preferred ACT of 217,100 lbs ww in Action 2. Finally, because gray triggerfish are not targeted by a majority of the recreational sector as discussed above, these impacts are likely to be relatively minor as fishermen would likely still go fishing as they target more desirable reef fish species.

Vermilion snapper is another species included within the reef fish aggregate bag limit. A framework action currently under development proposes to reduce the number of vermilion snapper which may be landed within the aggregate bag limit to 10. Reducing both the vermilion snapper and gray triggerfish components of the bag limit may compound the impacts on fishermen as the options for reef fish species which may be retained are further restricted.

Combined Effects of Action 4.1 and 4.2

Impacts are expected to relate to the amount of fishing that is affected from the selected closed season and reduction to the bag limit, to achieve the selected ACT (217,000 lbs ww). Table 2.4.2.4 provides a comparison of anticipated removals for the proposed closed seasons and bag limit modifications. The proposed May through June closed season would be the most disruptive to fishing behavior among the closed season alternatives, as fishermen are prohibited from landing the gray triggerfish they catch. However this closed season could be selected alongside any of the alternatives to modify the bag limit and still achieve the selected ACT. Alternatively, it is possible to reduce removals through a 1-fish bag limit and select any of the alternatives for a closed season, including the shortest proposed closed season (the month of June).

Generally, there is a trade-off in impacts between a longer closed season and a smaller bag limit. Recreational anglers vary in their fishing activity, preferences, and time available to fish and fishermen will be impacted depending on how their fishing practices are affected by the selected alternatives. Some fishermen take fewer trips and prefer the opportunity to land multiple reef fish species at the same time while other anglers prefer to have seasons when different reef fish species are open and the bag limit is higher. The currently selected preferred alternatives are expected to result in removals that come closest to the ACT without exceeding it: a June through July closed season and a 2-gray triggerfish bag limit. From the perspective of allowing the greatest amount of fish to be landed, this combination of alternatives would be expected to result in the least social impacts given the options available to reduce removals below the ACT.

4.4.5 Direct and Indirect Effects on the Administrative Environment

Action 4.1: Establish a Recreational Fixed Closed Season for Gray Triggerfish

The alternatives in **Action 4.1** are expected to have nominal differences in the direct and indirect impacts on the administrative environment. **Alternative 1** (no action) would have the greatest burden on the administrative environment, because there would be no established fixed closed season for gray triggerfish. Recreational landings would need to be closely monitored and enforced based on annual projections of when the ACT is expected to be reached. This date could fluctuate from year to year as the stock rebuilds creating additional administrative burdens on staff to estimate these closures, for stakeholders to become aware of these closures, and on law enforcement officials to enforce these closures. For example, an additional round of public information notices, broadcasts by radio, and press releases may be necessary to inform stakeholders when gray triggerfish harvest is prohibited, because it could be a different date each year based on changes in the resource and effort shifts. In addition, each of the five Gulf of Mexico states would also have to participate in the fluctuating closure dates, adopting compatible regulations and adding to the burden on the administrative environment. **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** would establish a fixed closed season, creating an initial burden on the administrative environment. However, when a fixed closed season is established and stakeholders have educated themselves about this regulatory change, no additional administrative burdens are expected. By establishing a fixed closed season, stakeholders are aware of when it occurs, slowing the harvest rate and reducing the probability of exceeding the ACL. Further, at this time the Council has selected to monitor the recreational

sector landings in-season based on the ACT in Action 5, which reduces the probability of exceeding the ACL.

Action 4.2: Modify the Recreational Bag Limit for Gray Triggerfish

The alternatives in **Action 4.2** are expected to have positive biological and physical impacts on their respective environments and create nominal differences in the direct and indirect impacts on the administrative environment. **Alternative 1** (no action) would have the least burden on the administrative environment, because there is not currently a gray triggerfish per angler bag limit within the 20-reef fish aggregate bag limit. **Alternative 2**, **Preferred Alternative 3**, and **Alternative 4** would establish a gray triggerfish per angler bag limit within the 20 reef fish aggregate. However, after these gray triggerfish per angler bag limits are established within the 20 reef fish aggregate and stakeholders and law enforcement officials have educated themselves about these regulatory changes no additional administrative burdens are expected.

Combined Effects of Action 4.1 and 4.2

The combined effects of these actions on the administrative environment are not expected to be different than the minimal impacts of the individual actions on the administrative environment. Combinations of alternatives or alternatives alone that do not meet the necessary reduction in ACT are expected to create the greatest burden on the administrative environment, because of the fluctuating fishing closures, stakeholder awareness, and states compatibility.

4.5 Action 5: Modify Recreational Accountability Measures

4.5.1 Direct and Indirect Effects on the Physical Environment

Action 5 would have no direct and little indirect effects on the physical environment. The effects of fishing on the physical environment are described in Section 4.1.1. **Action 5**, **Preferred Alternative 2** and **Alternative 3** would further constrain fishing effort compared to **Alternative 1** through in-season action, and so would be expected to reduce any adverse effects to the physical environment that could result if the ACL were exceeded. Because the harvest is constrained more through **Preferred Alternative 2** than **Alternative 3**, this alternative would be expected to limit effort the most and thus have the least effect on the physical environment. **Preferred Alternative 4** would only be effective if the ACL were exceeded and would be expected to mitigate any adverse effects by further restricting harvests in subsequent years. **Option 4a** would be effective any time the ACL were exceeded while **Preferred Option 4b** applies only when the stock is overfished. Therefore, **Option 4a** would increase the likelihood of the application of an overage adjustment.

Regardless of which alternative is selected, the effects on the physical environment would likely be minimal. Gray triggerfish, although targeted by fishermen, are not the sole species sought on a trip, so prohibiting fishing for gray triggerfish after either the ACT or ACL is met would not likely reduce overall reef fish fishing effort.

4.5.2 Direct and Indirect Effects on the Biological/Ecological Environment

The effects of fishing on the biological/ecological environment are described in Section 4.1.2. **Alternative 1** would only provide protection from overfishing through the recreational post-season AMs. These post-season AMs adjust the season length in the subsequent year if the AM trigger (ACL) is exceeded. Although this provides positive effects to the gray triggerfish stock by reducing the possibility of overfishing, exceeding the ACL could have short-term negative effects by not reducing overfishing and postponing efforts to rebuild the stock. The effects to the biological/ecological environment are not expected to change more than minimally. As noted in the last paragraph, gray triggerfish is not a primary target species, thus fishing effort is not expected to change greatly, thus it would be expected that impacts to the overall biological/ecological environment may be minimal.

Compared to the no action alternative, **Preferred Alternative 2** and **Alternative 3** would allow the closure of the recreational sector to the harvest of gray triggerfish should landings approach the ACT or ACL. These measures are designed to prevent in-season overages from occurring and reduce overfishing. For this reason, these measures have less of an effect on the gray triggerfish biological/ecological environment than **Alternative 1**. Because **Preferred Alternative 2** constrains the harvest of gray triggerfish more than **Alternative 3**, it would be expected to have a more positive effect on this stock because it minimizes the risk of overharvest. **Preferred Alternative 4** would only be effective if the ACL were exceeded and would be expected to mitigate any adverse effects by further restricting harvests in subsequent years. **Option 4a** would be less adverse to the biological/ecological environment because it would be effective any time the ACL were exceeded. **Preferred Option 4b** would apply the overage adjustment only if the stock were overfished. Indirect negative effects to the biological/ecological environments might be expected to occur as the gray triggerfish stock rebuilds. Increased competition for resources (e.g. prey species and physical space) both within the gray triggerfish stock, and among other competing reef fish species, would be expected to occur.

4.5.3 Direct and Indirect Effects on the Economic Environment

Alternative 1 would maintain current AMs for gray triggerfish. Current AMs monitor recreational gray triggerfish landings using three-year moving averages and would reduce the recreational gray triggerfish season in the following year if landings exceed the ACL. Because no changes would be made in the accountability measures, no direct economic effects would be expected to result from **Alternative 1**, the status quo alternative. However, reliance on just post-season AMs could result in large harvest overruns, adversely impacting the condition of the resource, particularly in the absence of any payback provision. This could jeopardize future harvests and the continued receipt of future associated economic benefits. As a result, **Alternative 1** could result in indirect future economic losses. However, because fishermen do not generally target gray triggerfish, these economic losses could be mitigated by harvesting other species, thus minimizing any adverse economic effects. This also applies to the other alternatives in this action.

Preferred Alternative 2 and **Alternative 3** would implement in-season AMs for the recreational sector based on the annual recreational gray triggerfish ACT and ACL, respectively. In contrast to **Alternative 1**, **Preferred Alternative 2** and **Alternative 3** would not use three-year moving averages to trigger accountability measures. The use of three-year moving averages instead of single-year landings would smooth out harvest fluctuations and decrease the likelihood of triggering AMs, thus incurring the associated reduction in economic benefits. However, the use of moving averages could potentially delay the implementation of AMs by masking potentially sizeable harvest overages and potentially delaying the recovery of gray triggerfish and receipt of the associated economic benefits. Relative to **Alternative 1**, **Preferred Alternative 2** and **Alternative 3** would therefore be expected to result in economic benefits. In addition, rather than mitigating overages by implementing post-season AMs, as would occur under **Alternative 1, Preferred Alternative 2** and **Alternative 3** would be expected to reduce the magnitude of harvest overages by implementing in-season AMs based on the ACT and ACL, respectively. Therefore, corrective action to reduce overages, which would restrict fishery participants' opportunities to harvest the resource, would be implemented sooner under **Preferred Alternative 2** and **Alternative 3**, resulting in reductions in short-term economic benefits occurring sooner than would occur under **Alternative 1**. In the long term, the speedier implementation of AMs under **Preferred Alternative 2** and **Alternative 3** would be expected to result in increased economic benefits due to the added protection afforded to gray triggerfish. It is assumed that long term benefits stemming from the added protection to the gray triggerfish stock outweigh short term economic costs that would result from any decreased fishing opportunities resulting from in-season accountability measures. **Preferred Alternative 2**, which would provide more protection to the gag stock by setting a lower trigger for AMs than **Alternative 3**, would be expected to result in greater economic benefits in the long run.

Preferred Alternative 4 would require overage adjustments when the recreational gray triggerfish ACL is exceeded regardless of the status of the gray triggerfish stock (**Option a**) or only if gray triggerfish are overfished or under rebuilding (**Preferred Option b**). Imposing an overage adjustment would be expected to result in fewer fishing opportunities than the absence of an adjustment and, as a result, would be expected to result in a short-term reduction in economic benefits relative to **Alternative 1**. **Preferred Option b**, which would only implement overage adjustments if gray triggerfish are overfished or under rebuilding, would not unduly restrict fishing opportunities and would be expected to result in fewer adverse economic effects than **Option a**. In the long term, **Preferred Alternative 4** would be expected to result in an increase in economic benefits due the enhanced protection to gray triggerfish that overage adjustments would provide.

4.5.4 Direct and Indirect Effects on the Social Environment

Generally, AMs result in social impacts only if they are triggered. Thus, if other effort restrictions serve to reduce projected landings such that landings remain below the determined threshold (either the ACL or ACT), the AM is never applied and no impacts result. In-season AMs result in direct, short-term impacts by closing the fishing season with little or no notice. This can be disruptive to fishing activity and confusing for the public. Impacts from post-season AMs manifest in a subsequent fishing season through a decrease in the amount of fish available for harvest.

Usually, impacts are not expected from selecting **Alternative 1 (**no action) as no change is made to the existing regulation. However, the recreational sector currently has only a post-season AM, where the ACL is reduced in a following season. Under **Alternative 1** then, the recreational sector is impacted in a subsequent fishing year if fishing effort is not sufficiently constrained in the current fishing season, by decreasing the amount of fish allowed to be landed. The moving average provision of **Alternative 1** could also result in negative impacts because it is complicated and difficult to explain its application to the public. Should the post-season AM be triggered because of a moving average, it may not be clear to fishermen why the given season's landings were not used to determine the season length of the following year. Thus, removing the use of moving averages for determining the triggering of post-season AMs could result in positive impacts by avoiding further problems in communication regarding management. On the other hand, the ACL changes during the rebuilding plan so it is not possible to calculate a three-year moving average. This means that it is essentially non-functioning during the rebuilding period, and any positive impacts from its removal would be negligible.

Although the recreational sector currently has an ACT, there is no mechanism for an in-season closure if the ACT is reached; the ACT is non-functioning relative to the AMs. While in-season closures can be disruptive to fishing activity, an in-season closure would mitigate negative impacts resulting from a decrease in a subsequent year's ACL, should the in-season closure prevent the recreational sector from exceeding the ACL. Thus, if an in-season closure keeps the sector from exceeding the ACT (**Preferred Alternative 2**) or ACL (**Alternative 3**), negative impacts may be avoided for the following season, as the amount of fish allowed to be landed the following year is not reduced. There is a trade-off, then, where ending the fishing season mid-season could allow for those fish to be caught later.

Because the ACT is set lower than the ACL, **Alternative 3** would allow more fishing to take place before closing the harvest of gray triggerfish, thereby incurring less impacts in the current season than **Preferred Alternative 2**. However, if the harvest of gray triggerfish is closed when the ACL is met (**Alternative 3**), and the ACL is subsequently determined to have been exceeded, the following year's ACL will be decreased, incurring similar impacts as **Alternative 1**. Due to the difficulties of monitoring recreational landings and the lag time in estimating landings, closing the harvest of gray triggerfish when the ACT is met or projected to be met (**Preferred Alternative 2**) affords greater protection to the recreational sector from exceeding its ACL. This protection is expected to prevent a reduction to fishing in the following season, thereby providing benefits to the recreational sector over a longer term.

It is difficult to analyze potential impacts from the post-season overage adjustment (**Preferred Alternative 4**) because any post-season reduction to the ACL is dependent on as yet unspecified scientific information. This information could suggest a larger overage adjustment to the ACL (resulting in greater impacts as fishing activity is reduced) or no overage adjustment (avoiding negative impacts by not reducing fishing activity). The sub-options for **Preferred Alternative 4** also reflect this flexibility which could result in increased or reduced impacts depending on whether fishing activity is reduced through an overage adjustment. Applying the overage adjustment anytime the ACL is exceeded (**Option 4a**) is more conservative than only applying it when gray triggerfish is under a rebuilding plan (**Preferred Option 4b**). However, the

flexibility remains under **Preferred Alternative 4**, as to whether or not the best scientific information available calls for implementing the overage adjustment.

Regardless of which alternative is selected, the effects on the social environment are expected to be relatively minimal. Gray triggerfish, although targeted by fishermen, are not the sole species sought on a trip, so prohibiting for the landing of gray triggerfish after either the ACT or ACL is met would not likely reduce overall reef fish fishing effort as fishermen have alternative reef fish species for which they can fish.

4.5.5 Direct and Indirect Effects on the Administrative Environment

Alternative 1 (no action) would have no immediate direct or indirect effect on the administrative environment. Measures to monitor landings and determine if an ACL has been exceeded are currently in place. **Preferred Alternative 2** and **Alternative 3** would add to the administrative burden because gray triggerfish recreational landings would need to be monitored in-season and projections would need to be made for when the stock would equal the ACT or ACL. This would put a substantial burden on NMFS Office of Law Enforcement, Southeast Regional Office, and Southeast Fishery Science Center staff to collate and verify landings information, file a notification of a closure, and enforce closures or quota reductions. To inform fishermen of quota closures due to AMs, a Federal Register notice and Fishery Bulletins are published by the Southeast Regional Office. This increases the burden to that office, but measures are already in place to take such action. On the other hand, the administrative environment may be negatively affected if harvests are not sufficiently constrained within a year because additional post-season actions may need to be taken to ensure ACLs are not exceeded in subsequent years. **Alternative 4** would only require the adjustment of the ACL or ACT if the ACL is exceeded and should not adversely affect the administrative environment. Any effects to the administrative environment from any of these alternatives would be minimal because the aforementioned administrative functions are already in place and being used.

4.6 Cumulative Effects

Cumulative effects to the human environment through this action would be minor. The cumulative effects from setting the gray triggerfish ACTs, ACLs, commercial and recreational management measures, and in-season recreational AMs have been analyzed in the environmental impact statement (EIS) for Amendment 30A (GMFMC 2008) and the environmental assessment for a 2012 interim rule (NMFS 2012). The cumulative effects of actions to the reef fish fishery have been analyzed in the EISs to previous amendments (GMFMC 2008, 2011a, 2011b), and are incorporated here by reference. The effects of setting the proposed gray triggerfish management measures in Amendment 37 are most closely aligned with the effects from setting gray triggerfish ACTs, ACLs, rebuilding plan, minimum size limits, and AMs in Amendment 30A (GMFMC 2008) and an interim rule that set 2012 ACLs and established a recreational in-season AM. These analyses found the effects on the biophysical and socioeconomic environments to be positive because they would ultimately restore/maintain the gray triggerfish stock at a healthy level and allows the maximum benefits in yield so that commercial and recreational fishing opportunities to be achieved. However, short-term negative impacts on the fisheries' socioeconomic environment have occurred and are likely to continue due to the need to limit

directed harvest. These negative impacts can be minimized by selecting measures that would provide the least disruption to the fishery while maintaining harvest levels consistent with the rebuilding plan. For the recreational sector, this would mean using combinations of bag limits, size limits and closed seasons to minimize disruptions, and for the commercial sector by using a combination of trip limits, size limits, quotas, and closed seasons. However, because gray triggerfish are not targeted by most reef fish fishermen, any such effects would be expected to be minor.

Global climate change can affect marine ecosystems through ocean warming by increased thermal stratification, reduced upwelling, sea level rise, and through increases in wave height and frequency, loss of sea ice, and increased risk of diseases in marine biota. Decreases in surface ocean pH due to absorption of anthropogenic carbon dioxide emissions may impact a wide range of organisms and ecosystems (Solomon et al. 2007). These influences could affect biological factors such as migration, range, larval and juvenile survival, prey availability, and susceptibility to predators. At this time, the level of impacts cannot be quantified, nor is the time frame known in which these impacts would occur. The Environmental Protection Agency's climate change webpage (http://www.epa.gov/climatechange/) provides basic background information on these and other measured or anticipated effects. A compilation of scientific information on climate change can be found in the United Nations Intergovernmental Panel on Climate Change's Fourth Assessment Report (Solomon et al. 2007) and incorporated here by reference. Global climate changes could have significant effects on Gulf of Mexico fisheries; however, the extent of these effects is not known at this time. Possible impacts are outlined in Amendment 31 (GMFMC 2009), the Generic ACL amendment (GMFMC 2011a), and Amendment 32 (GMFMC 2011b). In addition, oil from the Deepwater Horizon MC252 incident that occurred in April 2010 may affect gray triggerfish populations. However, the effects of this oil on gray triggerfish and other reef fish populations are incomplete and unavailable (see 40 CFR § 1502.22) at this time because studies of the effects of the oil spill are still ongoing. If the oil impacts important habitat for these species or interrupt critical life history stages, the effects could reduce these species' population sizes.

Monitoring

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 of Mexico is collected through MRFSS, HBS, and TPWD's Marine Recreational Fishing Survey. The MRFSS program has been replaced by Marine Recreational Information Program, a program designed to improve the monitoring of recreational fishing. Commercial data are collected through trip ticket programs, port samplers, and logbook programs. To evaluate the rebuilding plan, the Council's SSC has asked for an update on landings of Gulf of Mexico gray triggerfish from the Southeast Data, Assessment, and Review in early 2013. A benchmark assessment for gray triggerfish is currently scheduled for 2015. In response to the Deepwater Horizon MC252 incident, increased frequency of surveys of the recreational sector's catch and effort, along with additional fishery independent information regarding the status of the stock are being conducted. This will allow future determinations regarding the impacts of the Deepwater Horizon MC252 incident on various fishery stocks, including gray triggerfish, but is currently it not possible to make such determinations.

CHAPTER 5. REGULATORY IMPACT REVIEW

5.1 Introduction

NOAA's National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) It provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, 3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the proposed regulations are a "significant regulatory action" under the criteria provided in Executive Order (E.O.) 12866 and provides information that may be used in conducting an analysis of impacts on small business entities pursuant to the Regulatory Flexibility Act. This RIR analyzes the expected effects that this action would be expected to have on the reef fish fishery of the Gulf of Mexico. Additional details on the expected economic effects of the various alternatives in this action are included in Chapter 4.

5.2 Problems and Objectives

The purpose and need, issues, problems, and objectives of this amendment are presented in Chapter 1.

5.3 Description of the Fishery

A description of the Gulf reef fish fishery, with particular reference to gray triggerfish, is provided in Section 3.1.

5.4 Effects of Management Measures

Detailed analyses of the expected economic impacts of alternatives considered in Actions 1, 2, 3,4, and 5 of this proposed amendment are contained in Sections 4.1.3, 4.2.3, 4.3.3, 4.3.4, and, 4.3.5, respectively. The following discussion provides a summary of the expected economic impacts that would be expected to result from the preferred alternatives selected by the Council.

5.4.1 Action 1: Modify the Gray Triggerfish Rebuilding Plan

Preferred Alternative 3 would establish a rebuilding plan that would rebuild the stock in five years. In general, all else equal, rebuilding plans with shorter rebuilding times would be expected to result in greater short-term adverse economic effects due to the more restrictive measures that would be necessary in order to rebuild within the shorter timeframe. However, shorter rebuilding times would also be expected to result in a speedier rebuilding of the stock and quicker receipt of the economic benefits of a recovered stock. Quantitative estimates of the

short-term adverse economic effects and the longer-term economic benefits that would be expected to result from **Preferred Alternative 3** are not available. Estimates of these effects have not been computed because the necessary projected yield streams under the proposed rebuilding plan are not available.

5.4.2 Action 2: Establish Annual Catch Limits and Annual Catch Targets for Gray Triggerfish

Preferred Alternative 4 would decrease the commercial gray triggerfish annual catch target (ACT) by 45,100 lbs ww relative to **Alternative 1**. The expected potential economic effects, measured by losses in annual ex-vessel revenues relative to **Alternative 1**, are estimated to be $42,845. **Preferred Alternative 4** would not change the ACT established by the interim rule and therefore would not result in changes in ex-vessel value relative to the interim rule. **Preferred Alternative 4** would decrease the recreational gray triggerfish ACT by 187,000 lbs ww. Reductions in consumer and producer surplus expected to result from **Preferred Alternative 4** are estimated to be approximately $1.060 million and $0.283 million, respectively, relative to **Alternative 1**. Comparisons between changes in recreational gray triggerfish ACT considered in this amendment and the ACT set in the interim rule currently in effect would result in much smaller quota changes. Therefore, it follows that consumer and producer surpluses reductions relative to the interim rule would be smaller than the estimates reported relative to **Alternative 1**.

5.4.3 Action 3: Commercial Management Measures

Neither the establishment of a commercial fixed season (**Action 3.1**) nor the implementation of a commercial trip limit (**Action 3.2**) would be sufficient on its own to limit commercial gray triggerfish landings to a commercial ACT of 60,900 lbs ww. The Council's preferred combination of alternatives would implement a June through July fixed closed season (**Action 3.1 - Preferred Alternative 2**) and establish a trip limit of 12 gray triggerfish (**Action 3.2 - Preferred Alternative 3**). This combination of commercial management measures would be expected result in a reduction in ex-vessel values estimated at $87,651. However, this combination of alternatives would not be expected to constrain landings below the selected ACT and without an in-season closure later in the year would result in a 25,527-lb ww harvest overage. Therefore, should the Council's preferred combination be implemented, an additional closure of the gray triggerfish component of the commercial reef fish fishery would be required to further restrict commercial landings. This additional closure would occur at the end of the year once the commercial ACT is met.

5.4.4 Action 4: Recreational Management Measures

Without the establishment of a fixed closed season, modifications to the recreational gray triggerfish bag limit would not be sufficient to limit recreational gray triggerfish landings to the recreational ACT of 217,000 lbs ww and avoid an in-season closure later in the year. The Council has elected to implement a June through July fixed closed season (**Action 4.1 - Preferred Alternative 3**) and establish a 2-gray triggerfish bag limit within the 20-reef fish aggregate limit (**Action 4.2 - Preferred Alternative 3**). Relative to **Alternative 1**, the Council's

preferred combination of alternatives would be expected to result in landings reductions of 205,666 lbs ww, which would be expected to generate short-term losses in consumer and producer surplus estimated at $1.16 million and $0.31 million, respectively. However, these reductions are likely to approximate maximum adverse economic effects on the recreational sector because anglers typically prosecute gray triggerfish as a small part of a multi-species reef fish fishery and gray triggerfish are mainly a bycatch species. It is therefore plausible to assume that, to offset losses in consumer and producer surplus, anglers would increase their harvest of other reef fish, thus mitigating potential adverse economic effects.

5.4.5 Action 5: Modify Recreational Accountability Measures

In contrast to **Alternative 1**, **Preferred Alternative 2** would not use three-year moving averages to trigger accountability measures. The use of moving averages could possibly delay the implementation of accountability measures by masking potentially sizeable harvest overages and potentially delaying the recovery of gray triggerfish and receipt of the associated economic benefits. Relative to **Alternative 1**, **Preferred Alternative 2** would therefore be expected to result in economic benefits. In addition, **Preferred Alternative 2** would be expected to reduce the magnitude of harvest overages by implementing in-season accountability measures based on the ACT. Therefore, corrective action to reduce overages, which would restrict fishery participants' opportunities to harvest the resource, would be implemented sooner under **Preferred Alternative 2**, resulting in reductions in short-term economic benefits occurring sooner than would occur under **Alternative 1**. In the long term, the speedier implementation of accountability measures under **Preferred Alternative 2** would be expected to result in increased economic benefits due to the added protection afforded to gray triggerfish.

Preferred Alternative 4 - Preferred Option b would require overage adjustments when the recreational gray triggerfish ACL is exceeded if gray triggerfish are overfished or under rebuilding. Imposing an overage adjustment would be expected to result in fewer fishing opportunities than the absence of an adjustment and, as a result, would be expected to result in a short-term reduction in economic benefits relative to **Alternative 1**. In the long term, **Preferred Alternative 4** would be expected to result in an increase in economic benefits due the enhanced protection to gray triggerfish that overage adjustments would provide.

5.5 Public and Private Costs of Regulations

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

Council costs of document preparation, meetings, public hearings, and information dissemination……...…….. $140,000

NMFS administrative costs of document preparation, meetings and review $100,000

TOTAL $240,000

The Council and federal costs of document preparation are based on staff time, travel, printing, and any other relevant items where funds were expended directly for this specific action. There are no permit requirements proposed in this regulatory action or anticipated additional enforcement costs involved in monitoring any closures. In addition, under a fixed budget, any additional enforcement activity due to the adoption of this amendment would likely mean a redirection of resources to enforce the new measures rather than an expenditure of new funds.

5.6 Determination of Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is expected to result in: (1) An annual effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights or obligations of recipients thereof; or (4) raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this executive order. Based on the information provided above, this regulatory action would not meet the first criterion. Therefore, this regulatory action is determined to not be economically significant for the purposes of E.O. 12866.

CHAPTER 6. REGULATORY FLEXIBILITY ACT ANALYSIS

6.1 Introduction

The purpose of the Regulatory Act Analysis (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the fishery management plan (FMP) or amendment (including framework management measures and other regulatory actions) and to ensure the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

The RFA requires agencies to conduct a Regulatory Flexibility Act Analysis (RFAA) for each proposed rule. The RFAA is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An RFAA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." The RFAA provides: 1) A description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed rule; 3) a description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply; 4) a description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; 5) an identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule; 6) a description and estimate of the expected economic impacts on small entities; and 7) an explanation of the criteria used to evaluate whether the rule would impose "significant economic impacts".

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

The problems and objective of this proposed action are provided in Chapter 1. In summary, the objective of this proposed rule is to end overfishing and rebuild the stock by 2017 (i.e., the end of the 10-year rebuilding plan) to achieve optimum yield. The Magnuson-Stevens Fishery Conservation and Management Act provides the statutory basis for this proposed action.

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

This action, if adopted, would be expected to directly affect approximately 400 vessels that have a valid (non-expired) or renewable reef fish commercial permit. A renewable permit is an expired permit that may not be actively fished, but is renewable for up to one year after expiration. Although over 900 vessels have a commercial reef fish permit, which is required to possess and sell quantities of gray triggerfish in excess of the bag limit, only an average of 382 vessels per year harvested gray triggerfish during the period 2005 through 2009. More recent data are either not available (2011 to current) or are not expected to be representative of normal fishing performance (2010 as a result of the Deepwater Horizon MC252 oil spill and associated closures). The average annual dockside revenue for vessels that harvested gray triggerfish during this period was approximately $87,000 per vessel (2010 dollars).

This action, if adopted, would also be expected to directly affect 1,366 vessels that possess a valid or renewable reef fish for-hire permit. The for-hire fleet is comprised of charterboats, which charge a fee on a vessel basis, and headboats, which charge a fee on an individual angler (head) basis. Although the for-hire permit does not distinguish between charterboats and headboats, an estimated 69 headboats operate in the Gulf of Mexico. The average charterboat is estimated to earn approximately $77,000 (2010 dollars) in annual revenue, and the average headboat is estimated to earn approximately $234,000 (2010 dollars).

No other small entities that would be expected to be directly affected by this proposed rule have been identified.

The Small Business Administration has established size criteria for all major industry sectors in the U.S., including fish harvesters. A business involved in fish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $4.0 million (NAICS code 114111, finfish fishing) for all its affiliated operations worldwide. The revenue threshold for a business involved in the for-hire fishing industry is $7.0 million (NAICS code 713990, recreational industries). Based on the average revenue estimates provided above, all commercial and for-hire vessels expected to be directly affected by this proposed rule are determined for the purpose of this analysis to be small business entities.

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

This proposed rule would not establish any new reporting, record-keeping, or other compliance requirements.

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

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

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

Substantial number criterion

As previously discussed, this proposed rule, if implemented, would be expected to directly affect approximately 400 vessels that have a valid or renewable reef fish commercial permit and 1,366 vessels that possess a valid or renewable reef fish for-hire permit. The number of commercial vessels that would be expected to be directly affected represents over 40% of the fleet, and the number of for-hire vessels that would be expected to be directly affected represents the entire for-hire fleet. As a result, this proposed action is determined to meet the substantial number criterion.

Significant economic impacts

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

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

All entities expected to be directly affected by the measures in this proposed action are determined for the purpose of this analysis to be small business entities, so the issue of disproportionality does not arise in the present case.

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

A discussion of the expected economic effects of all the different actions in this proposed amendment is provided in Chapter 4. This proposed amendment addresses five basic actions: 1) revision of the gray triggerfish rebuilding plan; 2) specification of the commercial and recreational gray triggerfish allowable catch targets; 3) establishment of a gray triggerfish commercial sector closed season and trip limit; 4) establishment of a gray triggerfish recreational closed season and bag limit; and 5) establishment of in-season recreational sector gray triggerfish accountability measures.

Rebuilding plans are not contained in the regulations. As a result, the proposed revision of the gray triggerfish rebuilding plan is outside the scope of the RFA. Further, revision of the rebuilding plan would be an administrative action and, as a result, would not be expected to have any direct economic effects on any small entities. Direct effects of a rebuilding plan would only

be expected to accrue to the resultant harvest restrictions implemented to achieve the goals of the rebuilding plan. The proposed harvest restrictions encompass modification of the sector ACTs, seasons, trip limits, and bag limits. The expected economic effects of these proposed modifications are discussed below.

Accountability measures (AMs) are intended to ensure harvest overages do not occur and to correct or mitigate for overages if they do occur. In-season AMs are specifically intended to prevent or minimize harvest overages. The establishment of AMs, or their modification, would be an administrative action that would only be expected to have indirect effects on small entities. These indirect effects would accrue to the implementation of the AM, should such be triggered. Because the proposed action would only modify the current AMs, no direct effects would be expected to accrue to any small entities. As a result, this component of the proposed rule is also outside the scope of the RFA.

However, because the implementation of the proposed in-season AM would be expected to restrict fishing operations and potentially result in direct short-term reductions in revenue and profit, further discussion of the potential significance of these effects is provided. The proposed in-season gray triggerfish AM would result in closure of the gray triggerfish recreational season if the ACT is harvested or is projected to be harvested. As a result, although recreational fishing for gray triggerfish could continue, harvest would be prohibited. In response to the prohibition on gray triggerfish harvest, it is possible that a reduction in customary fishing trips, and revenue to associated small entities, may occur. However, as previously stated, this closure would only occur if the ACT is harvested or is projected to be harvested. If the ACT is harvested, then the normal economic benefits associated with this harvest, including revenues to small entities, would have been received. As a result, any reduction in revenue associated with the in-season accountability closure would represent a loss of extra revenue and not a reduction of normal expected revenue. Additionally, gray triggerfish is identified as a primary target species by few anglers, accounting for less than one tenth of 1% of all fishing trips, and is, instead, harvested incidental to fishing for other reef fish species or in conjunction with fishing for reef fish species in general. As a result, few, if any, recreational fishing trips would be expected to be cancelled in response to a closure triggered by harvest of the ACT. Because few trips would be expected to be cancelled, any reduction in revenue to small entities would be expected to be minimal. Further, as previously stated, any revenue that may be reduced would be revenue in excess of the normal revenue associated with the harvest of gray triggerfish. As a result, any reduction in revenue to small entities associated with the proposed establishment of in-season AMs would not be expected to be significant.

Although there are three proposed actions associated with the commercial harvest of gray triggerfish, specification of the ACT, establishment of the closed season, and establishment of a trip limit, the expected economic effects would be determined primarily by the specification of the ACT. Individually, assuming no change in fishing behavior, the proposed commercial closed season and trip limit would be expected to result in a reduction in total revenue for all vessels that harvest gray triggerfish of approximately $26,000 and $72,000, respectively. All reductions are expressed in 2010 dollars. Combined, these two measures would be expected to result in a reduction in total revenue of approximately $88,000. This result is less than the total of the two individual proposed actions, approximately $98,000, because the proposed closed season would

negate the expected effects of the trip limit during that period. However, the combined effects of these two proposed actions would not be expected to be sufficient to constrain the commercial gray triggerfish harvest to the ACT and avoid an in-season closure later in the year. The proposed ACT, 60,900 pounds whole weight (lbs ww), would be expected to require a reduction in expected harvest of approximately 118,000 lbs ww. The combined effects of the proposed seasonal closure and trip limit would be a reduction in harvest of approximately 92,000 lbs ww. However, because commercial harvest would be prohibited when the ACT is taken, the full necessary harvest reduction would be expected to occur as a result of the three measures combined (seasonal closure, trip limit, and closure when the ACT is harvested). Thus, although the total effect of the proposed seasonal closure and trip limit would only be expected to reduce revenue by approximately $88,000, the net effect of the proposed ACT, seasonal closure, and trip limit would be a reduction in revenue of approximately $112,000. Distributed across all entities expected to be directly affected by these proposed measures (382 vessels), the average expected effect would be a reduction in revenue of approximately $300 per entity, or less than 1% of the average annual revenue per vessel of $87,000. Although some vessels may be expected to experience a reduction in revenue by more than the average, overall, any reduction would not be expected to be significant, on average, because of the small amount of gray triggerfish traditionally harvested by reef fish fishermen.

Similar to the discussion of the expected effects of the proposed actions associated with the commercial sector, interactive economic effects on small entities would be expected to accrue to the proposed actions associated with the recreational sector. The proposed gray triggerfish recreational ACT, seasonal closure, and bag limit would be expected to individually result in a reduction in producer surplus, used as a proxy for profit, of approximately $295,000, $232,000, and $137,000, respectively. All reductions are expressed in 2010 dollars and equal the combined effects of the proposed actions across all affected entities. Combined, the proposed seasonal closure and bag limit would be expected to result in a reduction in producer surplus of approximately $310,000, which would be less than the effects of the two individual proposed actions combined because of the interactive effects of the two proposed measures. It should be noted that the combined effects of these two proposed measures exceeds the expected effects of the proposed ACT. This would be expected to occur because the estimated reduction in harvest under the proposed seasonal closure and bag limit exceeds the reduction necessary to limit harvest to the gray triggerfish recreational ACT and avoid an in-season closure later in the year. Thus, for the proposed actions affecting the recreational sector, the net expected economic effect would be determined by the combined effects of the proposed seasonal closure and bag limit rather than the proposed ACT.

Unlike the case for the commercial sector, the number of vessels within the for-hire fleet that take trips targeting gray triggerfish cannot be determined with available data. If the projected reduction in producer surplus is distributed across all for-hire vessels (1,366 vessels), the average reduction in producer surplus would be approximately $230 (2010 dollars), or approximately 1% in average annual profit per vessel (approximately $22,800 (2010 dollars); Savolainen et al. (2010)). Because all vessels would not be expected to target gray triggerfish, however, the average reduction in producer surplus per affected vessel would be expected to increase. However, the estimates of expected reduction in producer surplus associated with the proposed actions affecting the recreational sector were generated using a worst-case assumption.

Specifically, the projected reductions in producer surplus were based on the assumption that angler effort, and associated for-hire fees, would be reduced proportionate to the change in allowable harvest. As previously discussed, gray triggerfish is generally regarded as a bycatch or general harvest species, harvested in connection with general fishing (no target species) or as a result of fishing for other reef fish species. As a result, instead of cancelling fishing trips, few if any for-hire vessels would be expected to experience a reduction in customer traffic, and associated revenue, as a result of either the proposed seasonal closure or reduced bag limit. Instead, substitution of another target species during the proposed closed season and continued fishing at the proposed lower bag would be expected. As a result, the proposed actions affecting the recreational sector would not be expected to significantly reduce profits for a significant number of small for-hire entities.

Based on the discussion above, it is determined that, the actions in this proposed amendment, if implemented, would not be expected to have a significant economic effect on a substantial number of small entities.

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

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

CHAPTER 7. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

The Gulf of Mexico Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) §303(a) (11) to establish a standardized bycatch reporting methodology for federal fisheries and to identify and implement conservation and management measures that, to the extent practicable minimize bycatch, and minimize the mortality of bycatch that cannot be avoided. The Magnuson-Stevens Act at §3(2) defines bycatch as "fish which are not harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch-and-release fishery management program." Economic discards are fish that are discarded because they are undesirable to the harvester. This category of discards generally includes certain species, sizes, and/or sexes with low or no market value.

Regulatory discards are fish that are required by regulation to be discarded, but also include fish that may be retained but not sold. National Marine Fisheries Service (NMFS) outlines at 50 CFR §600.350(d) (3) (i) ten factors that should be considered in determining whether a management measure minimizes bycatch or bycatch mortality to the extent practicable.

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

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

The harvest of gray triggerfish is currently regulated with size limits, bag limits, quotas, and seasonal closures. However, these management tools may have the unavoidable adverse effect of creating regulatory discards, which reduces landings. Consequently, the Council is considering in this amendment the practicability of taking additional action to further minimize gray triggerfish bycatch, by sector. The assessments of this species determined discard mortality was minimal (SEDAR 9 2006a; SEDAR 9 Update 2011b) therefore discard mortality was modeled at 0% (SERO-LAPP Gulf Amendment 37 2012).

Release Mortality Rates

Gray Triggerfish

Gray triggerfish discard rates for the commercial and recreational sectors were not calculated in the SEDAR 9 2006 Benchmark Assessment (SEDAR 9 2006a) or the SEDAR 9 Update Assessment 2011 (SEDAR 9 Update 2011b), because the assessments of this species determined discard mortality was minimal. Only small percentages (i.e., 1.5%) of gray triggerfish are estimated to die after release (GMFMC 2008).

Gray triggerfish, typically juveniles, are caught incidentally in trawls by the Gulf of Mexico shrimp fishery. Bycatch of gray triggerfish by the shrimp fishery was modeled in SEDAR 9 (2006a) and SEDAR 9 Update (2011b). Estimated numbers of gray triggerfish bycatch are shown in Table 7.1 from the two assessments. These estimates were considered to be the best information available and were used in the final base model, and thus, also used in the update assessment continuity model.

Table 7.1. Shrimp bycatch (number of gray triggerfish) comparison of estimates made during SEDAR 9 2006a with those made for the SEDAR 9 Update 2011b. This table was reproduced from Table 4.3 in the SEDAR 9 Update (2011b).

GRAY TRIGGERFISH SHRIMP BYCATCH ALL AGES (in numbers of fish)			
		Update Assessment	
Year	**SEDAR 9 MEDIAN**	**Median**	**Percent Difference**
1972	3,479,000	3,735,000	7%
1973	1,321,000	1,369,000	4%
1974	1,576,000	1,712,000	8%
1975	1,003,000	1,115,000	10%
1976	808,500	806,000	0%
1977	1,795,000	1,857,000	3%
1978	6,776,000	6,669,000	-2%
1979	3,126,000	3,047,000	-3%
1980	5,725,000	5,940,000	4%
1981	5,190,000	5,138,000	-1%
1982	6,009,000	5,554,000	-8%
1983	1,858,000	1,841,000	-1%
1984	3,312,000	3,562,000	7%
1985	1,460,000	1,486,000	2%
1986	3,999,000	3,849,000	-4%
1987	5,564,000	5,409,000	-3%
1988	4,029,000	4,047,000	0%
1989	5,208,000	4,945,000	-5%
1990	2,576,000	2,441,000	-6%
1991	11,720,000	11,780,000	1%
1992	3,148,000	3,190,000	1%
1993	7,429,000	7,174,000	-4%
1994	4,912,000	4,314,000	-14%
1995	6,070,000	5,831,000	-4%
1996	7,223,000	7,356,000	2%
1997	4,586,000	4,348,000	-5%
1998	1,399,000	1,327,000	-5%
1999	6,240,000	6,674,000	7%
2000	2,640,000	13,540,000	81%
2001	19,150,000	13,720,000	-40%
2002	5,717,000	3,279,000	-74%
2003	1,045,000	3,991,000	74%
2004	120,400	3,160,000	96%
2005		1,898,000	
2006		3,275,000	
2007		4,669,000	
2008		14,280,000	
2009		1,292,000	
2010		3,171,000	

Other Reef Fish

The management measures in this amendment are addressing gray triggerfish, and therefore other reef fish species are not specifically addressed further in this section. Criteria 3 in the following Practicability Analysis discuss bycatch of other reef fish in additional detail.

Sea Turtles and Sawfish

No change in sea turtle or smalltooth sawfish bycatch is expected as a result of the proposed management measures. The Council and NMFS took action in Amendment 18A (GMFMC 2005b) to the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP) (effective September 8, 2006) to comply with the reasonable prudent measures that ensure any sea turtle or smalltooth sawfish taken in the reef fish fishery is handled in such a way as to minimize stress to the animal and increase its survival rate. Regulations were implemented requiring sea turtle release gear be onboard reef fish-permitted vessels when fishing to facilitate the safe release of any incidentally caught sea turtles. In addition, vessels with commercial and for-hire reef fish vessel permits are required to possess specific documents providing instructions on the safe release of incidentally caught sea turtles or smalltooth sawfish. The reasonable and prudent measures also required better data collection from the fishery on incidental takes of sea turtles.

Longline gear was restricted in the Gulf of Mexico in Reef Fish Amendment 31 (GMFMC 2009). This amendment reduced effort with longline gear thereby reducing the chance of sea turtle interactions through prohibition of longline gear in certain areas, depths, months, or some combination of the three. The more abundant sea turtles are in a given area and the higher the fishing effort in that area, the greater the probability a sea turtle will be incidentally caught by the gear. For example, most observed sea turtle takes occurred on fishing trips west of the Tampa Bay, Florida area, all but one turtle take was on a set at 50 fathoms (91 meters) or less, and 76% of sea turtles takes occurred from June through August (NMFS 2009). Most of the longline fishing effort is conducted in these places and at these times. The rule also restriction vessels to 1,000 hooks per vessel with no more than 750 hooks rigged at any given time.

The September 30, 2011, biological opinion (BiOp) estimated that reef fish commercial bottom longline gear and commercial vertical line gear will capture two sawfish every three years, respectively. The September 30, 2011, BiOp also indicated that recreational reef fish vertical line gear would capture four sawfish every three years.

Other Bycatch

Marine mammals may be incidentally encountered by the reef fish fishery. The Gulf of Mexico commercial reef fish fishery is considered to be listed a Category III fishery in NMFS' List of Fisheries, based on the use of vertical line and longline gear (76 FR 79312, November 29, 2011). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1% of the maximum number of animals, not

including natural mortalities that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population.

Seabirds are another species group of concern. The three primary orders of seabirds in the Gulf of Mexico are Procellariiformes (petrels, albatrosses, and shearwaters), Pelecaniformes (pelicans, gannets and boobies, cormorants, tropic birds, and frigate birds), and Charadriiformes (phalaropes, gulls, terns, noddies, and skimmers) (Clapp et al. 1982; Harrison 1983). Several other species of seabirds also occur in the Gulf of Mexico, and are listed as threatened or endangered by the U.S. Fish and Wildlife Service, including: Piping plover, least tern, roseate tern, bald eagle, and brown pelican (the brown pelican is endangered in Mississippi and Louisiana and delisted in Florida and Alabama). Human disturbance of nesting colonies and mortalities from birds being caught on fishhooks and subsequently entangled in monofilament line are primary factors affecting sea birds. Oil or chemical spills, erosion, plant succession, hurricanes, storms, heavy tick infestations, and unpredictable food availability are other threats. No evidence exists that the directed reef fish fishery adversely affects seabirds.

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

The harvest of commercial gray triggerfish is managed with a 14-inch fork length (FL) minimum size limit. A 14-inch FL minimum size limit and 20-fish aggregate bag limit are used to manage the recreational harvest of gray triggerfish. The following discusses current and proposed management measures with respect to their relative impacts on bycatch.

Size limits

Minimum size limits are estimated to be the greatest source of regulatory discards for most reef fish species. In Reef Fish Amendment 16B (GMFMC 1999) a 12-inch FL was implemented for gray triggerfish. The size limit was increased to 14-inch FL in Amendment 30A (GMFMC 2008) to the Reef Fish FMP.

The size limit for gray triggerfish is the primary source of discards because there is no closed season and the recreational bag limit is not limiting. The 14-inch FL minimum size limit is greater than the size at first maturity. Studies estimated first maturity for both male and female gray triggerfish at10-inches FL (Hood and Johnson 1997; Ingram 2001). Unlike nearly all other reef fish species managed by the Council, gray triggerfish has a very low release mortality rate. Only small percentages (i.e., 1.5%) of gray triggerfish are estimated to die after release (GMFMC 2008). Increasing the minimum size limit is not anticipated to significantly increase discard mortality due to the very low release mortality rate. An increase in the minimum size limit could also potentially benefit the stock by increasing spawning potential (larger fish are more fecund).

Size limits are typically established to reduce fishing mortality, increase yield-per-recruit, and prevent growth overfishing. Increasing the minimum size limit is estimated to increase the proportion of dead discards to landings, but the overall magnitude of dead discards is estimated to be less for higher size limits relative to the status quo because of the concurrent reductions in harvest.

This amendment originally included management alternatives to modify the current minimum size limit of 14 inches FL, to 16 or 18 inches FL. The issue of undersized gray triggerfish being landed from 2009 through 2011 was brought to the attention of NMFS, the Council, and the Gulf state directors through this amendment. Further, in Reef Fish Amendment 30A (GMFMC 2008) the minimum size limit was not only increased for gray triggerfish, but modified from total length to fork length. This could have caused confusion for stakeholders. In the recreational sector, undersized gray triggerfish landings have decreased from 2009 through 2011 (Figure 7.1); whereas, undersized commercial landings have not shown the same improvement from 2009-2011 (Figure 7.2). Therefore, outreach and education on species identification and measuring guidelines for gray triggerfish are being developed cooperatively with public relations staff from all agencies at the request of the Council at their April 2012 meeting. The Council decided to move the commercial and recreational size limit management measures to the Considered, but Rejected section of the amendment (Appendix C). The Council determined that there should be increased education regarding the current size limits before implementing new size limits and that the current minimum size limit (14 inches FL) was a large gray triggerfish.

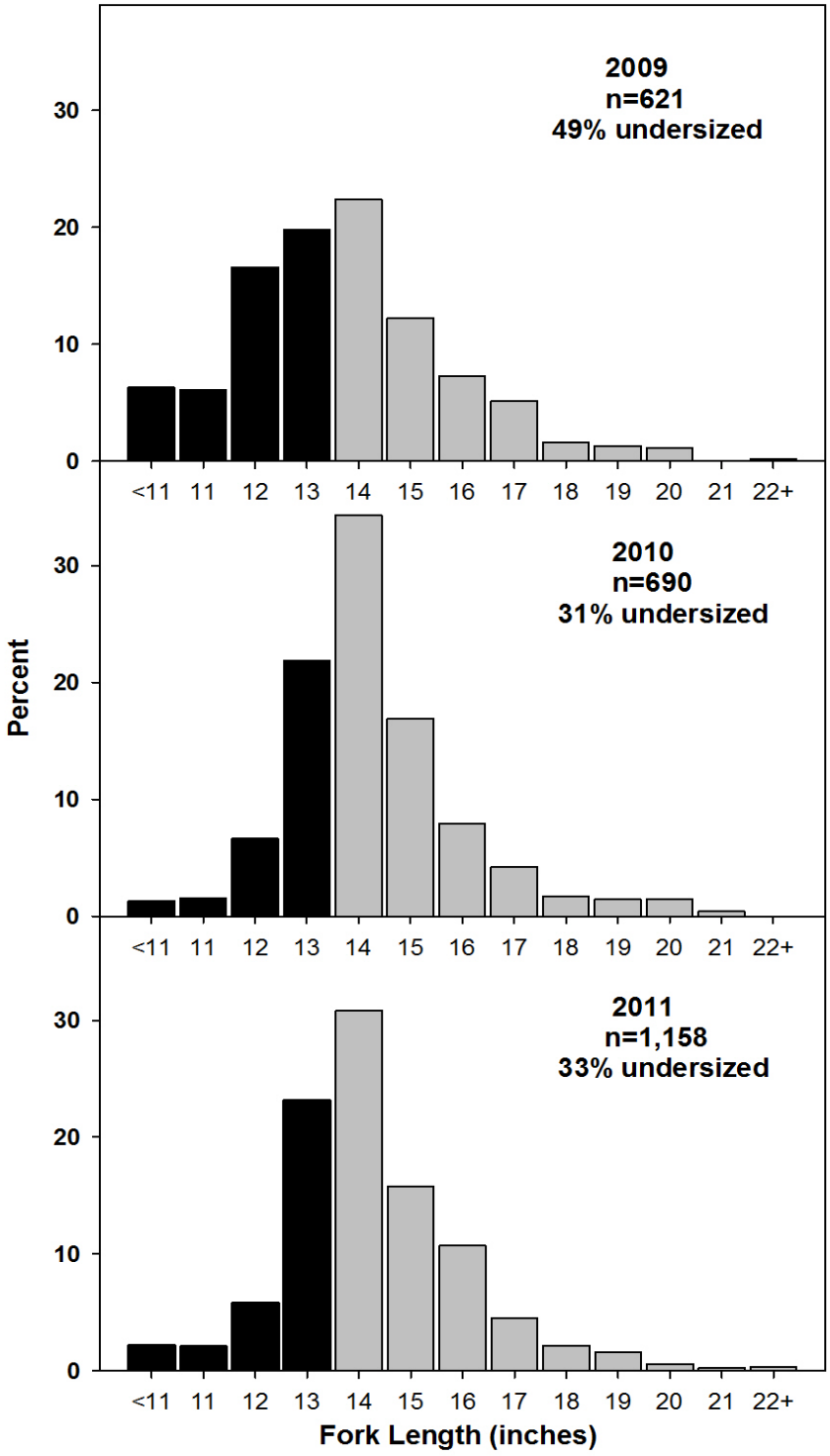

Figure 7.1. Percent of Gulf of Mexico recreational gray triggerfish landings in 1 inch fork length increments by year, 2009 through 2011. Landings are from MRFSS, HBS, and TPWD datasets. Black bars show the percentage of gray triggerfish that are undersized (less than 14 inches FL) and the gray bars show the percent of gray triggerfish that were 14 inches or greater. Source: SERO 2012.

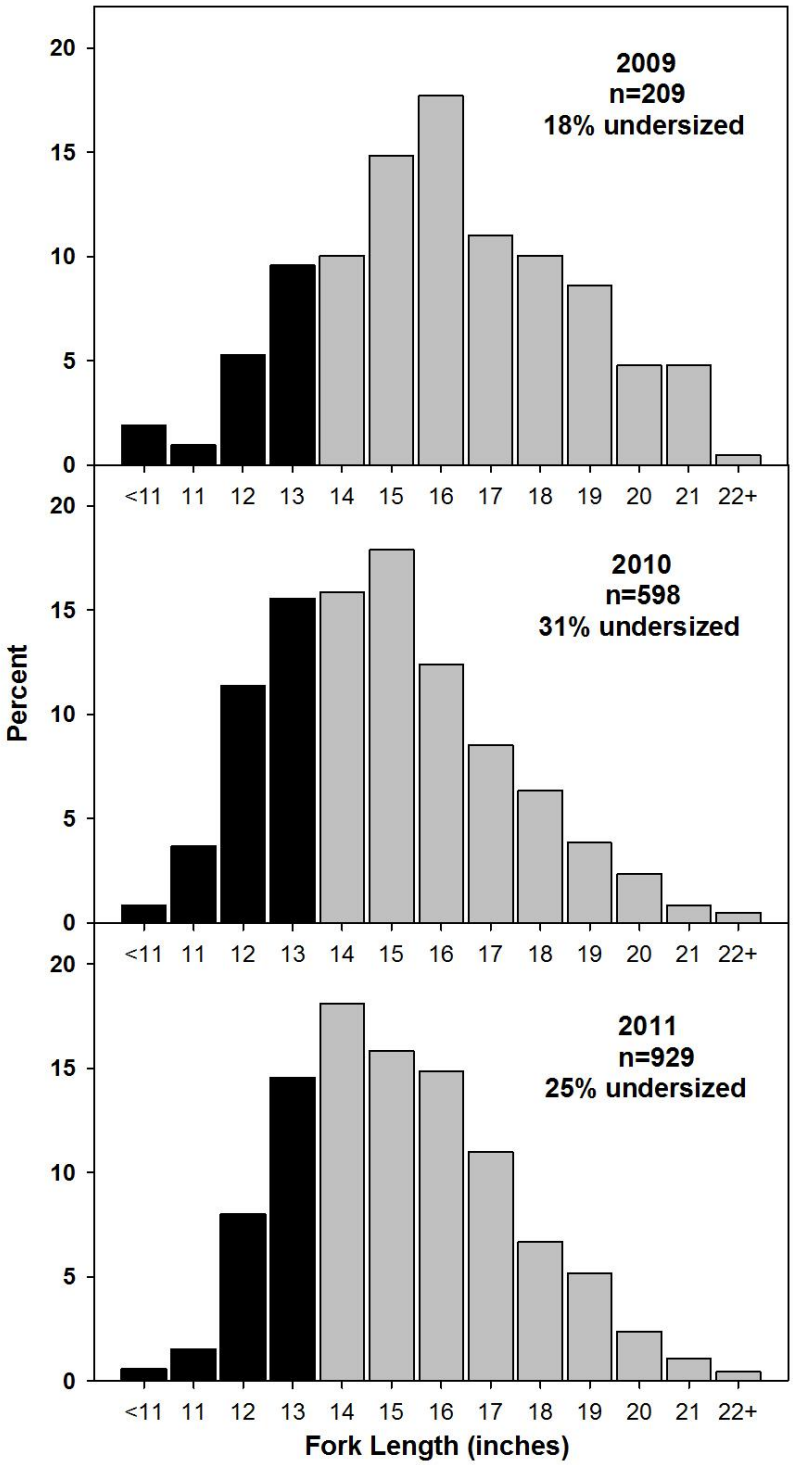

Figure 7.2. Percent of Gulf of Mexico commercial gray triggerfish landings in 1-inch fork length increments by year, 2009 through 2011 (n=1,736) measured in the Trip Intercept Program (TIP). Black bars how the percentage of gray triggerfish that are undersized (less than 14 inches FL) and the gray bars show the percent of gray triggerfish that were 14 inches or greater. Source: SERO 2012.

Closed Seasons

Reef Fish Amendment 30A (GMFMC 2008) implemented a commercial sector in-season accountability measures (AM) that closes the gray triggerfish fishing season when the annual catch target (ACT) is reached for the remainder of the fishing year. Amendment 30A (GMFMC 2008) also established a post-season accountability measure for the commercial sector that reduces the season the following year to accommodate for the annual catch limit (ACL) being exceeded. Implementing a closed season would be expected to increase the number of discards. On May 14, 2012, NMFS implemented an interim rule (NMFS 2012) for the in-season closure authority of the recreational sector to reduce overfishing of gray triggerfish. In 2012 the season for the recreational fishing sector closed on June 11, 2012, and the commercial fishing sector closed on July 1, 2012.

Bag Limits

The recreational sector for gray triggerfish is managed within a 20-fish aggregate bag limit. A restrictive bag limit can encourage discards from high-grading after the bag limit is met. However, recreational data from Marine Recreational Fisheries Survey and Statistics (MRFSS) indicates that gray triggerfish landed per trip per angler is less than one fish on 95% of the trips when a gray triggerfish is landed (see Section 2.4). Therefore, high grading may not be a problem because few fishermen would catch the proposed bag limit of two fish.

Alternatives being considered to minimize bycatch

The discard mortality rate for gray triggerfish, as discussed in Sections 2.3 and 2.4, is very low, enough so that in recent gray triggerfish assessments (SEDAR 9 2006a and SEDAR 9 Update 2011b) the discard mortality rate was set at zero. Therefore, there are few ways to further reduce discard mortality for this species. Ways to reduce dead discards in the reef fish fishery can be accomplished either by reducing the number of fish discarded or reducing the release mortality rate of discards. To reduce the number of discards, management measures must limit fishing effort or change the selectivity of fishing gears in such a way that reduces the harvest of sub-legal fish. This requires the sources of release mortality to be identified (e.g., depth, length, hooking location, surface interval, temperature) and management measures must be imposed to reduce discard mortality rates. The Council and NMFS have taken numerous actions to reduce bycatch for specific species and have developed management measures to minimize bycatch in general including requirements to use of circle-hooks, de-hookers and venting tools.

Discards and discard mortality are anticipated to increase with the proposed management measures. Implementing closed seasons for the commercial and recreational sectors, a commercial trip limit, and a recreational bag limit are expected to increase the amount of gray triggerfish discards. However, as mentioned above, the effect of these discards should be minimal because of the species' ability to survive the capture process. Additionally, these management measures are designed to limit harvest to levels that allow the stock to recover from an overfished state. Therefore, these measures are overall beneficial for the stock and meet the purpose of Amendment 37.

Practicability Analysis

Criterion 1: Population effects for the bycatch species

Bycatch of gray triggerfish due to management measures such as fixed closed seasons and in-season closures could result in loss of yield. Based on theoretical analysis (SERO-LAPP Gulf Amendment 37 2012), establishing a recreational or commercial closed season is expected to increase the bycatch and discards of gray triggerfish. Given that gray triggerfish are normally caught as a bycatch on trips targeting other reef fish species, the management measures proposed herein are not expected to alter the manner in which the reef fish fishery is prosecuted; therefore, there should be no changes in the effects to other reef fish species.

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

Relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict. With any rebuilding scenario considered, the stock will be larger than the current stock size. Gray triggerfish eggs are demersal (Simmons and Szedlmayer 2012) whereas, the larvae and juveniles are pelagic are closely associated with *Sargassum* spp. mats in the late summer and early fall (Dooley 1972; Bortone et al. 1977; Wells and Rooker 2004). Juveniles then recruit to demersal habitats (4 - 7 months), where they congregate around reefs, rocky outcrops, and wrecks (Simmons and Szedlmayer 2011). Diet studies on juvenile and adult gray triggerfish after recruitment to benthic structure determined they consume a wide variety of invertebrates such as barnacles, bivalves, polychaetes, crustaceans, echinoderms, and isopods (Vose and Nelson 1994; Kurz 1995). The reduction of ACLs and ACTs could result in an increase in gray triggerfish bycatch and discards, potentially resulting in impacts to other species in the ecosystem that gray triggerfish prey upon. Some anticipated impacts are changes in individual size, population size, and habitat shifts.

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

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. Fishers do not generally target gray triggerfish. Snappers, groupers, and other reef fishes are commonly caught in association with gray triggerfish (SERO 2012). Those most commonly caught include red snapper, vermilion snapper, gag, and red grouper. Red snapper are overfished, but overfishing is projected to have ended by 2010 (SEDAR 7 Update 2009); red grouper are not overfished and are not undergoing overfishing (SEDAR 12 Update 2009); gag are undergoing overfishing and are overfished (SEDAR 10 Update 2009); and vermilion snapper are not undergoing overfishing and are not overfished (SEDAR 9 Update 2011a). Regulatory discards significantly contribute to fishing mortality in all of these reef fish species, especially red snapper and groupers. As noted in Criterion 1, it is expected that by reducing gray triggerfish harvest, species closely associated with them should not be affected. As mentioned in Sections 2.3 and 2.4, gray triggerfish

generally are not targeted and are caught incidentally when fishermen are targeting other species like red snapper and grouper. Therefore, reef fish fishing activities by the commercial and recreational sectors should not be changed by the proposed gray triggerfish management actions.

Criterion 4: Effects on marine mammals and birds

The effects of current management measures on marine mammals and birds are described above in this Chapter in Other Bycatch. There is no information to indicate marine mammals and birds rely on gray triggerfish for food, and they are not generally caught by fishers harvesting gray triggerfish.

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

Reducing the ACL and ACT for both sectors will affect costs associated with fishing operations. Modifying recreational or commercial seasonal closures for gray triggerfish will have direct impacts to both recreational anglers and commercial fishermen. Commercial fishermen will incur losses in revenue due to limiting the amount of harvest per trip. However, gray triggerfish is considered a bycatch species compared to other targeted reef fish, and the trip limits considered in this amendment are higher than landings for many commercial trips, thus the trip limit may not affect discards. By contrast a commercial trip limit is expected to increase the duration of the fishing season and thus increase revenues. A trip limit is also expected to bring a higher market price due to the fact that market demand remains constant while there is potentially less fish harvested per trip.

Criterion 6: Changes in fishing practices and behavior of fishermen

Seasonal closures and trip limits may alter angler effort and closed seasons may, at least initially affect decisions about when and where to fish. Shifts or changes in fishing locations and seasons could have an effect on fishing behavior and practices that may potentially affect the bycatch of other reef fish. However, these effects should be minor because gray triggerfish are generally not targeted, but are incidentally caught when fishermen fish for other species.

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

The proposed measures are not expected to significantly impact administrative costs. Size limits, bag limits, and closed seasons are currently used to regulate the commercial and recreational sectors. Establishing a commercial trip limit is expected to increase enforcement costs and management effectiveness. All of these measures will require additional research to determine the magnitude and extent of changes in bycatch and bycatch mortality.

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

The establishment of a commercial trip limit is expected to have a positive effect to the commercial sector. The economic benefits of the commercial trip limit is expected to include an

extended fishing season, maintenance of higher market prices by not flooding the market with large harvest, and being able to maintain the local market after the traditional tourist season. As discussed in Section 4.3.3 it is plausible to infer that commercial fishermen could mitigate the adverse effects of a trip limit by taking more fishing trips. However, such a scenario is very unlikely for gray triggerfish because it is essentially an incidentally caught species.
As described in Section 4.4.4 the commercial trip limit would only impact the commercial fisherman with landings that exceed the trip limit.

Criterion 9: Changes in the distribution of benefits and costs

Proposed management measures in this amendment should not significantly alter bycatch of gray triggerfish. However, the proposed management measures are expected to provide an overall net benefit to the stock and increase the rate of recovery, which will benefit both fishing sectors. Proposed commercial trip limits would reduce the commercial fishermen ability to harvest larger amounts of gray triggerfish per trip, which in turn is expected to maintain higher market prices. For the recreational sector, there may be some social impacts for all anglers and some economic impacts to the for-hire fleet because of the bag limits and fixed closed season. However, such changes are expected to me minor effects, given that gray triggerfish is a bycatch species, harvested during fishing trips targeting other reef fish species.

Criterion 10: Social effects

Bycatch is considered wasteful and it reduces overall yield obtained from the fishery. Minimizing bycatch to the extent practicable will increase efficiency, reduce waste, and benefit stock recovery, thereby resulting in net social benefits.

CONCLUSIONS

Analysis of the 10 bycatch practicability factors indicates there would be minimal biological impacts associated with further reducing bycatch and bycatch mortality of gray triggerfish. The main benefits of reducing the gray triggerfish bycatch, reducing the stock ACL and ACT, establishing fixed closed seasons, reducing the recreational bag limit, and establishing a commercial trip limit are less waste and increased yield in the directed fishery. Gray triggerfish management measures (e.g., season closures, higher size limits) are needed to end overfishing and outweigh any small increases in bycatch and discards. When determining reductions associated with various management measures, release mortality was not factored into the analysis. The increases in discards associated with each of these management measures varies, with the greatest increase in discards associated with changes to the sector ACLs and ACTs which will lead to longer commercial and recreational seasons closures resulting in increased discards. The benefits of reducing harvest, ending overfishing, and rebuilding the stock is estimated to outweigh the benefits of further reducing discards.

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NMFS = National Marine Fisheries Service, SF = Sustainable Fisheries Division

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GC = General Counsel, SERO=Southeast Regional Office, NEPA=National Environmental Policy Act, HC = Habitat Conservation, SEFSC=Southeast Fisheries Science Center and PR = Protected Resources Division.

CHAPTER 9. LIST OF AGENCIES CONSULTED

Federal Agencies

Gulf of Mexico Fishery Management Council's
- Scientific and Statistical Committee
- Reef Fish Advisory Panel

National Marine Fisheries Service
- Southeast Fisheries Science Center
- Southeast Regional Office

U.S. Coast Guard
Environmental Protection Agency

State Agencies

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

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APPENDIX A. COMMERCIAL GRAY TRIGGERFISH ACL/ACT BUFFER SPREADSHEET

ACL/ACT Buffer Spreadsheet version 4.1 - April 2011 **Commercial Gray Triggerfish**

sum of points	1		
max points	5.0		
Min. Buffer	**0**	**min. buffer**	User adjustable
Max Unw.Buff	19	max unwt. Buff	
Max Wtd Buff	**25**	**max wtd. buffe**	User adjustable

Buffer between ACLand ACT (or ABC and ACL) Unweighted 4

Weighted **5**

Component	Element score	Element	Selection	Element result
Stock assemblag	0	This ACL/ACT is for a single stock.	x	0
	1	This ACL/ACT is for a stock assemblage, or an indicator species for a stock assemblage		
Ability to Constrain Catch	0	Catch limit has been exceeded 0 or 1 times in last 4 years	x	0
	1	Catch limit has been exceeded 2 or more times in last 4 years		
		For the year with max. overage, add 0.5 pts. For every 10 percentage points (rounded up) above ACL		
		Not applicable (there is no catch limit)		
		Apply this component to recreational fisheries, not commercial or IFQ fisheries		
	0	Method of absolute counting		not applicable
Precision of	1	MRIP proportional standard error (PSE) <= 20		
Landings Data	2	MRIP proportional standard error (PSE) > 20		
Recreational		Not applicable (will not be included in buffer calculation)	x	
		Apply this component to commercial fisheries or any fishery under an IFQ program		
Precision of	0	Landings from IFQ program		1
	1	Landings based on dealer reporting	x	
Landings Data	2	Landings based on other		
Commercial		Not applicable (will not be included in buffer calculation)		
Timeliness	0	In-season accountability measures used or fishery is under an IFQ	X	0
	1	In-season accountability measures not used		

Sum 1

Weighting factor

	Element weight	Element	Selection	Weighting
Overfished statu	0	1. Stock biomass is at or above B_{OY} (or proxy).		0.3
	0.1	2. Stock biomass is below B_{OY} (or proxy) but at or above B_{MSY} (or proxy).		
	0.2	3. Stock biomass is below B_{MSY} (or proxy) but at or above minimum stock size threshold (MSST).		
	0.3	4. Stock is overfished, below MSST.	x	
	0.3	5. Status criterion is unknown.		

APPENDIX B. RECREATIONAL GRAY TRIGGERFISH ACL/ACT BUFFER SPREADSHEET

ACL/ACT Buffer Spreadsheet version 4.1 - April 2011 **Recreational Gray Triggerfish**

sum of points	2		
max points	5.0		
Min. Buffer	**0**	**min. buffer**	User adjustable
Max Unw.Buff	19	max unwt. Buff	
Max Wtd Buff	**25**	**max wtd. buffe**	User adjustable

Buffer between ACLand ACT (or ABC and ACL) Unweighted 8

Weighted **10**

Component	Element score	Element	Selection	Element result
Stock assemblage	0	This ACL/ACT is for a single stock.	x	0
	1	This ACL/ACT is for a stock assemblage, or an indicator species for a stock assemblage		
Ability to Constrain Catch	0	Catch limit has been exceeded 0 or 1 times in last 4 years	x	0
	1	Catch limit has been exceeded 2 or more times in last 4 years		
		For the year with max. overage, add 0.5 pts. For every 10 percentage points (rounded up) above ACL		
		Not applicable (there is no catch limit)		
		Apply this component to recreational fisheries, not commercial or IFQ fisheries		
Precision of Landings Data Recreational	0	Method of absolute counting		1
	1	MRIP proportional standard error (PSE) <= 20	x	
	2	MRIP proportional standard error (PSE) > 20		
		Not applicable (will not be included in buffer calculation)		
		Apply this component to commercial fisheries or any fishery under an IFQ program		
Precision of Landings Data Commercial	0	Landings from IFQ program		not applicable
	1	Landings based on dealer reporting		
	2	Landings based on other		
		Not applicable (will not be included in buffer calculation)	x	
Timeliness	0	In-season accountability measures used or fishery is under an IFQ		1
	1	In-season accountability measures not used	x	

Sum 2

Weighting factor

	Element weight	Element	Selection	Weighting
Overfished statu	0	1. Stock biomass is at or above B_{OY} (or proxy).		0.3
	0.1	2. Stock biomass is below B_{OY} (or proxy) but at or above B_{MSY} (or proxy).		
	0.2	3. Stock biomass is below B_{MSY} (or proxy) but at or above minimum stock size threshold (MSST).		
	0.3	4. Stock is overfished, below MSST.	x	
	0.3	5. Status criterion is unknown.		

APPENDIX C. GRAY TRIGGERFISH DECISION TOOLS REPORT AND ADDENDUM FOR COMMERCIAL TRIP LIMIT ANALYSIS IN NUMBER OF FISH

Modeling the Combined Effects of Gulf Reef Fish Amendment 37 Proposed Management Measures for Gray Triggerfish

LAPP/DM Branch
NOAA Fisheries Service
Southeast Regional Office

Introduction
Gray triggerfish (*Balistes capriscus*) is one of 31 reef fish species in the Fishery Management Plan (FMP) for the Reef Fish Resources of the Gulf of Mexico. The FMP provides management for reef fish species in federal waters of the Gulf of Mexico.
A benchmark stock assessment was conducted in 2006 for the Gulf of Mexico gray triggerfish stock (SEDAR 9 2006). The assessment results indicated the stock was both overfished and experiencing overfishing (SEDAR 9 2006). Following the assessment results, in 2008 Amendment 30A was implemented and established commercial and recreational annual catch targets (ACTs), annual catch limits (ACLs), accountability measures, and a stock rebuilding plan. This amendment was expected to end overfishing and rebuild the gray triggerfish stock within 10 years of the 2008 implementation, or by the end of 2017.
In 2011, an update stock assessment was conducted for Gulf of Mexico gray triggerfish (SEDAR 9 Update 2011). Results from the update stock assessment indicated the gray triggerfish stock is experiencing overfishing, and the stock is overfished. Amendment 37 is currently being drafted to establish management measures that will end overfishing of gray triggerfish and rebuild the stock by 2017. Current management measures include a 14 inch FL minimum size limit for both the commercial and recreational sector, and a 20 fish aggregate recreational bag limit. Species other than gray triggerfish included in the recreational aggregate bag limit are vermilion snapper, lane snapper, almaco jack, tilefish, goldface tilefish, and blueline tilefish. Amendment 37 proposes an increase to the minimum size limit (16 or 18 inches FL), closed seasons for both sectors, trip limits (25, 50, and 75 pounds) for the commercial sector, and modification to the bag limit (1, 2, or 4 gray triggerfish per angler) for the recreational sector. Commercial and recreational decision tools were created to evaluate the efficacy of the different management measures.

Data Sources

Commercial landings data for Gulf of Mexico gray triggerfish were obtained from the Southeast Fisheries Science Center's (SEFSC) Trip Interview Program (TIP) (accessed March 2012), and the SEFSC's coastal fisheries logbook program (CFLP) (accessed February 2012). TIP data were collected by port samplers that interviewed fishermen and collected information on the length and numbers of gray triggerfish landed, gear used, and information on the fishing trip

(e.g., date, location). CFLP provided information on landings (in lbs), gear used, area, and depth of capture for each trip.

Recreational landings data for Gulf of Mexico gray triggerfish were obtained from the Marine Recreational Fisheries Statistics Survey (MRFSS), the Texas Parks and Wildlife Department (TPWD) Creel Survey, and the Southeast Headboat Survey (HBS). MRFSS and TPWD conduct dockside intercepts to collect information on the size and number of gray triggerfish caught by mode (charter, private/rental, shore). HBS collects size and number of gray triggerfish caught through dockside sampling and logbooks completed by headboat operators.

Methods

Reductions in landings are necessary to achieve the proposed ACLs and ACTs. Various trip limits, minimum size limits, closed seasons, and bag limits were explored as tools to reduce harvest, prevent overfishing, and avoid an early closure of gray triggerfish in-season. The percent reduction in landings for each management measure was determined using 2009 to 2011 data. All calculations were done using SAS (SAS Institute, Cary, NC).

Commercial Trip Limits

Trip limits from 25 to 200 pounds whole weight (ww) per trip were examined using CFLP data. To model trip limits, if total catch per logbook-reported trip was greater than the trip limit being analyzed, the value was re-set to the new trip limit; otherwise no changes to landed catch were made. Estimated reductions were calculated on a monthly basis based on the difference in landings with no trip limit compared to landings when a trip limit was imposed. Commercial fishermen were assumed to release or stop targeting gray triggerfish once their trip limit was met. Given the small weights in the trip limits being considered, it was also assumed that additional trips (compared to historical levels) targeting gray triggerfish would not occur.

The majority of gray triggerfish trips reported relatively small landings per trip (Figure 1). Over 55% of the trips landed 25 pounds or less and over 70% of the trips landed 50 pounds or less. These relatively small landings were reflected in trip limit reduction estimates with the largest reductions occurring at trip limits of 25 and 50 pounds (Table 1).

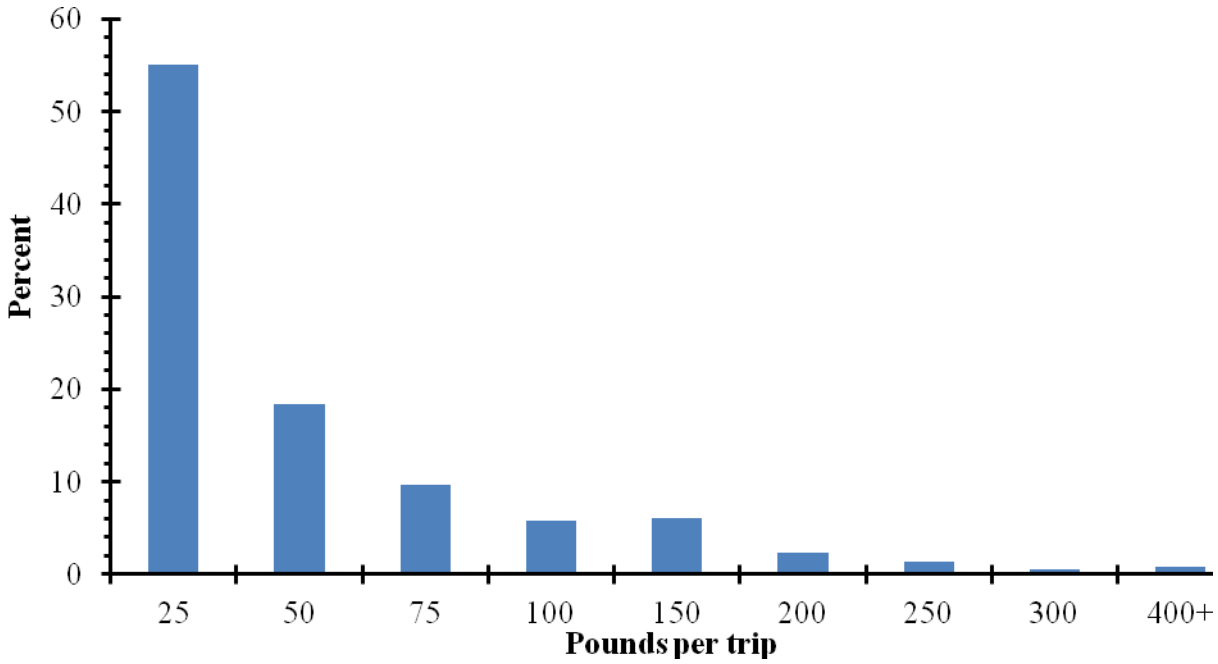


Figure 1. Percent of commercial trips landing different amounts of gray triggerfish in the Gulf of Mexico from 2009-2011 (n = 4,692 trips). Pounds are in whole weight.

Table 1. Projected reductions of commercial gray triggerfish landings by month for various trip limits. Results are based on 4,692 trips during 2009-2011. Warmer colors denote higher reductions in landings.

Trip Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
25	58%	67%	61%	63%	63%	62%	53%	57%	63%	64%	66%	64%
50	40%	52%	42%	44%	43%	42%	33%	36%	43%	43%	48%	43%
75	30%	44%	31%	32%	30%	30%	21%	23%	29%	29%	35%	30%
100	25%	39%	24%	23%	21%	23%	14%	15%	20%	22%	26%	21%
150	20%	32%	16%	13%	11%	14%	6%	7%	10%	11%	16%	11%
200	18%	28%	11%	7%	7%	10%	4%	3%	6%	5%	11%	7%

Commercial Minimum Size Limit Analyses

Length measurements were collected through the TIP. All of the length measurements were in mm. The majority (99%) of the gray triggerfish samples in the TIP dataset was in fork length, but some data were in total length. All lengths were converted to inches fork length using standard conversion factors and equations summarized in Table 2. The size limit analysis estimated the percent reduction in weight so the weight of each fish was required. No weight

information was available in the TIP dataset so weight was estimated from length using the equations summarized in Table 2.

Table 2. Meristic conversions for Gulf of Mexico gray triggerfish. The conversions came from SEDAR 9 update 2011.

Conversion	Model
Total Length (mm) to Fork Length (mm)	TL = 1.1889*(FL) – 10.5017
Whole Weight (lbs) to Fork Length (mm)	WW = (0.00000002039*(FL*3.0203))*2.2046

Figure 2 provides the length distribution for the commercial landings in 1 inch increments from 2009-2011. There was a high level of non-compliance to size limits with 26% of the fish harvested below the current minimum size limit (14 inches FL).

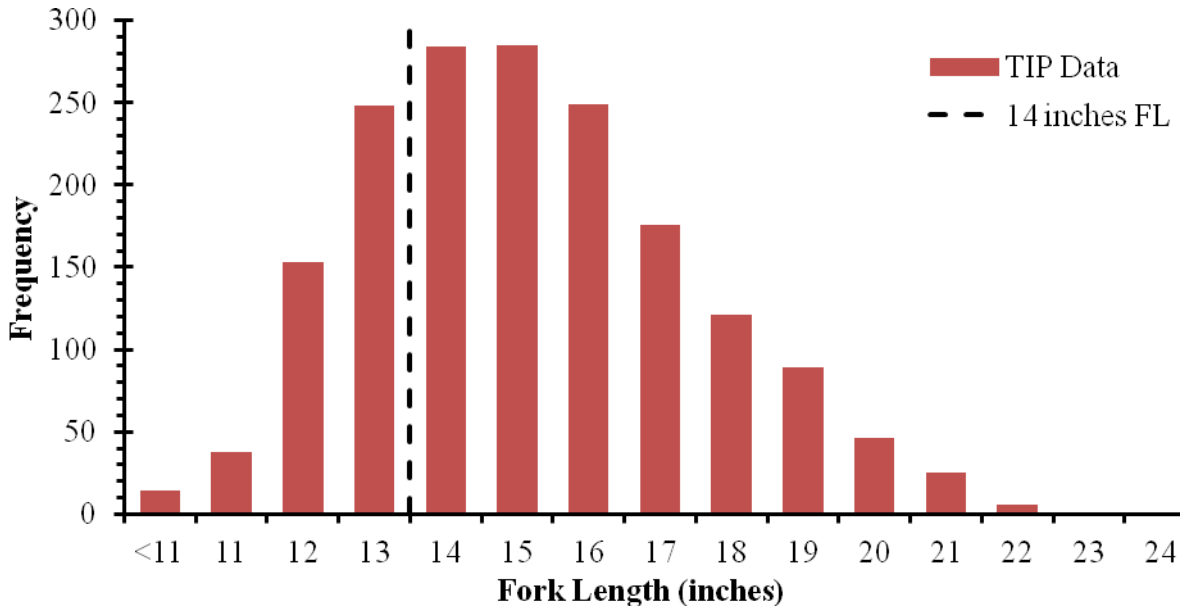


Figure 2. Gulf of Mexico fork length distribution for commercially landed gray triggerfish from TIP for 2009 to 2011 (n=1,736 gray triggerfish). The dashed black line denotes current commercial minimum size limit of 14 inches FL.

Monthly reductions in harvest in weight were calculated for minimum size limits (MSL) at 1 inch intervals between 15-20 inches as follows:

Percent reduction = *((C – G) - B)/C*, where:
C = catch in pounds ww of TIP samples
G = weight of TIP fish that are greater than or equal to the MSL
B = weight of fish smaller than the 14-inch FL MSL (non-compliance or measurement error)

Percent reductions associated with MSL were normalized to a 0% reduction at the commercial status quo of 14 inches FL. Due to concerns about low sample sizes, output was pooled for 2009-2011 data which produced greater than 150 gray triggerfish samples for each month. Projected MSL impacts were calculated for each month (Table 3).

Table 3. Projected reduction of commercial gray triggerfish landings by month for various minimum size limits. Warmer colors denote higher reductions.

Size Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	14%	11%	11%	16%	14%	8%	17%	10%	13%	8%	14%	12%
16	24%	29%	24%	28%	25%	24%	27%	29%	33%	23%	32%	27%
17	39%	48%	40%	39%	40%	26%	36%	50%	46%	41%	50%	44%
18	59%	63%	52%	43%	51%	37%	43%	72%	52%	55%	62%	56%
19	68%	71%	62%	57%	68%	44%	46%	83%	62%	68%	73%	71%
20	77%	80%	73%	70%	77%	48%	55%	89%	69%	80%	78%	81%

Recreational Bag Limits

The number of gray triggerfish caught per angler on a given trip was collected by MRFSS, TPWD, and HBS. The MRFSS system classifies recreational catch into three categories:

- Type A - Fish that were caught, landed whole, and available for identification and enumeration by the interviewers.
- Type B - Fish that were caught but were either not kept or kept but not available for identification.
    - Type B1 - Fish that were caught and filleted, released dead, given away, or disposed of in some way other than Types A or B2.
    - Type B2 - Fish that were caught and released alive.

Type A and B1 catches were used for bag limit analyses. Type A catch represents the total catch of all anglers on a fishing trip. However, some or all of the anglers contributing to the A catch are also interviewed to report type B1 catch, and those may be recorded on an individual basis. If the number of people contributing to the A catch was greater than the number of people interviewed to report B1 catch, the following formula, following Brooks (2004), was used to account for possible under reporting of the B1 catch:

$$B1 = B1_{interviewed} \times (\#\ people\ in\ fishing\ party / \#\ people\ interviewed\ to\ report\ B1\ catch).$$

The total catch per angler was then determined by summing the total Type A and Type B1 catch (AB1) for each trip and then dividing it by the number of anglers in the fishing party. Percent reductions in harvest were estimated for bag limits ranging from 1 to 10 gray triggerfish per person. If AB1 catch per angler was greater than the bag limit being analyzed, the value was re-set to the new bag limit ($AB1_{bag\ limit}$), otherwise no changes to the catch were made.

The following formulas were used to estimate reductions in harvest resulting from bag limits:

$$\textit{If AB1 catch} <= \textit{bag limit, then harvest} = A + B1$$

$$\textit{If AB1 catch} > \textit{bag limit, then harvest} = AB1_{bag\ limit}$$

Reductions for TPWD and HBS bag limits were calculated in a similar manner as described above, except no B1 catch data were available. If the catch per angler was greater than the bag limit being analyzed, the value was re-set to the bag limit, as described above. If the catch per angler was less than the bag limit being analyzed, then no change to the catch was made. Percent reductions associated with bag limits were estimated relative to the status quo of the 20 fish aggregate bag limit, by mode of fishing. Table 4 provides the monthly percent reductions for bag limits from 1 to 10 gray triggerfish. MRFSS and TPWD output were pooled by mode. Due to small bag limit sample sizes at the beginning of the year (January to March) and at the end of the year (October to December) the samples in these months were pooled to accomplish a minimum sample size of 30 gray triggerfish. The impact of bag limits varied by mode: the largest reductions were observed in the private mode while the smallest reductions were observed in the headboat mode.

Table 4. Projected reduction of gray triggerfish landings by month for various bag limits for A) MRFSS and TPWD charter, B) MRFSS and TPWD private, and C) Headboat. Warmer colors denote higher reductions.

A) MRFSS & TPWD Charter

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	5%	0%	0%	0%	1%	1%	1%
8	0%	0%	0%	0%	0%	7%	0%	0%	0%	1%	1%	1%
7	0%	0%	0%	0%	0%	9%	0%	0%	0%	2%	2%	2%
6	0%	0%	0%	0%	0%	12%	0%	0%	0%	2%	2%	2%
5	0%	0%	0%	1%	0%	14%	2%	0%	1%	3%	3%	3%
4	0%	0%	0%	3%	0%	17%	4%	0%	1%	3%	3%	3%
3	4%	4%	4%	5%	0%	19%	9%	0%	1%	6%	6%	6%
2	16%	16%	16%	9%	7%	23%	14%	2%	4%	9%	9%	9%
1	41%	41%	41%	24%	22%	30%	30%	20%	21%	21%	21%	21%

B) MRFSS & TWPD Private

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	4%	4%	4%	2%	0%	21%	2%	0%	0%	0%	0%	0%
9	7%	7%	7%	4%	0%	23%	3%	0%	0%	0%	0%	0%
8	9%	9%	9%	5%	0%	25%	5%	0%	0%	0%	0%	0%
7	11%	11%	11%	6%	0%	27%	6%	0%	0%	0%	0%	0%
6	13%	13%	13%	7%	0%	29%	8%	2%	0%	0%	0%	0%
5	15%	15%	15%	14%	8%	31%	9%	7%	0%	0%	0%	0%
4	17%	17%	17%	23%	19%	34%	11%	11%	1%	1%	1%	1%
3	20%	20%	20%	31%	29%	36%	12%	15%	3%	3%	3%	3%
2	30%	30%	30%	40%	39%	38%	15%	20%	13%	13%	13%	13%
1	52%	52%	52%	52%	49%	48%	29%	30%	25%	25%	25%	25%

C) Headboat

Bag Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
7	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
6	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
2	0%	0%	0%	1%	1%	1%	0%	2%	1%	1%	1%	1%
1	4%	4%	4%	5%	5%	3%	2%	4%	7%	4%	4%	4%

Recreational Minimum Size Limit

Length measurements were collected during biological sampling associated with MRFSS, HBS, and TPWD. The length measurement unit recorded was mm. MRFSS and HBS recorded length in FL and TPWD recorded total length. All lengths were converted to inches FL using standard conversion factors and equations summarized in Table 2. The size limit analysis estimated the percent reduction in weight landed. Thus the weight of each fish was required. MRFSS and HBS recorded weights. No weight information was available for TPWD intercepts and some of the MRFSS and HBS samples did not have weight data. When weight data were unavailable it was estimated from length using the equations summarized in Table 2.

Figure 3 provides the length distribution of recreationally caught gray triggerfish by mode (MRFSS, HBS, and TPWD) in 1 inch increments from 2009-2011. Approximately 35% of the fish harvested were below the current minimum size limit of 14 inches FL.

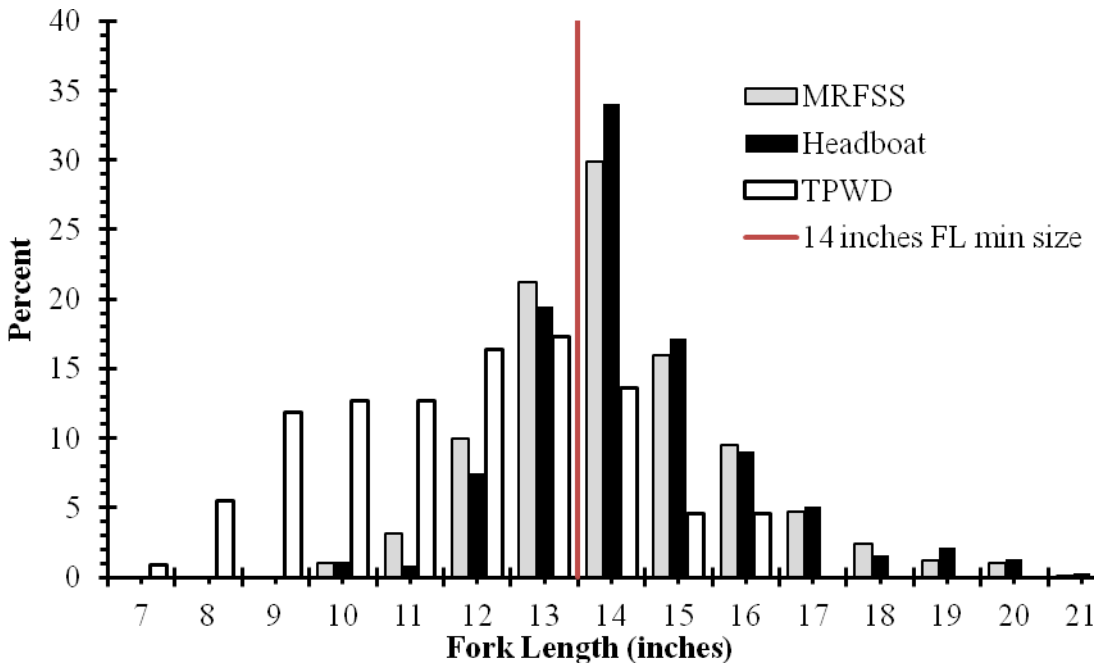


Figure 3. Gulf of Mexico fork length distribution of recreationally landed gray triggerfish from MRFSS, HBS, and TPWD for 2009 to 2011 (n=1,906). The red line denotes the current recreational minimum size limit of 14 inches FL.

Monthly reductions in harvest in weight were calculated for each mode of fishing (charter, headboat, and private/rental) for minimum size limits (MSL) at 1 inch intervals between 15-20 inches as follows:

Percent reduction = *((C – G) - B)/C*, where:
C = catch in pounds ww
G = weight of fish that are greater than or equal to the MSL
B = weight of fish smaller than the 14-inch FL MSL (non-compliance or measurement error)

Percent reductions associated with MSL were estimated by mode of fishing normalized to a 0% reduction at the recreational status quo size limit of 14 inches FL. Due to concerns about low sample sizes, output was pooled for 2009-2011 data. MRFSS and TPWD output were pooled by mode. If a sample size of 30 gray triggerfish was not achieved then the samples were pooled with the nearest months until a sample size of 30 was achieved. HBS had an adequate sample

size (>30 gray triggerfish) in each month so pooling was not conducted. Projected MSL impacts varied by month and mode (Table 5).

Table 5A. Projected reductions of gray triggerfish landings by month for various minimum size limits for A) HBS, B) MRFSS and TPWD charter, and C) MRFSS and TPWD private. Warmer colors denote higher reductions.

A) HBS

Size Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	34%	34%	34%	32%	41%	22%	10%	27%	31%	35%	35%	35%
16	54%	54%	54%	43%	63%	41%	33%	39%	48%	56%	56%	56%
17	64%	64%	64%	54%	74%	55%	52%	52%	57%	63%	63%	63%
18	68%	68%	68%	63%	80%	64%	63%	63%	65%	69%	69%	69%
19	72%	72%	72%	63%	82%	73%	65%	63%	67%	71%	71%	71%
20	76%	76%	76%	75%	82%	79%	74%	63%	69%	74%	74%	74%

B) MRFSS & TPWD Charter

Size Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	27%	27%	27%	36%	29%	20%	25%	27%	25%	29%	29%	29%
16	38%	38%	38%	51%	52%	30%	42%	43%	45%	46%	46%	46%
17	50%	50%	50%	63%	66%	55%	53%	57%	56%	58%	58%	58%
18	56%	56%	56%	66%	69%	64%	63%	65%	65%	67%	67%	67%
19	56%	56%	56%	71%	72%	71%	69%	68%	69%	72%	72%	72%
20	56%	56%	56%	72%	74%	82%	73%	71%	72%	76%	76%	76%

C) MRFSS & TPWD Private

Size Limit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	29%	29%	29%	26%	23%	7%	14%	18%	16%	24%	24%	24%
16	40%	40%	40%	49%	52%	18%	16%	26%	29%	40%	40%	40%
17	40%	40%	40%	63%	71%	27%	16%	30%	47%	44%	44%	44%
18	40%	40%	40%	72%	85%	39%	22%	30%	51%	58%	58%	58%
19	40%	40%	40%	72%	85%	52%	27%	30%	51%	58%	58%	58%
20	40%	40%	40%	72%	85%	52%	27%	30%	51%	63%	63%	63%

2013 Predicted Landings

Amendment 37 is being drafted in 2012 and the resultant management measures will be imposed on the 2013 fishing year. An estimate of monthly commercial and recreational 2013 landings are

needed to apply the percent reductions from the various management measures, and determine the predicted landings relative to ACLs and ACTs. Predicted 2013 landings for both commercial and recreational sectors came from Seasonal Auto-Regressive Integrated Moving Average (SARIMA) models. Forecasting future gray triggerfish catches is particularly well-suited to SARIMA models since their landings have a long-term time-series trend and a seasonal trend (Box and Jenkins 1976). The models used past, present, and future exploitable abundance from the latest assessment (SEDAR 9 Update 2011) and a linear combination of historical catch data (accounting for seasonal trends). The incorporation of historical data and exploitable biomass into the model will likely produce future landings that more closely reflect actual future landings than if only historical landings were used as a proxy. Additional details of the SARIMA model projections can be found in the 2012 Recreational Red Snapper Quota Closure Analysis (SERO-LAPP-2012-01).

The historical commercial catch data input into the SARIMA model was the SEFSC's Commercial ACL dataset which was broken into monthly landings. Table 6A provides the SARIMA predicted 2013 commercial landings by month, and Figure 4A displays the annual commercial 2009, 2010, 2011, and predicted 2013 landings by month. The different landings distribution in 2010 could be due to fisheries closures that were in place as a result of the Deepwater Horizon MC252 oil spill.

The historical recreational catch data input into the SARIMA model were the three recreational datasets (i.e. MRFSS, HBS, and TPWD). The HBS landings were on a monthly scale but the MRFSS and TPWD predictions came from uniformly distributing the landings for each two-month wave to create monthly landings. Predicted 2013 recreational landings by month and mode are presented in Table 6B, and Figure 4B displays the annual recreational 2009, 2010, 2011, and predicted 2013 landings by month. The different landings distribution in 2010 could be due to fisheries closures that were in place as a result of the Deepwater Horizon MC252 oil spill.

Table 6. Projected monthly 2013 A) commercial landings and B) recreational landings in pounds whole weight for Gulf of Mexico gray triggerfish under status quo management measures with no seasonal closures.

A. Commercial Landings	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Landings (lbs ww)	12,173	11,074	14,241	15,273	16,130	13,572	13,483	16,620	15,577	15,999	16,141	18,410	178,693

B. Recreational Landings	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
HBS	0	0	1,272	2,645	4,196	9,541	5,528	2,313	265	949	0	0	26,709
TPWD CHARTER	23	24	25	26	63	62	118	118	61	63	26	26	635
TPWD PRIVATE	0	0	0	0	0	0	0	0	0	0	0	0	0
MRFSS CHARTER	1,646	1,357	13,358	12,849	33,518	32,385	19,370	19,353	11,826	12,234	3,104	3,226	164,226
MRFSS PRIVATE	7,151	6,456	7,029	6,800	71,207	68,888	18,175	18,180	5,746	5,974	2,666	2,790	221,062
TOTAL	**8,821**	**7,836**	**21,685**	**22,320**	**108,984**	**110,876**	**43,191**	**39,964**	**17,898**	**19,220**	**5,795**	**6,041**	**412,631**

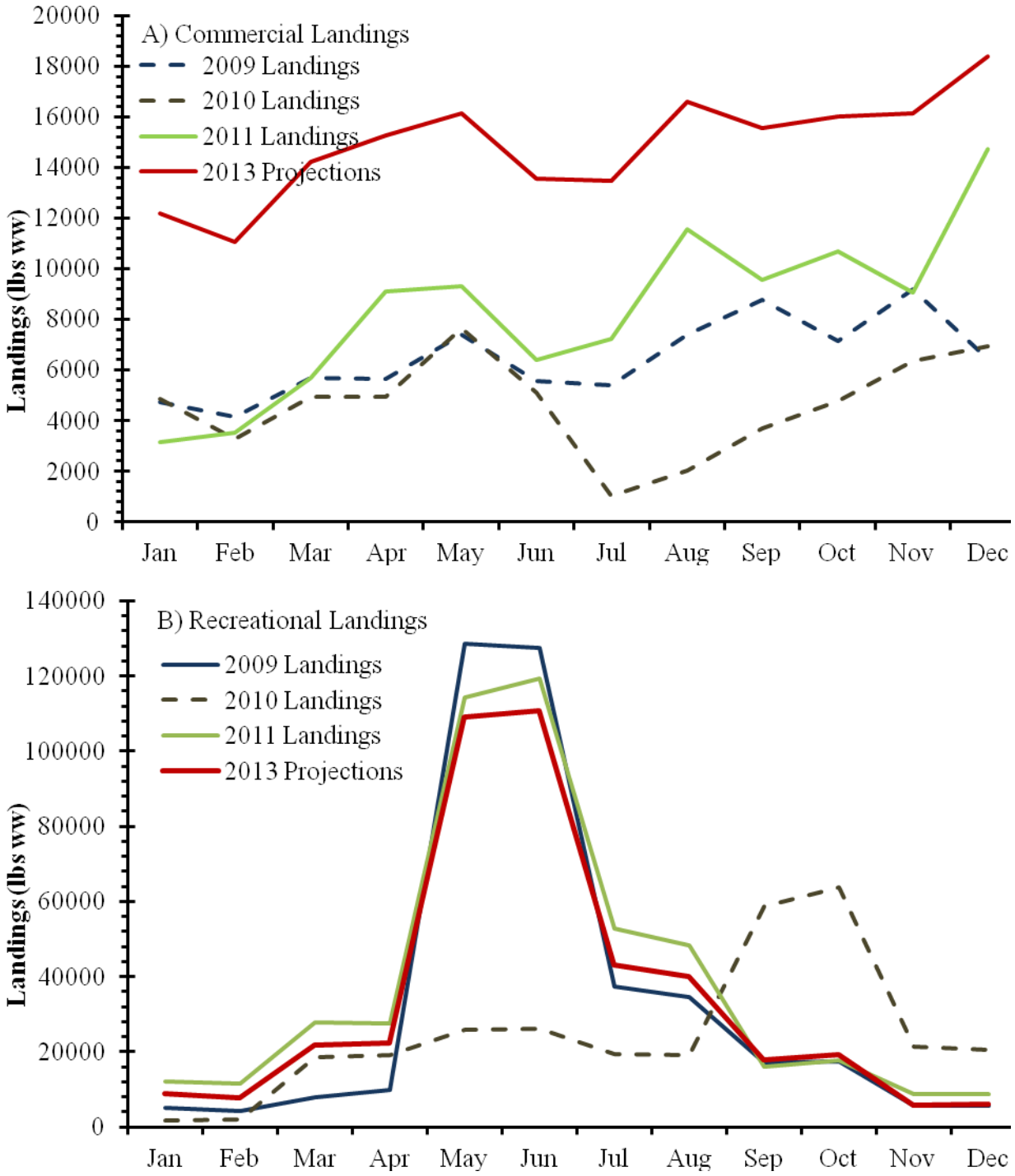


Figure 4. Monthly Gulf of Mexico gray triggerfish landings distributions. Figure A displays the 2009, 2010, 2011, and projected 2013 commercial landings, and Figure B displays the 2009, 2010, 2011, and projected 2013 recreational landings of gray triggerfish in the Gulf of Mexico by month. The recreational landings include MRFSS, HBS, and TPWD landings.

Seasonal Closure Analyses

Landings of gray triggerfish are highly seasonal in the Gulf of Mexico; thus, reductions associated with seasonal closures differ greatly depending upon the time period selected for closure (Figure 4). The impact of a seasonal closure was modeled by converting the number of days closed into a percentage of days closed for a given month. The projected landings during that month were then reduced by the percentage of the month that was closed.

Decision Tools

Percent reductions calculated from changes in management measures were applied to 2013 monthly projected landings to determine how much harvest would be reduced. These results were incorporated into commercial and recreational decision tools. For both models, if month (*m*) was 100% closed, landings were set to zero pounds for all sectors. For the commercial decision tool (CDT), if a month was partially or fully open, the projected monthly commercial landings (CL) were computed as:

$$CL_m = PCL_m * T_m * O_m * \varsigma_m$$

where PCL: projected 2013 commercial landings, T: projected trip limit reduction, O: percent of month open to fishing, and ς: projected size limit reduction.

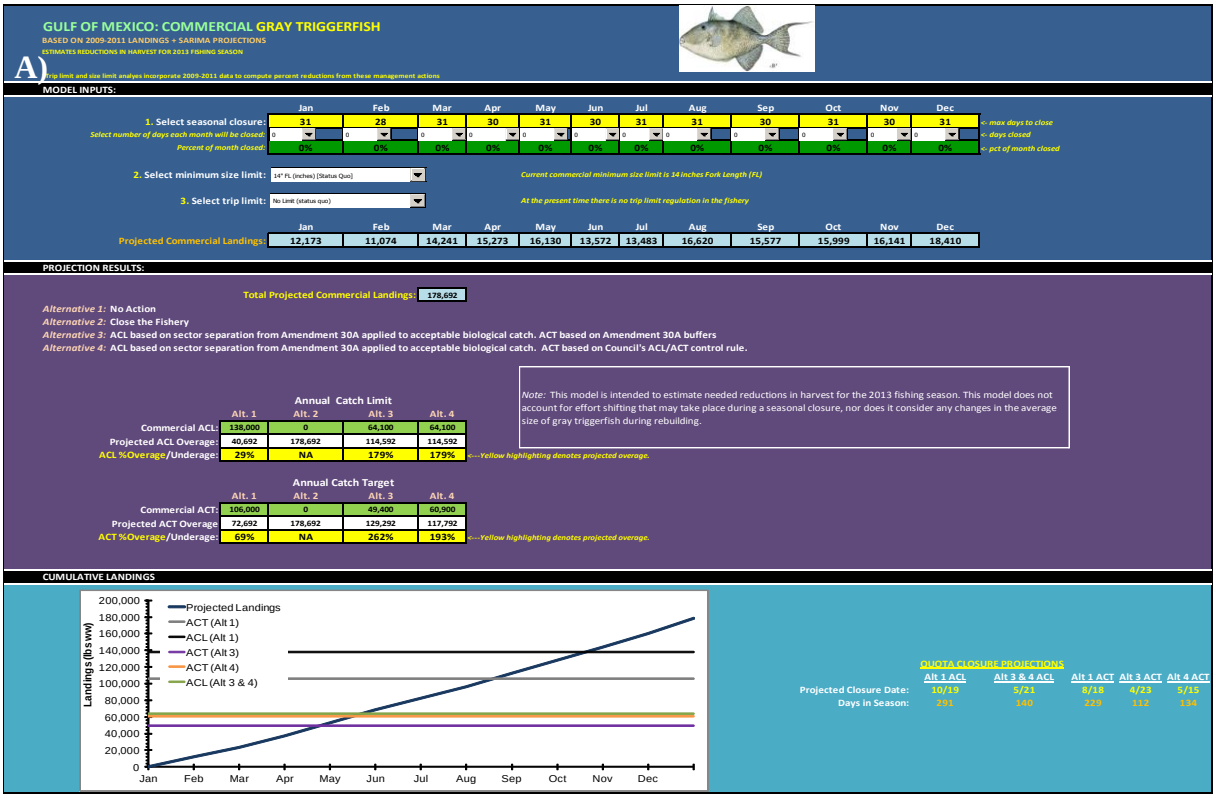
For the recreational decision tool (RDT), if a month was partially or fully open, the projected monthly recreational landings (RL) were computed as follows:

$$RL_{sector,m} = PRL_{sector,m} * O_m * \varsigma_{sector,m} * \beta_{sector,m}$$

where PRL: projected 2013 recreational landings, O: percent of month open to fishing, ς: projected size limit reduction, and β: projected bag limit reduction.

The projected monthly recreational landings were calculated for each sector (headboat, private, and charter) based on various management measures imposed. The sector landings (RL_{sector}) were combined to predict the total recreational landings.

The commercial decision tool (CDT) and recreational decision tool (RDT) were implemented in Microsoft Excel using drop-down menus for inputting desired management measures (Figure 5). Excel was chosen because it is widely available for constituent use.



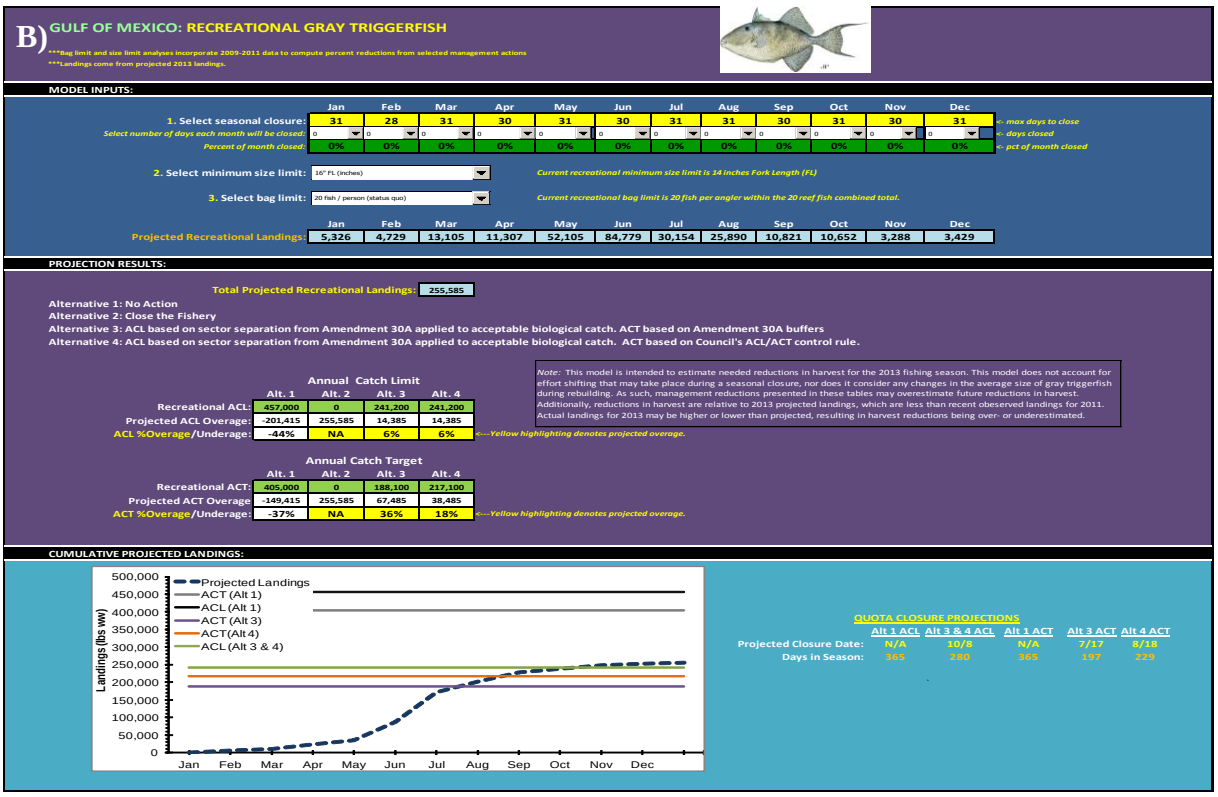


Figure 5. Screenshots for A) commercial and B) recreational gray triggerfish decision tools.

For both decision tools, the projected landings were summed across the year for a variety of user-defined management scenarios and compared to the Amendment 37 ACL and ACT alternatives. For purposes of this analysis, results are only summarized based on the Council's preferred ACL/ACT alternatives. The Council's preferred alternative sets an ACL of 64,100 lbs ww and an ACT of 60,900 lbs ww. In instances where management measures were insufficient to constrain harvest below the ACT, the projected quota closure date was computed.

Results

Commercial

The 25 pound trip limit was predicted to reduce landings significantly whereas the 200 pound trip limit was predicted to have a relatively small influence on reducing the landings (Table 1). However, the reduction from the 25 pound trip limit alone is not enough to reduce the landings below the preferred ACL and ACT alternatives. Therefore, a size limit or seasonal closure needs to be combined with the 25 pound trip limit to accomplish the necessary reduction in landings.

The size limit management measures are not predicted to have significant reduction in landings (>30%) over the course of the year unless it's increased to at least 17 inches FL (Table 3). A factor reducing the effectiveness of the size limits reducing the landings is the high level of non-compliance to commercial size limits. The length distribution of gray triggerfish in the commercial catch had 26% of the fish harvested below the current minimum size limit (14 inches FL) (Figure 2).

The predicted 2013 commercial landings by month had the lowest landings in the early months (January and February) and the highest landings in the later months (August to December) (Figure 4A). Therefore, the largest reductions in landings from seasonal closures would occur in the later months.

Table 7 presents projected commercial landings and days open in the season under a variety of management measures that meet the preferred alternative 4 ACL (64,100 lbs ww) and ACT (60,900 lbs ww). If no management measures are implemented the model predicts the ACT will be exceeded on May 15th. Other than a closed season of 2 months or greater, or a large increase in minimum size (>19 inches FL), a combination of more than one management measure is needed to reduce the landings below the preferred ACT.

Table 7. Projected commercial harvest (lbs ww) of Gulf of Mexico gray triggerfish under a variety of proposed management measures that predict landings below the preferred alternative 4 ACL (64,100 lbs ww) and ACT (60,900 lbs ww).

Closed Season	Days Open	Minimum Size Limit (inches FL)	Trip Limit (lbs ww)	Total Projected Landings (lbs ww)
None	134	14	none	Closed on May 15
Apr-May	304	14	25	56,596
Jun-Jul	304	14	25	56,682
Jun -Jul	304	17	50	48,635
None	365	18	75	57,807
None	365	17	50	60,266
Jun 26-Dec	176	16	none	59,510
Aug-Dec	212	14 (status quo)	50	55,652
Jul-Dec	181	14 (status quo)	75	55,905

Recreational

Despite the exploration of a large range of bag limits there is predicted to be very little reduction in landings achieved until the aggregate bag limit is reduced to 4 gray triggerfish per angler per trip or less. This is a reflection of the fact that the number of gray triggerfish harvested per angler is low.

The size limit management measures have potential to produce significant reduction in landings (>30%) over the course of the year with increases in the size limit to 15 inches or larger. A factor reducing the effectiveness of the size limits reducing the landings is the high level of non-compliance to recreational size limits. The length distribution of gray triggerfish in the recreational catch had about 35% of the fish harvested below the current minimum size limit (14 inches FL) (Figure 3).

The predicted 2013 recreational landings by month peaked in May and June. Therefore, the largest reductions from seasonal closures would occur in the May and June and only moderate reductions in the other months.

Table 8 presents projected recreational landings and days open in the season for a variety of management alternatives for the preferred alternative 4 (ACL = 241,200 and ACT = 217,100 pounds ww). If no management measures are implemented the model predicts the ACT will be exceeded on June 12th. Additionally, a mix of management measures can reduce the landings to prevent the ACT from being exceeded.

Table 8. Projected recreational landings (lbs ww) of Gulf of Mexico gray triggerfish under a variety of proposed management measures that predict landings below the preferred alternative 4 ACL (241,200 lbs ww) and ACT (217,100 lbs ww).

Closed Season	Days Open	Minimum Size Limit (inches FL)	Bag limit (fish/person)	Total Projected Landings (lbs ww)
None	162	14	20	Closed on June 12
May - Jun	304	14 (status quo)	20 (status quo)	192,771
Jun – Jul	304	14 (status quo)	2	206,965
Jan – Apr & Jul - Dec	61	14 (status quo)	18	216,970
Jun – Jul	304	15	20 (status quo)	191,421
Jan – Mar & Oct - Dec	183	16	20 (status quo)	215,056
Jun	335	15	5	215,803
None (status quo)	365	16	3	211,109
Mar - May	273	14 (status quo)	2	207,096
None (status quo)	365	15	1	210,634

Discussion

As with most projection models, the reliability of the CDT and RDT results are dependent upon the accuracy of their underlying data and assumptions. We have attempted to create a realistic baseline as a foundation for comparisons, under the assumption that projected 2013 landings will accurately reflect actual 2013 landings. Uncertainty exists in this projection, as economic conditions, weather events, changes in catch-per-unit effort (CPUE), fisher response to management regulations, and a variety of other factors may cause departures from this assumption. The bounds of this uncertainty are not captured by the model as currently configured; as such, landing rates may be higher or lower than projected. In addition to the aforementioned sources of uncertainty, the modeled reductions associated with management measures assume that past performance in the fishery is a good predictor of future dynamics. We have attempted to constrain the range of data considered to recent years to reduce the unreliability of this assumption.

Any increase to the minimum size limit will increase dead discards, but the effective reduction rate is based upon the assumption of 0% release mortality. The assumption of 0% discard mortality was determined in the Gulf of Mexico gray triggerfish assessments (SEDAR 9 2006, SEDAR 9 Update 2011).

The Deepwater Horizon MC252 oil spill did cause gray triggerfish landings to decline because of fishing closures in 2010 (Figure 4); however, the length, weight, and numbers of gray triggerfish per trip from 2010 had similar distributions to 2009 and 2011. Therefore, 2010 data was included in the analysis.

Both the commercial and recreational sectors exhibited high levels of non-compliance to size limits (Figures 2 and 3). All of the predicted reductions for the size limit alternatives are based on current fishing practices. It's possible that compliance could be improved through education and outreach projects that incorporate gray triggerfish size limit regulations. This compliance could achieve additional reductions in landings beyond those considered by this analysis.

Neither model accounts for effort shifting that may take place during a seasonal closure. Effort shifting may lead to increased removal rates before and after a closure that partially offset the reductions expected from the closure.

The input of historical catch data into the SARIMA predicted 2013 recreational landings came from datasets that had the landings applied on different scales. HBS landings were on a monthly scale, but the MRFSS and TPWD predictions created monthly landings from uniformly distributing the landings for each wave. Therefore, any monthly differences within a wave for the MRFSS and TPWD datasets were not incorporated into the model for seasonal closure analyses. However, the reductions for recreational size limits and bag limits came from intercept data which was available for each month which allowed these two recreational management measures to incorporate monthly differences.

The predicted 2013 commercial landings are higher than landings from the recent years (2009 to 2011) (Figure 4A). However, the predicted 2013 commercial landings incorporation of historical data and exploitable biomass into the model which makes the prediction more likely to reflect future landings than using just historical landings as a proxy.

The predicted 2013 landings generated from the SARIMA model does take into account changes in exploitable abundance as the stock is rebuilding. However, this prediction is only for 2013 and the management measures will likely be applied for more than one year. Therefore, additional changes in the average size of gray triggerfish during rebuilding will not be considered. An increased average size would lead to fishermen capturing their quota more rapidly relative to previous years under similar effort levels. All of these factors would result in more pessimistic projections. As such, management reductions presented in this report may be overestimates, and caution should be taken in their interpretation and use. By contrast, continued adverse economic conditions and rising fuel prices may reduce effort, which would counter these other trends.

In general, the models suggest additional management regulations are necessary to rebuild gray triggerfish within the allowable time frame and constrain harvest. Tables 7 and 8 provide a combination of management regulations to reduce the landings to the preferred alternative ACL and ACT levels. A combination of management alternatives may lessen the hardship on the fishermen since it reduces the need for lengthy closed seasons or large size limits.

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Addendum for Commercial Trip Limit Analysis from Pounds to Numbers

Prepared by John T. Froeschke and Michael Larkin addendum

Commercial trip limits were chosen as one of the management measures in Reef Fish Amendment 37 to the Reef Fish Fishery Management Plan. Three trip limits were considered: 25, 50, and 75 lbs whole weight. The Law Enforcement Advisory Panel suggested that enforcement of any such regulation would be enhanced if regulations specified an allowable number of fish per trip rather than a trip limit by weight (see Tab G, No. 6- Report LEC/LEAP Joint Meeting Summary in the October 2012 Council meeting briefing materials for more information). The Council decided to use this analysis to establish commercial trip limits for gray triggerfish at their October 2012 meeting.

An analysis was conducted to convert the commercial trip limits by weight into numbers of gray triggerfish. The purpose was to estimate the probability that a given number of gray triggerfish would exceed specified trip limits (e.g., probability that six fish exceeds a 25 lb trip limit). For this purpose, commercial landings data for Gulf of Mexico gray triggerfish were obtained from the Southeast Fisheries Science Center's Trip Interview Program (TIP) (accessed March 2012). The TIP data were collected by port samplers that interviewed commercial fishermen and collected information on the length and numbers of gray triggerfish landed, gear used, and information on the fishing trip (e.g., date, location). The analysis used the most recent years of data (2009, 2010, and 2011) (Table 1).

Table 1. Summary statistics of TIP data used to estimate the probability of exceeding a trip limit (by weight) for a given number of gray triggerfish.

Year	n	Mean (lbs ww)	Standard Deviation (lbs ww)
2009	221	3.84	1.95
2010	642	3.23	1.53
2011	945	3.38	1.56

A simulation was run (1,000 iterations) and for each iteration, a specified number of gray triggerfish (range 3 – 25 fish) were randomly selected (with replacement) from the original TIP dataset. Total weight of each sample was calculated. The probability of exceeding the three trip limits (by-weight) was determined. Based on the analysis completed, trips limits in number of fish can be selected based on the acceptable probability of exceeding the poundage on any particular trip for each of the alternatives as expressed in numbers of fish (Figure 1). The Gulf Council was comfortable with a 5-11% probability of exceeding the trip limit (in pounds). This resulted in trip limit weight to numbers of fish conversions of 25 lbs to 6 fish, 50 lbs to 12 fish, and 75 pounds to 18 fish.

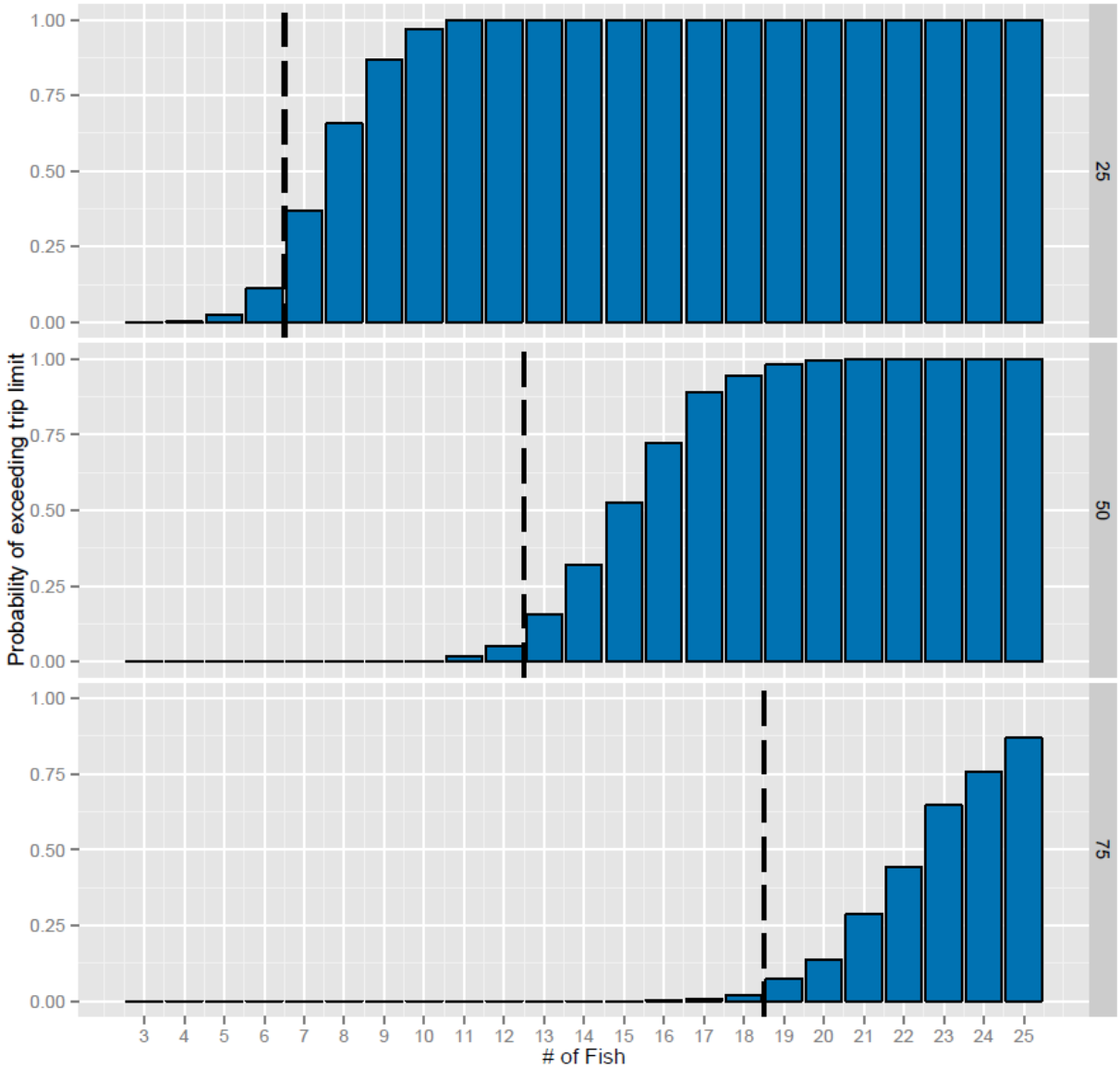

Figure 1. Result of simulations to convert commercial trip limits from weights to numbers of gray triggerfish. For a range of trip limits (by number), the probability of exceeding the trip limit (by weight) was determined. Trip limits considered included: 25 lbs, (top panel), 50 lbs (middle panel), and 75 lbs (bottom panel) whole weight. Dashed black line indicates a potential trip limit in numbers with a 5-11% probability of exceeding the trip limit (in pounds).

As with any analysis, results are contingent on analytical assumptions. The analysis uses historical TIP data, which is assumed to be representative of future fishing conditions. If the average size of gray triggerfish changes over time then the number of gray triggerfish that exceed a trip limit may be over or underestimated. The average size is expected to increase during the rebuilding plan (SEDAR 9 2006). Therefore the probabilities of exceeding the gray triggerfish may be underestimated in the future.

APPENDIX D. CONSIDERED BUT REJECTED ACTIONS AND ALTERNATIVES

Action 3 - Commercial Management Measures

Action 3.1: Modify the Commercial Minimum Size Limit for Gray Triggerfish

Alternative 1: No Action – do not modify the current minimum size limit of 14 inches fork length.
Alternative 2: Modify the minimum size limit for gray triggerfish to 16 inches fork length
Alternative 3: Modify the minimum size limit for gray triggerfish to 18 inches fork length

Action 4 - Recreational Management Measures

Action 4.1: Modify the Recreational Minimum Size Limit for Gray Triggerfish

Alternative 1: No Action – do not modify the current minimum size limit of 14 inches fork length.
Alternative 2: Modify the minimum size limit for gray triggerfish to 16 inches fork length.
Alternative 3: Modify the minimum size limit for gray triggerfish to 18 inches fork length.

The Council moved Action 3.1: Modify the Commercial Minimum Size Limit for Gray Triggerfish and Action 4.1: Modify the Recreational Minimum Size Limit for Gray Triggerfish to the considered, but rejected section at their June 2012 Council meeting. The Council expressed concerns about the high percentage of undersized gray triggerfish landings from 2009-2011. The level of non-compliance for landed gray triggerfish below 14 inches fork length (FL) in the commercial sector was 18% in 2009, 31% in 2010, and 25% in 2011. The level of non-compliance for land gray triggerfish below the 14 inches FL in the recreational sector was 49% in 2009, 31% in 2010, and 33% in 2011. Historically, this species was managed based on total length and has only been managed by fork length since the implementation of Amendment 30A on August 4, 2008 (GMFMC 2008). The Council requested that communications staff at the federal level work with staff at the state level to prepare education and outreach materials to inform the public of these issues with minimum size limits and measurement guidelines. Some Council members felt that a 14 inch FL gray triggerfish was large enough and that increasing the minimum size limit since 2008 changes were implemented in Amendment 30A was too soon. Some Council members felt fishers needed additional time to educate themselves about the change in minimum size limit from total length to fork length. Based on the information discussed above, the Council moved this alternative to considered, but rejected. Therefore the Council will considered other management measures for both the recreational and commercial sectors to achieve the necessary reduction in landings.

APPENDIX E. OTHER APPLICABLE LAW

The Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. 1801 et seq.) provides the authority for fishery management in federal waters of the exclusive economic zone. However, fishery 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 are summarized below.

Administrative Procedures Act

All federal rulemaking is governed under the provisions of the Administrative Procedure Act (APA) (5 U.S.C. Subchapter II), which establishes a "notice and comment" procedure to enable public participation in the rulemaking process. Under the Administrative Procedures Act 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 Administrative Procedures 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 C.F.R. part 930, subpart C. According to these regulations and Coastal Zone Management Act Section 307(c)(1), when taking an action that affects any land or water use or natural resource of a state's coastal zone, Nation Marine Fisheries Service (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, 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 Coastal Zone Management Act 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 Data Quality 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.

Endangered Species Act

The Endangered Species Act of 1973, as amended, (16 U.S.C. Section 1531 et seq.) requires federal agencies use their authorities to conserve endangered and threatened species. The Endangered Species Act requires National Marine Fisheries Service, when proposing a fishery action that "may affect" critical habitat or endangered or threatened species, to consult with the appropriate administrative agency (itself for most marine species, the U.S. Fish and Wildlife Service for all remaining species) to determine the potential impacts of the proposed action. Consultations are concluded informally when proposed actions may affect but are "not likely to adversely affect" endangered or threatened species or designated critical habitat. Formal consultations, including a biological opinion, are required when proposed actions may affect and are "likely to adversely affect" endangered or threatened species or adversely modify designated critical habitat. If jeopardy or adverse modification is found, the consulting agency is required to suggest reasonable and prudent alternatives. A summary of the most recent biological opinion for the reef fish fishery can be found in Section 3.2. The NMFS, as part of the review process for the Secretary of Commerce, will make a determination regarding the potential impacts of the proposed actions.

Marine Mammal Protection Act

The Marine Mammal Protection Act established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the United States. Under the Act, the Secretary of Commerce (authority delegated to NMFS) is responsible for the conservation and management of cetaceans and pinnipeds (other than walruses). The Secretary

of the Interior is responsible for walruses, sea and marine otters, polar bears, manatees, and dugongs.

Part of the responsibility that NMFS has under the Marine Mammal Protection Act involves monitoring populations of marine mammals to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted," and a conservation plan is developed to guide research and management actions to restore the population to healthy levels.

In 1994, Congress amended the Marine Mammal Protection Act, to govern the taking of marine mammals incidental to commercial fishing operations. This amendment required the preparation of stock assessments for all marine mammal stocks in waters under U.S. jurisdiction, development and implementation of take-reduction plans for stocks that may be reduced or are being maintained below their optimum sustainable population levels due to interactions with commercial fisheries, and studies of pinniped-fishery interactions.

Under section 118 of the Marine Mammal Protection Act, NMFS must publish, at least annually, a List of Fisheries that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals that occurs in each fishery. The categorization of a fishery in the List of Fisheries determines whether participants in that fishery may be required to comply with certain provisions of the Marine Mammal Protection Act, such as registration, observer coverage, and take reduction plan requirements. The conclusions of the most recent List of Fisheries for gear used by the reef fish fishery can be found in Section 3.2.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.) regulates the collection of public information by federal agencies to ensure the public is not overburdened with information requests, the federal government's information collection procedures are efficient, and federal agencies adhere to appropriate rules governing the confidentiality of such information. The Paperwork Reduction Act requires NMFS to obtain approval from the Office of Management and Budget before requesting most types of fishery information from the public. Actions 2 and 3 may have Paperwork Reduction Act consequences.

Executive Orders

E.O. 12630: Takings

The Executive Order (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. 12866: Regulatory Planning and Review

Executive Order 12866: Regulatory Planning and Review, signed in 1993, requires federal agencies to assess the costs and benefits of their proposed regulations, including distributional impacts, and to select alternatives that maximize net benefits to society. To comply with E.O. 12866, NMFS prepares a Regulatory Impact Review (RIR) for all fishery regulatory actions that either implement a new fishery management plan or significantly amend an existing plan. The RIRs provide a comprehensive analysis of the costs and benefits to society of proposed regulatory actions, the problems and policy objectives prompting the regulatory proposals, and the major alternatives that could be used to solve the problems. The reviews also serve as the basis for the agency's determinations as to whether proposed regulations are a "significant regulatory action" under the criteria provided in E.O. 12866 and whether proposed regulations will have a significant economic impact on a substantial number of small entities in compliance with the Regulatory Flexibility Analysis. A regulation is significant if it 1) has an annual effect on the economy of $100 million or more or adversely affects in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments and communities; 2) creates a serious inconsistency or otherwise interferes with an action taken or planned by another agency; 3) materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or 4) raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

E.O. 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations

This Executive Order mandates that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, 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 and possessions. The Executive Order is described in more detail relative to fisheries actions in Section 3.4.

E.O. 12962: Recreational Fisheries

This Executive Order 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 Order requires NMFS and the U.S. Fish and Wildlife Service to develop a joint agency policy for administering the Endangered Species Act.

E.O. 13089: Coral Reef Protection

The Executive Order 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 (EFH), which established additional Habitat Areas of Particular Concern 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 Executive Order on Federalism requires agencies in formulating and implementing policies, to be guided by the fundamental Federalism principles. The Order 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 Order 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 have been identified relative to the action proposed in this amendment. Therefore, consultation with state officials under Executive Order 13132 is not necessary.

E.O. 13158: Marine Protected Areas

This Executive Order 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, habitat areas of particular concern, and gear-restricted areas in the eastern and northwestern Gulf of Mexico.

Essential Fish Habitat

The amended Magnuson-Stevens Act included a new habitat conservation provision known as EFH that requires each existing and any new FMPs to describe and identify EFH for each federally managed species, minimize to the extent practicable impacts from fishing activities on EFH that are more than minimal and not temporary in nature, and identify other actions to encourage the conservation and enhancement of that EFH. To address these requirements the Council has, under separate action, approved an Environmental Impact Statement (GMFMC 2004a) to address the new EFH requirements contained within the Magnuson-Stevens Act. Section 305(b)(2) requires federal agencies to obtain a consultation for any action that may adversely affect EFH. An EFH consultation will be conducted for this action.

APPENDIX F. LIST OF PUBLIC HEARING DATES AND LOCATIONS

Monday, October 15, 2012

Destin Community Center
101 Stahlman Avenue, Destin, FL 32541
(850) 654-5184

Courtyard Marriott
3250 Tamiami Trial N., Naples, FL 34103
(239) 434-8700.

Tuesday, October 16, 2012

Sirata Hotel
5300 Gulf Boulevard, St. Petersburg, FL 33706
(727) 363-5100

Holiday Inn Hotel
160 W. Commerce Boulevard, Gulf Shores, AL, 36542
(251) 948-6191

Wednesday, October 17, 2012

Courtyard Marriott
11471 Cinema Drive, D'Iberville, MS 39540
(228) 392-1200

Hilton Galveston
5400 Seawall Boulevard, Galveston Island, TX 77551
(409) 744-5000

Thursday, October 18, 2012

Harte Institute
6300 Ocean Drive, Room 127
Corpus Christi, TX 78412-5869
(361) 825-2000

Crowne Plaza New Orleans Airport
2829 Williams Boulevard, Kenner, LA 70062
(504) 467-5611.

APPENDIX G. SUMMARIES OF PUBLIC HEARING TESTIMONY

Naples, Florida
October 15, 2012

Council/Staff:
John Sanchez
Dr. Carrie Simmons

16 members of the public in attendance

The audience did not wish to hear the presentation or discuss Reef Fish Amendment 37 – Modifications to the Gray Triggerfish Rebuilding Plan.

St. Petersburg, Florida
October 16, 2012

Staff:
Steven Atran
Dr. Carrie Simmons

45 members of the public in attendance, 20 spoke

Bob Gill – Seafood dealer
Supported all the Preferred Alternatives.
Action 5 - (recreational accountability measures) he preferred no in-season closures because they are disruptive to the for-hire sector.

Captain Buddy Bradham – Retired from Florida Fish and Wildlife Comm.
Captain Bradham noted from tonight's presentation that less than 95% of anglers catch 1 triggerfish. He felt that if that's the case, then the fishermen are the not the ones that are hurting the fishery.

Rich Davis – Recreational spearfisherman
Five years ago, triggerfish would follow him around on dives, but that hasn't happened in two to three years. Gray triggerfish are not there now. He does not feel it is due to fishermen, but to something else.

Brad Gorst – Charterboat captain, Gulfstream Charter
Agrees with Bob Gill on the Preferred Alternatives, but this is more of a northern Gulf issue.

John Kaytis – Recreational fisherman
Mr. Kaytis stated that he is not concerned about triggerfish. It is not a target species for him. However, if the triggerfish are gone, he felt it is not due to recreational fishermen.

Jeff Warner – Florida Sportsman magazine
He is opposed to all of the alternatives until the data are corrected.

Mark Hubbard – Hubbard's Marina and For-Hire Fisherman
Captain Hubbard supported Alternative 1 (no action) across the board.

John Longley – Recreational fisherman
Mr. Longley stated that he does not have a strong preference for this amendment, but suggested no action.

Destin, Florida
October 15, 2012

Council/Staff:
Martha Bademan
Emily Muehlstein

11 members of the public in attendance.

George Eller – Checkmate Charters and AAA Marine
Action 4.1 – The recreational closed season should be Preferred Alternative 3 (close June and July) because at this time of year the focus is on snapper so they don't need to keep triggerfish. He also suggests that there be a fixed closed season for Jan-Feb, in addition to a June-July closure.
Action 4.2 – George supports the Preferred Alterative 3, a 2-fish bag limit.

Jim Green – Party Boat American Spirit
Action 4.1 – Jim prefers Alternative 2 (close May 1–June 30th). For his business amberjacks are closed June-July, and only part of July will be open for snappers. If you close June and July (preferred) then the end of July does not provide for many fish to target.
Alternative 4.2 – He supports Alternative 2, a 4-fish bag limit. There are days that the fishing isn't that good and since it's not a dramatic difference in determining the length of the season then 4 fish would work better for his business.

Mike Eller – Charter Captain, Lady 'Em
Action 1 – Supports the Preferred Alternative 3.
Action 2 – Supports the Preferred Alternative 4.
Action 3.2 – He would like 50 lb trip limit; Preferred Alternative 3.
Action 4.1 – Supports Alternative 2, a May-June closure.
Action 4.2 – Would like to use Preferred Alternative 3, a 2-fish bag limit.
Action 5 – Prefers Alternative 3, using in-season closure authority that is based on the annual catch limit.

Bob Zales – Charter captain
Action 1 – Supports Preferred Alternative 3.
Action 2 – Captain Zales suggests that the Council set the annual catch limit equal to the acceptable biological catch and not use an annual catch target at all.
Action 4.1 – He suggests that the season close June 1 and remain closed until snapper season opens again.
Action 4.2 – Supports Preferred Alternative 3, a 2-fish bag limit.
Action 5 – He is not sure he supports the in-season closure authority and suggests that the Council consider a post-season payback provision that goes both ways.

Trip Aukeman – CCA
Overall, Trip expresses his support for what the captains would like to see happen.
Action 4.1 – Trip generally supports season closures during spawning, and supports the Council's Preferred Alternative 3.

Scott Robson – Charterboat Phoenix
Action 1 – Scott supports Preferred Alternative 3.
Action 2 – He supports Alternative 4, but would rather not use an annual catch target at all if that can be an option.
Action 4.1 – He supports the Council's Preferred Alternative 3, a fixed closed season during June and July.
Action 4.2 – Scott agrees with the Council's Preferred Alternative 3, a 2-fish bag limit.
Action 5 – Supports the selection of Preferred Alternative 4, and would really like to see a payback provision that goes both ways.

BJ Burkett – Charter Hook 'em Up
Action 1 – Supports the Preferred Alternative 3.
Action 4.1 – BJ agrees with Capt. Zales, and would like to see the Council open the season the day snapper closes. Otherwise, he supports the Preferred Alternative 3.
Action 4.2 – Supports the Preferred Alternative for a 2-fish bag limit.
Action 5 – He would like the Council to use a two-way payback provision.

Gary Jarvis – Charter Captain
Action 1 – Would like the Council to select the no action alternative.
Action 3.1 – Would like selection of Alternative 2, commercial closure during peak spawning. Gary says that mid-summer closures are beneficial.
Action 4.1 – He supports Preferred Alternative 3, a June and July fixed closed season.
Action 5 – Gary would like Alternative 3, the use of in-season closure authority based on the annual catch limit.

Benji Kelley – Charter Ms. Kelley
Action 4.1 – Benji would like the season to open March 1st and suggests that it must stay open through October. If that requires another closure he prefers that triggerfish be closed during snapper season and re-open when snapper closes.
Action 4.2 – He likes a 2-fish bag limit, Preferred Alternative 3.

Gulf Shores, Alabama
October 16, 2012

Council/Staff:
Kevin Anson
Emily Muehlstein

2 members of the public in attendance.

Ben Fairey – Charterboat Necessity
Action 2 – Ben supports the Preferred Alternative 4.
Action 4.1 – Preferred Alternative 3, establish closed season from June-July, since red snapper is open and we have something to target at that time. Red snapper and amberjack are open at that and most of the triggerfish fishing occurs in the fall. He would like the season to be open in the fall. He would really like to have the season open as long as possible to avoid dead discards. The most frequently heard complaint on his boat is about dead discards. His customers hate to throw back dead fish because the seasons are closed.
Action 4.2 – Supports the Preferred Alternative 3, to lower the bag limit to 2-fish per person.
Action 5 – Captain Fairey supports the Preferred Alterative 2.

Alan Keahl
Action 4.1 – He supports the Council's preferred alternative, a June-July fixed closure.
Action 4.2 – He is in favor of a 2-fish bag limit.

D'Iberville, Mississippi
October 17, 2012

Staff:
Emily Muehlstein

No members of the public in attendance.

Kenner, Louisiana
October 18, 2012

Staff:
Emily Muehlstein

No members of the public in attendance.

Galveston, Texas
October 17, 2012

Council/Staff:
Lance Robinson
Ryan Rindone

No members of the public in attendance

Corpus Christi, Texas
October 18, 2012

Council/Staff:
Robin Riechers
Ryan Rindone

12 members of the public in attendance

No testimony was given.

Members of the public who did not speak: 12

Holly Grand	TAMU
Coral Lozada	TAMU
Ivy McClellan	TAMU
Andrew McArdie	TAMU
Sage Lane	TAMU
Logan Brown	TAMU
Jamie Nevins	TAMU
Matt Streich	TAMU
Martin Donley	TAMU
Ashley Fitzcannon	TAMU
Ariane Frappier	TAMU
Michael Miglini	Charter Fisherman

APPENDIX H. SUMMARY OF WRITTEN COMMENTS

Written comments received to date on gray triggerfish are posted on the Council website and are summarized below:

- Gray triggerfish are not overfished, especially since the size limit change and circle hook mandate has made them harder to catch.
- Council should select a 5-fish bag limit with no closed season.
- No action- it is already hard to catch 14-inch or larger triggerfish because of the overabundance of red snapper.
- The Gulf dead zone has changed fish location and skewed the triggerfish data because the fish have moved from their normal location.
- Triggerfish should be granted 'gamefish status' and commercial harvest should be prohibited.
- The minimum size limit should not be increased.
- It would be better to have a smaller bag limit and eliminate the need for a closed season.
- A November to April closure would be less disruptive to divers.

** The full text of written public comments received before 10/31/12 can be found at: http://www.gulfcouncil.org/fishery_management_plans/Public%20Comment/RF%20Amendment%2037%20-%20Triggerfish/Reef%20Fish%20Amendment%2037%20Comments.pdf