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FINAL REEF FISH AMENDMENT 32

GAG GROUPER– REBUILDING PLAN, ANNUAL CATCH LIMITS, MANAGEMENT MEASURES

RED GROUPER – ANNUAL CATCH LIMITS, MANAGEMENT MEASURES GROUPER ACCOUNTABILITY MEASURES

(INCLUDING FINAL ENVIRONMENTAL IMPACT STATEMENT, REGULATORY IMPACT REVIEW, AND REGULATORY FLEXIBILITY ANALYSIS, FISHERY IMPACT STATEMENT)

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ABBREVIATIONS USED IN THIS DOCUMENT

ABC	Acceptable biological catch
ACL	Annual catch limit
ACT	Annual catch target
B	Biomass
EA	Environmental assessment
EEZ	Exclusive economic zone (federal waters)
F	Fishing mortality
FEIS	Final environmental impact statement
FIS	Fishery Impact Statement
FWCC	Florida Fish and Wildlife Conservation Commission
GMFMC	Gulf of Mexico Fishery Management Council
GW	Gutted weight
IFQ	Individual fishing quota
MFMT	Maximum fishing mortality threshold
MRFSS	Marine Recreational Fisheries Statistics Survey
MRIP	Marine Recreational Information Program
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
NMFS	NOAA's National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OFL	Overfishing limit
OY	Optimum yield
RA	Regional administrator of NMFS
RFA	Regulatory flexibility analysis
RIR	Regulatory impact review
SEDAR	Southeast Data, Assessment, and Review
SEFSC	Southeast Fisheries Science Center
SPR	Spawning potential ratio
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TL	Total length
VMS	Vessel monitoring system

Final Environmental Impact Statement (FEIS) Cover Sheet

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Name of Action
Reef Fish Amendment 32: Gag – Rebuilding Plan, Annual Catch Limits, Management Measures; Red Grouper – Annual Catch Limits, Management Measures; Grouper Accountability Measures

Location of Action Gulf of Mexico

Type of Action
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Abstract
The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires NOAA's National Marine Fisheries Service (NMFS) and the Gulf Council to prevent overfishing, and achieve, on a continuing basis, the optimum yield from federally managed fish stocks. Red grouper are not undergoing overfishing and are not considered overfished. Gag is undergoing overfishing and is considered overfished. This action incorporates both red grouper and gag management measures as actions affecting one species invariably affect the other. Amendment 32 would consider: Rebuilding plans for the gag stock; establishing or modifying recreational bag limits, size limits, and closed seasons for gag and red grouper; applying commercial gag quota adjustments to account for dead discards; adjusting multi-use individual fishing quota shares (allocation); changing the commercial gag size limit; establishing time and area closures; and modifying current gag, red grouper, and shallow-water grouper accountability measures.

Table of Contents for FEIS

Please note this fishery action is presented as an integrated document. It addresses different applicable laws including the National Environmental Policy Act (NEPA). Therefore, the document does not follow a standard EIS format, however, elements of the FEIS are present and identified in the following table of contents for the FEIS. Amendment 32 contains a total of seven actions, four subactions, 34 alternatives, and 18 options. The amount of analysis required to evaluate these alternatives is thus very extensive, causing the EIS to exceed 150 pages.

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Executive Summary

Gag and red grouper are the two most abundant grouper species in the Gulf of Mexico and account for the bulk of the recreational and commercial grouper landings. Gag are primarily caught by the recreational sector and the current allocation ratio defining the annual catch limits of the acceptable biological catch is 61% recreational and 39% commercial. On the other hand, red grouper are primarily harvested by the commercial sector and the allocation ratio is 24% recreational and 76% commercial.

The stocks of both species received update stock assessments in 2009. For gag, the assessment indicated the gag stock size had declined since 2005. A large part of the decline was attributed to an episodic mortality event in 2005 (most likely associated with red tide) that resulted in an additional 18% of the gag stock being killed in addition to the normal natural and fishing mortalities. The update assessment indicated the Gulf gag stock was both overfished and undergoing overfishing, and the Gulf of Mexico Fishery Management Council (Council) was informed of this status determination in August 2009. For red grouper, the update assessment indicated that although the stock continues to be neither overfished or undergoing overfishing, the stock has declined since 2005. This decline was attributed to a 2005 episodic mortality event resulting in a little more than 20% of the red grouper stock being killed, in addition to normal natural and fishing mortalities.

In response to these assessments, the Council has requested, and NMFS has implemented, two gag interim rules for 2011 management measures to reduce overfishing. These rules reduced the gag commercial quota, prohibited the use of red grouper multi-use shares in the individual fishing quota program the commercial sector operates in, and established a two month fall recreational fishing season. For red grouper, a 2010 regulatory amendment developed by the Council (GMFMC 2010) reduced the 2011 total allowable catch and commercial quota to allow the stock to recover from the episodic mortality event. It did not implement any new recreational measures because harvests under current management measures were not exceeding catch targets. Both red grouper and gag total allowable catches were projected to increase in 2012 as the stocks recovered, and these increases are included in this amendment. However, the total allowable catch projections for red grouper used in the 2010 regulatory amendment were based on estimated 2010 landings which overestimated the actual 2010 red grouper catch. When the reduced 2010 landings were incorporated into a revised set of projections, the revised projections indicated that the red grouper total allowable catch could be increased in 2011 rather than wait until 2012, although the subsequent increase in 2012 under the regulatory amendment would be lower than what is proposed in this amendment. A 2011 regulatory amendment is currently under development for implementation in the fall of 2011 that would increase the 2011 red grouper total allowable catch as well as increase the red grouper bag limit. A similar increase for gag was not possible because gag is overfished and is under a rebuilding plan.

Given the overfished status of gag, the primary purpose of this amendment is to decrease or end overfishing of gag so that the stock can recover under a set rebuilding plan. This purpose has been temporarily addressed by the interim rules discussed above; however, long-term measures are needed to allow this stock to recover. A secondary purpose of this action is to develop red grouper management measures that will allow the optimum yield of red grouper to continue to be caught as the stock recovers from the 2005 episodic mortality event. Actions addressing these purposes would be consistent with the goals and objectives of the Council's plan to manage gag and red grouper to achieve the mandates of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

A total of seven actions, four subactions, 34 alternatives, and 18 options are evaluated in this draft environmental impact statement. A short summary of each action follows.

Action 1. Rebuilding plan for gag

This action evaluates four alternatives ranging from a no action alternative (Alternative 1; no rebuilding plan) to the shortest time period to rebuild the stock to a level consistent with producing maximum sustainable yield and assumes no harvest of gag (Alternative 4; 5 years). Other alternatives include the longest period allowed under the Magnuson-Stevens Act (Preferred Alternative 2; 10 years) and the time period associated with harvesting the stock at the fishing mortality associated with optimum yield (F_{OY}) (Alternative 3; 7 years). The catch targets explained in the amendment for gag are based on protocols developed in Amendment 30B. These catch targets are based on F_{OY} yield streams and should rebuild the stock in seven years as dictated by Alternative 3. However, given management uncertainties and uncertainties about the stock assessment projections for more than a few years out, the Council selected **Alternative 2** as preferred because it allows a buffer for achieving the management target.

With respect to the physical and biological/ecological environments, Alternatives 2-3 provide benefits over no action, albeit minor, because they limit fishing effort which reduces impacts with the physical environment and benefits to the gag stock. For the social and economic environments, in general, the shorter the rebuilding period, the more stringent the required management measures will be, and thus the greater the indirect economic and social costs on fishing participants in the short-term. On the other hand, the indirect economic benefits resulting from larger yields will also accrue sooner as well. Conversely, longer rebuilding periods will require less stringent management measures in the short-term and thus smaller indirect economic costs on fishing participants in the short-term. The indirect economic benefits from larger yields would accrue farther into the future. This action should have minimal effects on the administrative environment because measures to monitor and enforce landings are already in place.

Action 2. Recreational bag limits, size limits, and closed seasons

Action 2.1. Gag scenarios

Reductions in the total removals (landed fish and dead discards) from recreational harvest need to be between 36 and 61% depending on the baseline years used to estimate the reductions and what F value the fishery is managed at. The baseline years are the last three years of the stock assessment (2005-2008) and 2009, the last year of full landings data available for the assessment rerun. The 2005-2008 average landings are greater than the 2009 landings, so needed reductions are greater when using this time series. Sub-action 2.1 is comprised of five alternatives ranging from no changes to current gag regulations (Alternative 1; no action) to a two month fall fishing season (Alternative 2) that would achieve a 60 percent reduction in harvest. The other alternatives evaluated in this sub-action include a split-season (Alternative 3 – winter and spring season with a 52-56% reduction in removals) and using changes in size limits to achieve the longest season possible of July 1 through October 31 (Preferred Alternative 4, preferred option a – 22-inch minimum size limit and option b – 22-30-inch slot limit). Preferred Alternative 4 meets the Council's objective of maintaining the longest season possible while Alternatives 3 and 4 meet the preferred fishing time periods of anglers from different areas of the Gulf of Mexico. The Council's Reef Fish Advisory Panel did recommend another spilt season alternative (winter and summer season with a 46-52% reduction in removals) to better meet the needs of the recreational sector; however, this alternative did not quite meet the reduction objectives developed by the Council.

For the physical environment, Alternative 1 and Preferred Alternative 4 would be least beneficial because longer seasons and increased fishing effort can result in increased gear interactions and lost or discarded fishing line, which could foul the hard bottom. For the biological/ecological environment, longer open fishing seasons and shorter closed seasons will reduce the amount of regulatory discards of gag caught by fishermen targeting other species and provide a benefit for gag as long as the measures meet the target removals needed to rebuild the stock. For the economic and social environments, Alternative 2 would have the greatest adverse economic effects over the short term and Alternative 1 the least. Size limits and season closures are standard fisheries management measures and are in effect for many species, therefore, this action should have minimal effects on the administrative environment.

Action 2.2. Red grouper bag limit

Red grouper are not considered overfished and undergoing overfishing. Recent recreational landings have not exceeded current catch targets, therefore Action 2.1 evaluates changes in bag limits to allow the recreational sector to harvest its allocation. This action evaluates three alternatives ranging from not changing the current bag limit of two fish within the four fish grouper aggregate bag limit (Alternative 1; no action) to increasing the bag limit to four red grouper within the four fish grouper aggregate bag limit (Preferred Alternative 3). Alternative 2 would set the red grouper bag limit at three fish within the four fish grouper aggregate bag limit. Both Alternative 2 and Preferred Alternative 3 have an accountability measure in the alternative where if, as a result of increasing the bag limit, the annual catch limit for a year is exceeded, the bag limit will be reduced in the subsequent year. Preferred Alternative 4 is the greatest red grouper bag limit increase that can be achieved within the four fish per person aggregate grouper bag limit.

For the physical and biological/ecological environments, Preferred Alternative 3 would likely have the greatest adverse effects because of potential increased effort. However, this impact to the physical environment should be minimal because of the fishing gear used as well as to the biological/ecological environment because it minimizes discards and has an adaptive management component should the annual catch limit be exceeded. For the economic and social environments, Preferred Alternative 3 had the greatest benefit to the recreational sector because it allows those fishermen catching red grouper to retain more fish. This action should not have any adverse effect effects on the administrative environment because bag limits are standard fishery management measures. In addition, should either Alternative 2 or Preferred Alternative 3 lead to exceeding the recreational annual catch limit, automatic measures would be implemented to reduce future bag limits to control harvest.

Action 3. Commercial gag quota adjustment to account for dead discards

Action 3 specifies gag quotas from 2012 forward. In testimony to the Council, commercial sector representatives have indicated that although they can reduce the number of gag caught by targeting the harvest of other reef fish species, they cannot absolutely avoid gag. Therefore, there will be some incidental gag harvest that will result in dead discards from either the capture of undersized fish or by fishermen without gag individual fishing quota allocation. The alternatives in this action range from specifying no quota reductions to account for these discards (Alternative 1; no action) to reducing the quotas by 47% (Alternative 3; worst case reduction needed). Preferred Alternative 2 is consistent with actions taken by the Council in a gag interim rule and reduces the quota by 14% to account for discards.

The effects of this action on the physical and biological/ecological environments would likely be minimal with the biological effects being similar to those of Action 1. As would be expected, the greater the

reductions in the quota, the greater the adverse economic and social effects of the alternative. Therefore, Alternative 3 would have the greatest adverse effect and Alternative 1 the least. Because this action does not change how the individual fishing quota program is run, regardless of the alternative chosen, this action should have no effect on the administrative environment.

Action 4. Adjustments to multi-use individual fishing quota shares

To allow for flexibility and account for varying gag to red grouper ratios across the Gulf of Mexico, at the beginning of each fishing year a percentage of the gag and red grouper allocation is designated as multi-use allocation, valid for harvesting either red or gag grouper. Amendment 29 established that 4% of red grouper allocation and 8% of gag allocation would be converted to multi-use. However, under the reduced red grouper and gag annual catch limits expected to be implemented in this amendment, the current multi-use allocations could result in commercial harvest of gag exceeding its sector annual catch limit. The alternatives for this action range from not making any changes to how multi-use allocations are awarded (Alternative 1; no action) to setting the percentage of gag multi-use allocation using a formula based on the buffer between the gag quota and the gag annual catch limit to prevent the multi-use shares from exceeded the red grouper annual catch limit (Preferred Alternative 3). In addition, Preferred Alternative 4 sets the percentage of red grouper multi-use allocation to zero while the gag stock is under a rebuilding plan, Then once the stock is rebuilt it allows red grouper multi-use shares based on a formula similar to Preferred Alternative 3 but applied to red grouper multi-use shares . Alternative 2 is similar to Preferred Alternative 4 except it would award red grouper multi-use shares starting in 2011.

This action should not affect the physical environment. Alternative 1 would have the greatest adverse effect on the biological/ecological environment because it could lead to gag overfishing and Preferred Alternative 4 should be most beneficial because it minimizes the risk of gag overfishing. For the social and economic environments, although it restricts the flexibility to the social environment that individual fishing quota program participants would enjoy under the other alternatives, Preferred Alternative 4 is expected to yield positive economic effects due to the anticipated beneficial impacts to the rebuilding of the gag stock which is currently overfished and is undergoing overfishing. Preferred Alternative 4 would be beneficial to the administrative environment relative to the other alternatives because red grouper multi-use allocation, at least for the short term, would not need to be calculated and tracked.

Action 5. Commercial gag size limit

Estimates of average release mortality rates for gag in the commercial fishery are high (~67%). Thus, a major concern for the commercial sector is bycatch and bycatch mortality of gag while fishermen target red grouper. This is likely to occur because of the large differences in the expected red grouper and gag quotas. The alternatives for this action range from maintaining the current 24-inch minimum size limit (Alternative 1; no action) to the elimination of a minimum size limit (Alternative 4). The Council is considering two other minimum size limits of 22 inches (Preferred Alternative 2) and 20 inches (Alternative 3). The effect of Alternatives 2-4 would be to convert some or all the regulatory discards due to size to catch.

This action should have little effect on the physical environment because the alternatives should have no effect on how fishing gear is used; however, if reducing the size limit allows fishermen to be more efficient, there could be some reduction in effort and hence a reduction in impacts. The current minimum size for the commercial sector is 24 inches which is just above the size at 50% maturity, thus any decrease in minimum size is likely to have a negative effect on the spawning potential of gag. The economic and

social environments may receive slight benefits with decreasing minimum size limits, however, these may be offset if there is a differential price between larger (higher price per pound) and smaller (lower price per pound) gag. However, there may be some social benefit to equalizing the minimum size limit for the commercial and recreational sectors (Preferred Alternative 2). Reducing the gag size limit may have a negative effect on the administrative environment because of confusion between black grouper and gag. Both currently have the same size limit so reducing the gag size limit could lead to enforcement and voluntary compliance difficulties.

Action 6. Time and area closures

Given the disproportionate commercial quotas between red grouper and gag (5.49 and 0.659 million pounds gutted weight, respectively), it may be possible through the strategic use of seasonal area closures to direct fishing away from concentrations of gag towards red grouper or other species. The alternatives range from maintaining the existing season area closures (Preferred Alternative 1, no action) to closing the area between the Madison-Swanson marine reserve and The Edges seasonal area closure (Alternative 3; add 244 square nm) and adding to the current Madison-Swanson marine reserve (Alternative 2-extension; add 70 square nm). Other alternative include modify the period and type of closure for The Edges (Alternative 4; seasonally add 390 square nm), and modify the period and type of closure for the current Madison-Swanson and Steamboat Lumps marine reserves. For each of the alternatives with the exception of Preferred Alternative 1, there are four options including prohibiting all fishing from November 1 through April 30, but allowing surface trolling from May 1 through October 31 (Option a), prohibiting all fishing from November 1 through April 30 and allowing all fishing from May 1 through October 31 (Option b), prohibiting all fishing from January 1 through April 30 and allowing all fishing from May 1 through December 31 (Option c), and prohibiting fishing year-round (Option d).

Preferred Alternative 1 is not expected to have any effect on the physical or biological environment with the other alternatives having a positive benefit as long as the area and time period of the closure to fishing is greater than the no action alternative. Positive impacts to the biological environment may be expected simply based on size of the closed areas relative to status quo. These benefits would include additional protection to spawning aggregations of gag and potentially reducing bycatch and bycatch mortality of gag while fishermen are targeting red grouper. Alternative 2 and Alternative 3 would add an additional time-area closure in a region which is the prime spawning area for gag, shifting fishing effort on red grouper and other species to areas where gag spawning aggregations are less abundant from January through April, the peak gag spawning season. For the economic and social environments, the expansion of these closed areas and modifications to seasonal closure times relative to no action are expected to reduce effort; however, the magnitude of the anticipated effort reductions that could result from Alternatives 2-4 is not known and could simply be shifted if fishers target other areas. Currently, seasonal area closures are used in the management of the Gulf of Mexico reef fish fishery and commercial vessels are required to have functioning vessel monitoring systems. The effects of the other alternatives in this action other than status quo on the administrative environment should be minimal.

Action 7. Gag, Red Grouper, and Shallow-water Grouper Accountability Measures

Accountability measures are designed to prevent annual catch limits from being exceeded, and if exceeded, correct or mitigate any overages. Annual catch limits are amounts of fish allowed to be caught in a year and can either relate to a stock as a whole or to individual fishing sectors (commercial and recreational). For gag and red grouper, the annual catch limits are sector specific.

Action 7.1 Gag, red grouper, and shallow-water grouper commercial accountability measures

Current accountability measures are based on quota monitoring for red grouper, gag, or shallow-water grouper quota and were implemented before the current individual fishing quota program was established. This individual fishing quota program is also an accountability measure because it allocates the red grouper, gag, and other shallow-water species quotas to the individual fishermen based on their shares. The program strictly monitors individual catches to ensure participating fishermen do not exceed their individual allocation, thus ensuring the overall quota for a stock is not exceeded. This action has two alternatives. One is to maintain the current quota based accountability measures (Alternative 1, no action) and the other is to have the individual fishing quota program to the accountability measure (**Preferred Alternative 2**). This action should have no effects on the physical, biological/ecological, economic, and social environments because any effects will be administrative. **Preferred Alternative 2** should have provide a benefit to the administrative environment relative to Alternative 1 in that less emphasis on commercial quota tracking would be required for these species. However, NMFS would still manage the individual fishing quota program and monitor commercial harvests, so this benefit would be slight.

Action 7.2 Gag and red grouper recreational accountability measures

The recreational sector currently has accountability measures developed in an earlier amendment. This action considers measures that would enhance the existing accountability measures. The alternatives range from maintaining the current accountability measures (Alternative 1, no action) to adding an overage adjustment if an annual catch limit is exceeded for stocks in a rebuilding plan and providing for in-season measures if landings are projected to exceed the annual catch limit (**Preferred Alternative 4**). Alternative 2 would provide only an overage adjustment for stocks in a rebuilding plan and Alternative 3 would provide only in-season accountability measures. Currently, if recreational landings are determined to exceed the red grouper or gag annual catch limits, the Assistant Administrator for Fisheries will file a notification maintaining the prior year red grouper or gag target catch level. In addition, the notification will reduce the length of the recreational shallow-water grouper fishing season in the following year by the amount necessary to ensure recreational gag and red grouper landings do not exceed the recreational target catch level for that fishing year.

For the physical and biological/ecological environments, added constraints to harvest would limit fishing effort and the chances of overfishing. Therefore, the greater the protection the accountability measures afford, the greater the benefit. For the economic and social environments, establishing accountability measures could lead to closures of the fishery, and thus could have short-term adverse effect. However, establishing accountability measures could have future effects if these measures are triggered. Alternative 3 and **Preferred Alternative 4** would require in-season monitoring which would add to the burden on the administrative environment.

Cumulative effects

The cumulative effects of the rebuilding plan for gag and constraining red grouper harvests from expanding on the biophysical and socioeconomic environments are positive because they will ultimately restore/maintain the stocks at a level that will allow the maximum benefits in yield and recreational fishing opportunities to be achieved. However, short-term negative impacts on the fisheries' socioeconomic environment may occur due to the need to limit directed harvest and reduce bycatch mortality. These negative impacts can be minimized for the recreational sector by using combinations of

bag limits, size limits and closed seasons and for the commercial sector through the individual fishing quota program, size limits, and season-area closures. The effects of the proposed actions 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. A full discussion of the cumulative effects is contained in Section 5.8 of the environmental consequences.

FISHERY IMPACT STATEMENT

The Magnuson-Stevens Act requires NOAA's National Marine Fisheries Service and the Gulf Council to prevent or end overfishing. The primary purpose of this amendment is to decrease or end overfishing of gag so that the stock can rebuild from the overfished status. One secondary goal of this amendment is to develop management measures for red grouper consistent with achieving optimum yield. To address these goals the following actions are proposed: 1) implementing a rebuilding plan for gag, 2) modifying the recreational management measures for gag and red grouper, 3) reducing the commercial gag quota to account for dead discards, 4) modifying the multi-use provision for IFQ shares, 5) lowering the commercial minimum size limit for gag, 6) exploring new and current time and area closures, and 7) adjusting accountability measures for the commercial and recreational sectors. Physical, biological, social, and economic impacts expected from the proposed actions are summarized below. Detailed analyses and discussion of these impacts are provided in Section 5.0.

The effects of the different reef fish actions on the physical and biological/ecological environments are generally tied to how the action affects fishing effort. For the physical environment, reduced effort generally means less interaction of fishing gear with the bottom and so reduces the effects from fishing. For the biological/ecological environments, less effort generally means fewer removals allowing the stock to reproduce and grow larger. However, reducing effort on one stock can sometimes lead to an effort shift which could result in unintended consequences on other stocks.

Under the gag rebuilding plan, the annual catch limit is set according to the rebuilding schedule and divided proportionally according to the allocation of each sector. The reduction in quota is applied through different management measures that are appropriate to each sector. The proposed actions to shorten the recreational gag season, reduce the commercial quota to account for bycatch, and reduce the commercial minimum size limit for gag are each expected to reduce effort relative to taking no action. Thus, these actions are likely to provide biological benefits to the gag stock. These measures are designed to limit the gag harvest and allow the stock to recover to a healthy level. Decreasing the commercial gag size limit is designed to reduce gag bycatch, thereby reducing total removals.

The selected 10 year rebuilding plan, suspension of IFQ multi-use allocations, and accountability measures are more administrative in nature and do not directly affect the physical and biological/ecological environments. However, these actions do indirectly and positively affect these environments relative to no action by providing a framework to rebuild the stock or to limit the likelihood of a stock to be harvested above the optimum yield.

The secondary goal of this amendment is to develop management measures for red grouper consistent with achieving optimum yield. Recent trends in red grouper catches remain below optimum yield. Harvest levels that remain below optimum yield due to management measures do not incur adverse impacts to the biological environment. Therefore increasing the red grouper bag limit is expected to allow fishermen to approach optimum yield without negatively impacting the biological environment. However, increasing the bag limit for red grouper has the potential for greater gear interactions with the bottom which could result in negative effects to the physical environment.

The Council explored an action to create new or modify existing time area closures to provide greater protection of gag spawning aggregations and reduce gag bycatch. Ultimately, the Council selected the no action alternative. Negative biological and ecological impacts may occur while gag is rebuilding if fishers specifically target spawning aggregations of gag, removing the more aggressive dominant males from the

population. However, the Council has selected several other actions in this amendment to rebuild the gag stock and reduce bycatch of gag while fishers are targeting other reef fish within the 10 year rebuilding period.

Adverse economic effects in the short term are expected to result from the more restrictive fishing regulations under the proposed rebuilding plan for gag. However, economic benefits resulting from larger yields following the rebuilding of the stock are expected in the long run. The proposed reduction of the recreational gag season is anticipated to result in reductions in net economic benefits to the recreational sector ranging from approximately $16.26 million to $17.98 million. For red grouper, recreational measures proposed are anticipated to be associated with consumer surplus increases estimated at approximately $1.07 million. The present value of losses in economic value expected to result from proposed commercial quota reductions are estimated at $472,167, based on a 3% discount rate. However, economic benefits stemming from the added protection to the gag stock during rebuilding are expected to result from these precautionary reductions in the long run. Similarly, long-term positive economic effects are anticipated to result from the added protection afforded to gag due to the suspension of multi-use red grouper allocations while gag is rebuilding. The preferred commercial gag size limit reduction included in this amendment is expected to result in limited positive economic effects due to fishermen's preference for larger gag. No economic effects are expected to result relative to time and area closures because the Council elected to take no action. Nor are economic effects anticipated to result from commercial accountability measures because accountability measures are already in place; this action removed the redundant quota closure measure, leaving the existing individual fishing quota program to serve as the accountability measure. Proposed accountability measures for the recreational sector would add an overage adjustment when the gag or red grouper stocks are overfished and under a rebuilding plan. Overage adjustments, which would result in the implementation of more restrictive regulations, are thus anticipated to be associated with adverse economic effects.

Given the primary purpose of this amendment to decrease or end overfishing of gag so that the stock can begin to rebuild, the primary mechanism to achieve this purpose is to decrease effort targeting gag. Social impacts are expected to accrue as a result of the proposed actions that decrease effort targeting gag because fishing behavior is targeted directly. The adverse social impacts are expected to be more severe in the short-term while the rebuilding plan is in effect, but mitigated in the long-term as the stock rebuilds and effort restrictions are relaxed. Thus, social benefits are anticipated in the long-term as a result of the rebuilding plan.

Recreational fishermen will be most impacted by the shortened gag fishing season. Although positive effects are expected from increasing the red grouper bag limit, lessening the effort restrictions on red grouper is not expected to offset equivalently the impacts from shortening the gag season. Substantial negative impacts may also accrue to the recreational sector should the proposed accountability measures be applied. These impacts would be indirect as they would occur only if the recreational sector exceeds its quota, thereby triggering the accountability measures.

Commercial fishermen will be most impacted by the decrease in gag quota. It is possible that adverse impacts may occur from the suspension of the multi-use IFQ provision and decrease to the minimum commercial size limit for gag, however these impacts would be minor. Because commercial harvest of gag and red grouper are managed under an IFQ program, accountability measures are already in place for the commercial sector. Thus, the action proposes to remove the redundant quota closure accountability measure that is not considered necessary to prevent the harvest from exceeding the shallow-water grouper annual catch limits.

Comparison of the biological, physical, economic, and social impacts from the selected Preferred Alternatives relative to no action.

Action &Preferred Alternative	Anticipated Impacts/Effects on Environmental Components		
	Biological/Physical	**Economic**	**Social**
1: Rebuilding Plan: 10 years	Indirect Positive	Indirect Negative	Indirect Negative
2.1: Gag Recreational Season (July 1 – Oct 31)	Positive	Negative short-term.	Negative short-term.
2.2: Red Grouper Recreational Bag limit (increase to 4 fish/person)	Negative, but negligible	Positive to Negligible short-term	Positive to Negligible short-term
3: Commercial Gag Quota Reduction for Discards	Positive	Negative short-term; Positive long-term.	Negative short-term; Positive long-term.
4: Suspension of IFQ Multi-use provision	Indirect Positive	Negative short-term; Positive long-term.	Negative short-term (Minor to None)
5: Reduction of Commercial gag size limit	Positive	Limited positive	Commercial longliners: None. Limited positive for others.
6: Time & Area Closures: No action	None		
7.1: Commercial Accountability Measures	None (removes redundant accountability measures)		
7.2: Recreational Accountability Measures	Indirect Positive	Negative	Indirect Negative
Combined Impacts	Positive benefits for gag but unintended consequences possible if fishing effort shifts to other stocks.	Negative in the short-term; Positive in the long-term.	Negative in the short-term; Positive in the long-term.

The proposed actions to shorten the recreational season and to decrease the commercial quota are expected to incur the greatest negative impacts to the recreational and commercial sector, respectively. Each action decreases the amount of gag that may be caught through a measure appropriate to each sector. Given the alternatives for each action, the Council selected the alternative that would incur the least social disruption while still meeting the required thresholds of the rebuilding plan. Additionally, no action was selected to modify or create additional time and area closures. Thus the Council elected to avoid the additional impacts that would have been incurred through additional time and area closures.

In summary, the goal of ending overfishing, by nature, aims to provide benefits for the biological and ecological environment by reducing fishing effort. Essentially, this means socio-economic impacts are deemed acceptable or necessary in the short-term so as to provide long-term benefits to all components of the environment: physical, biological/ecological, economic, and social. Although fishing effort is not the only impact on the marine environment, fishing effort is the only factor within the Council's domain to

regulate. As such, the Council considered multiple alternatives for each proposed action to be taken and selected alternatives that negotiate the mandates of National Standard 1 (achieve optimum yield while avoiding overfishing), with National Standard 8 (consider the importance of fishery resources to fishing communities).

1 Introduction

1.1 Background

Gag and red grouper are the two most abundant grouper species in the Gulf of Mexico. In 2008, these two species accounted for 93% of the recreational grouper landings reported by Marine Recreational Fisheries Statistics Survey (MRFSS), and 80% of commercial grouper landings in the Gulf (Personal communication from the National Marine Fisheries Service (NMFS), Fisheries Statistics Division, Silver Spring, MD). The commercial sector accounts for the majority of red grouper landings, while the recreational sector accounts for the majority of gag landings. Both of these groupers are protogynous hermaphrodites, meaning that they start life as females and change sex to males later in life.

Gag

Management of gag uses a variety of management measures. The recreational and commercial allocation of the stock annual catch limit was set in Amendment 30B where 61% of the gag total allowable catch is allocated to the recreational sector and 39% is allocated to the commercial sector (GMFMC 2008a). The commercial grouper fishing sector is managed under an individual fishing quota program that has been in effect since January 1, 2010. Prior to 2010, the grouper portion of the reef fish fishery was managed with quotas, seasonal and area closures, and minimum size limits. Most gag caught by the commercial sector is with handlines (Table 1.1.1) Management of the recreational sector has used traditional measures such as minimum size limits, aggregate and species-specific bag limits, and a closed season (February 1-March 31). Both sectors are subject to area closures.

Table 1.1.1. Commercial gag landings in pounds gutted weight.

Year	Commercial Longline	Commercial Handline	Other	Total Landings
2000	571,801 (25%)	1,589,245 (71%)	86,429 (4%)	2,247,476
2001	946,629 (31%)	2,052,522 (66%)	99,866 (3%)	3,099,017
2002	1,021,695 (34%)	1,880,834 (63%)	61,702 (2%)	2,964,231
2003	1,094,008 (42%)	1,435,412 (55%)	65,133 (3%)	2,594,553
2004	1,097,933 (38%)	1,726,429 (60%)	72,619 (3%)	2,896,980
2005	871,726 (35%)	1,535,458 (62%)	68,958 (3%)	2,476,141
2006	516,528 (38%)	798,282 (58%)	55,175 (4%)	1,369,985
2007	475,295 (38%)	741,954 (59%)	44,931 (4%)	1,262,181
2008	340,626 (27%)	865,382 (69%)	42,473 (3%)	1,248,481

The "other" category is predominantly trawl in the early years (60-70s), trap in the middle years (80s), and spear in the later years (90s-00s).
(Source: personal communication, Brian Linton, Southeast Fisheries Science Center).

The gag stock has been assessed since 1997 when a stock assessment concluded that gag, although not overfished, may be undergoing overfishing (Schirripa and Legault 1997, GMFMC 1998). In 2006 and 2007, the SEDAR 10 (2006) assessment and a subsequent 2007 reanalysis with corrected dead discard estimates (NMFS 2007) concluded that the gag stock was undergoing overfishing and had been since the 1970s. In response to the SEDAR 10 findings, Amendment 30B (GMFMC 2008a) created new 2009 regulations that reduced the gag recreational bag limit. In addition, a commercial gag quota of 1.32 million pounds gutted weight was adopted, representing a 41% decrease from the average landings during 2004-2006.

A 2009 update stock assessment of the Gulf gag stock (SEDAR 2009) indicated the gag stock had diminished. This decline could also be seen in commercial and recreational harvests (Tables 1.1.1 and 1.1.2). A large part of the decline was attributed to an episodic mortality event in 2005 (most likely associated with red tide) that resulted in an additional 18% of the gag stock being killed in addition to the normal natural and fishing mortalities[1]. The 2008 spawning stock biomass was estimated to be 47% of its minimum stock size threshold and the mean fishing mortality rate during 2005-2007 was estimated to be nearly 2.5 times higher than the maximum fishing mortality threshold. Based on these results, the NMFS Regional Administrator notified the Council on August 11, 2009 of his determination that the gag stock was both overfished and undergoing overfishing. In response and in line with Magnuson-Stevens Act National Standard Guidelines, the Council initiated Amendment 32 to the subject FMP to address this overfishing and develop a stock rebuilding plan.

Table 1.1.2. Recreational gag landings in pounds gutted weight.

Year	Recreational Gag Landings (pounds)
2000	4,503,759
2001	3,710,284
2002	4,078,416
2003	3,434,862
2004	4,491,715
2005	3,513,119
2006	2,286,345
2007	2,231,784
2008	3,009,777

(Source: personal communication, Brian Linton, SEFSC).

The Council's Scientific and Statistical Committee (SSC) reviewed the update stock assessment (SEDAR 2009) to make an allowable biological catch recommendation to the Council. Based on concerns expressed by the SSC and summarized in NMFS (2010a), the SSC asked for revised stock projections using 2009 landings estimates, which were provided for review in May 2010 (NMFS 2010b). After reviewing these estimates, the SSC recommended the 2011 acceptable biological catch be decreased considerably from 3.62 million pounds (MP) to 1.17 MP. Because of the time needed to revise the assessment update, the Council found it could not complete Amendment 32 in time for subsequent rulemaking to be implemented before December 1, 2010, when the 2011 gag individual fishing quota allocation is announced. Therefore, the Council requested NMFS develop an interim rule to set the gag quota at 390,000 pounds, suspend the red grouper multi-use individual fishing quota shares to preclude their use to harvest gag, and set the recreational harvest to zero until recreational measures could be implemented in Amendment 32. However, in the course of developing management alternatives for gag, potential discrepancies in commercial and recreational estimates of discards were discovered[2]. The

[1] Personal communication, Brian Linton, SEFSC, 75 Virginia Beach Drive, Miami, FL 33149

[2] Similar issues about how dead discards were treated in the red grouper assessment were discussed by the Council at its August 2010 meeting. However, because of differences in how dead discards were estimated, the same concerns were not triggered for red grouper. The Council did request NMFS to examine the effects of using observer- versus logbook-based commercial discards in the assessment, but did not ask the assessment itself be reexamined. A report from NMFS indicated these differences had little effect on the assessment outcome (Walter 2011)

Council discussed these discrepancies at their August 2010 meeting and agreed another review of the gag assessment would be in order and asked it be conducted in the fall or winter of 2010. Given this delay and the uncertainty regarding the status of the gag stock, the Council revised their interim rule request to limit the commercial harvest to 100,000 pounds. The Council felt that some commercial harvest was necessary so gag that would otherwise be regulatory discards under a zero harvest restriction could be retained and counted towards the quota. The other two actions remained unchanged from the original interim rule request. This rule, referenced in this document as the 2010 interim rule, was published on December 1, 2010, with an effective date of January 1, 2011 (75 FR 74650).

In December 2010, the gag update assessment was rerun to address the dead discard issues discussed above. The results of the rerun indicated the spawning stock biomass was only slightly lower than the earlier assessment runs and the fishing mortality estimates were nearly unchanged except for 2008, the last year of the assessment[3]. However, 2008, the terminal year, was not used to calculate the current fishing mortality rate ($F_{current}$). Yield streams for the overfishing limit (OFL), rebuilding F ($F_{rebuild}$), and F associated with the optimum yield (F_{OY}) slightly increased for each year, but the rerun did not change the stock status from overfished and undergoing overfishing (Table 1.4.1.1). Based on this review, the Council subsequently requested a second interim rule to replace the current rule. This rule established a commercial quota of 430,000 pounds gutted weight, continue the suspension of the use of red grouper multi-use allocation to harvest gag, and have a recreational season from September 16 to November 15.

Red grouper

Management of red grouper differs between the commercial and recreational sectors. For the commercial grouper fisheries, an individual fishing quota system has been in effect since January 1, 2010. Under this system, percentages of the commercial grouper quotas are allocated to individual fishing quota participants who can then fish or trade their shares. Additionally, most red grouper are caught with longlines (Table 1.1.3) which are managed with minimum depth restrictions. Management of the recreational sector consists of minimum size limits, aggregate and species-specific bag limits, and a closed season (February 1-March 31). Both sectors are subject to a seasonal area closure of the Edges (i.e., January 1-April 30). In addition, all reef fish fishing is prohibited year round in two restricted fishing areas in the northwestern Gulf (Madison-Swanson and Steamboat Lumps), as well as the Tortugas Ecological Reserves off of the Florida Keys. These area closures are explained in more detail in Section 3.1.

[3] Draft Standing, Special Spiny Lobster and Special Reef Fish Scientific and Statistical Committee, January 18-21, 2011,Committee Summary, Gulf of Mexico Fishery Management Council, Tampa, Florida

Table 1.1.3. Commercial red grouper landings in pounds gutted weight.

Year	Commercial Longline	Commercial Handline/Bandit	Fish Trap*, Spear and other	Total
2005	3,324,830 (61%)	1,458,048 (27%)	654,683 (12%)	5,437,561
2006	3,141,704 (61%)	1,393,400 (27%)	627,423 (12%)	5,162,527
2007	2,077,544 (56%)	1,584,746 (43%)	46,572 (1%)	3,708,862
2008	2,850,100 (60%)	1,859,847 (39%)	29,347 (1%)	4,739,294
2009	1,132,994 (31%)	2,467,753 (67%)	56,092 (2%)	3,656,839

* Fish traps were banned in February 2007
(Source: January 2011 re-run of red grouper assessment and projections – Walter 2011).

Red grouper were declared overfished and placed under a rebuilding plan in 2004. The stock had been found to be overfished and undergoing overfishing in both a 1999 stock assessment (Schirripa and Legault 1999) and a subsequent 2002 assessment (NMFS 2002a). However, the 2002 assessment indicated that the stock was recovering faster than previously estimated, most likely due to a strong recruitment year class in 1997. Management measures implemented in 2004 as part of the rebuilding plan included a reduced aggregate commercial shallow-water grouper quota, a red grouper quota within the aggregate quota, and a recreational bag limit of two red grouper within the five fish aggregate grouper bag limit. In 2005, stepped commercial grouper trip limits (10,000, 7,500, and 5,500 pounds) were adopted for the commercial fishery, and the recreational red grouper bag limit was further reduced to 1 fish. For 2006 through 2009, a fixed 6,000-pound commercial grouper trip limit was adopted. In 2007, the SEDAR 12 assessment confirmed that the red grouper stock was overfished in the 1990s, but estimated that the red grouper spawning stock had rebuilt to biomass at maximum sustainable yield (SSB_{MSY}) starting in 1999, and that the 2005 stock status was close to its optimum yield spawning stock biomass level. Consequently, the red grouper rebuilding plan could be replaced with a management policy to maintain the stock at its optimum yield level.

The 2009 update stock assessment of the red grouper stock in the Gulf of Mexico (SEDAR 2009a) indicated the stock continues to be neither overfished or undergoing overfishing. However, the stock has declined since 2005 and is reflected with reduced commercial and recreational landings since that time (Tables 1.1.3 and 1.1.4). A large part of this decline was attributed to an episodic mortality event in 2005 (most likely associated with red tide), that resulted in a approximately 20% of the red grouper stock being killed on top of the normal natural and fishing mortalities (personal communication, Clay Porch, SEFSC[4]). The annual catch target currently in effect was found to exceed the optimum yield level for 2010 from the model runs preferred by the Council's SSC. After reviewing the assessment update, the SSC asked that projections of the status of red grouper and gag be rerun using updated landings estimates for 2009. The SSC was concerned that projected 2009 and 2010 harvest levels based on the current total allowable catches were too high and did not reflect actual landings. The requested scenarios used the 'red tide, constant catchability' model for red grouper, used updated estimates for 2009 landings data, and either set the 2010 harvest level equal to the current TAC or equal to 2009 estimated landings (NMFS 2010). The resulting analysis reported the present annual catch target (i.e., 7.57 MP GW) exceeded the 2011 acceptable biological catch level set by the SSC (6.31 MP GW) and 2011 optimum yield level (i.e., 5.68 MP GW) selected by the Council as the level to set the annual catch target.

[4] Dr. Clay Porch, NMFS Southeast Fisheries Science Center, Miami, Florida

Table 1.1.4. Recreational red grouper landings in pounds gutted weight. (Source: Walter 2011)

Year	Recreational Red Grouper Landings (pounds)
2000	2,171,627
2001	1,380,664
2002	1,687,802
2003	1,335,259
2004	3,152,707
2005	1,440,810
2006	960,889
2007	1,016,655
2008	892,925
2009	978,325

As a consequence of this work, the Council developed a framework action that adjusted the total allowable catch from the existing 7.57 million pounds to 5.68 million pounds gutted weight. This total allowable catch was in accordance with the Council's SSC determination of an acceptable biological catch recommendation, which was 85 percent of the overfishing limit defined in the 2009 red grouper stock assessment update. Based on the 76:24 ratio for the commercial and recreational allocation of red grouper, subsequent rule making adjusted the commercial quota to 4.32 million pounds gutted weight.

1.2 Purpose and Need

The actions in this amendment meet several purposes and needs necessary to manage shallow-water grouper stocks. The primary purpose of this amendment is to decrease or end overfishing of gag so that the stock can begin to rebuild. This purpose has been temporarily addressed in an interim rule, however, long-term measures are needed to allow this stock to recover. One secondary purpose of this action is to develop red grouper management measures that will allow the optimum yield of red grouper to continue to be caught as the stock recovers from a 2005 episodic mortality event. These actions would be consistent with the goals and objectives of the Council's plan to manage gag and red grouper to achieve the mandates of the Magnuson-Stevens Act. Another secondary purpose of this amendment is to minimize gag bycatch such that landings for the shallow-water grouper harvest are consistent to the extent practicable with both National Standard 1 (prevent overfishing and achieve optimum yield) and National Standard 9 (minimize bycatch and bycatch mortality). The Magnuson-Stevens Act requires NMFS and regional fishery management councils to prevent overfishing, and achieve, on a continuing basis, the optimum yield from federally managed fish stocks. These mandates are intended to ensure fishery resources are managed for the greatest overall benefit to the nation, particularly with respect to providing food production and recreational opportunities, and protecting marine ecosystems. To further this goal, the Magnuson-Stevens Act requires fishery managers to specify through rebuilding plans their strategy for rebuilding overfished stocks to a sustainable level within a certain time frame, provide accountability measures to minimize the risk of overharvest, to minimize bycatch and bycatch mortality to the extent practicable, and to ensure that management decision are based on the best available scientific information. The recreational and commercial allocation of the stock annual catch limit will remain consistent with Amendment 30B.

1.3 History of Management

The following summary describes management actions that affect the reef fish fishery in the Gulf. The summary focuses on management of grouper species and on data collection provisions in the fishery management plan.

The Reef Fish Fishery Management Plan and environmental impact statement (EIS) were implemented in November 1984. The regulations, designed to rebuild declining reef fish stocks, included prohibitions on the use of fish traps, roller trawls, and powerhead-equipped spear guns within an inshore stressed area and directed NMFS to develop data reporting requirements in the reef fish fishery.

In July 1985, the Florida Marine Fisheries Commission (now FWCC) established a Florida state regulation to set a minimum size limit of 18 inches total length for red grouper, gag, yellowfin grouper, Nassau grouper, and jewfish (goliath grouper). In December 1986, the FWCC set a state recreational bag limit of five grouper per person per day, with an off-the-water possession limit of 10 per person, for any combination of groupers excluding rock hind and red hind.

Amendments

Amendment 1 (EA/RIR/IRFA), implemented in 1990, set objectives to stabilize long-term population levels of all reef fish species by establishing a survival rate of biomass into the stock of spawning age fish to achieve at least 20% spawning stock biomass per recruit (SSBR) by January 1, 2000. Among the grouper management measures implemented were:

- Set a 20-inch total length minimum size limit on red grouper, Nassau grouper, yellowfin grouper, black grouper, and gag;
- Set a 50-inch TL minimum size limit on goliath grouper (jewfish);
- Set a five-grouper recreational daily bag limit;
- Set an 11.0 MP commercial quota for grouper, with the commercial quota divided into a 9.2 MP shallow-water grouper quota and a 1.8 MP deep-water grouper quota. Shallow-water grouper were defined as black grouper, gag, red grouper, Nassau grouper, yellowfin grouper, yellowmouth grouper, rock hind, red hind, speckled hind, and scamp. Scamp would be applied to the deepwater grouper quota once the shallow-water grouper quota was filled. Deep-water grouper were defined as misty grouper, snowy grouper, yellowedge grouper, warsaw grouper, and scamp once the shallow-water grouper quota was filled. Goliath grouper were not included in the quotas;
- Allowed a two-day possession limit for charter vessels and headboats on trips that extend beyond 24 hours, provided the vessel has two licensed operators aboard as required by the U.S. Coast Guard, and each passenger can provide a receipt to verify the length of the trip. All other fishermen fishing under a bag limit were limited to a single day possession limit;
- Established a framework procedure for specification of total allowable catch (TAC to allow for annual management changes;
- Established a longline and buoy gear boundary at approximately the 50-fathom depth contour west of Cape San Blas, Florida, and the 20-fathom depth contour east of Cape San Blas, inshore of which the directed harvest of reef fish with longlines and buoy gear was prohibited, and the retention of reef fish captured incidentally in other longline operations (e.g., sharks) was limited to the recreational daily bag limit. Subsequent changes to the longline/buoy boundary could be made through the framework procedure for specification of TAC;

- Limited trawl vessels (other than vessels operating in the unsorted groundfish fishery) to the recreational size and daily bag limits of reef fish;
- Established fish trap permits, allowing up to a maximum of 100 fish traps per permit holder;
- Prohibited the use of entangling nets for directed harvest of reef fish. Retention of reef fish caught in entangling nets for other fisheries was limited to the recreational daily bag limit;
- Established the fishing year to be January 1 through December 31;
- Extended the stressed area to the entire Gulf coast; and
- Established a commercial reef fish vessel permit.

Amendment 2 (EA/RIR/IRFA), implemented in 1990, prohibited the harvest of goliath grouper to provide complete protection for this species in federal waters in response to indications that the population abundance throughout its range was greatly depressed. The harvest prohibition was initially implemented by emergency rule.

Amendment 3 (EA/RIR/IRFA), implemented in July 1991, provided additional flexibility in the annual framework procedure for specifying TAC by allowing the target date for rebuilding an overfished stock to be changed. It revised the FMP's primary objective from a 20% SSBR target to a 20% spawning potential ratio (SPR). The amendment also transferred speckled hind from the shallow-water grouper quota category to the deepwater grouper quota category.

Amendment 4 (EA/RIR/IRFA), implemented in May 1992, established a moratorium on the issuance of new commercial reef fish permits for a maximum period of three years. Amendment 4 also changed the time of year TAC is specified from April to August and included additional species in the reef fish management unit.

Amendment 5 (SEIS/RIR/IRFA), implemented in February 1994, established a fish trap endorsement for vessel permits of permittees who had logbook landings of reef fish from fish traps in 1991 or 1992 through November 19, 1992, and established a three-year moratorium during which those endorsements would be non-transferable. The amendment also required that traps must be returned to shore at the end of each fishing trip; that each trap must be individually buoyed, or if fished in a trawl (several traps connected by a submerged line) a floating buoy is required at each end of the trawl; and prohibited the possession of magnesium pop-up devices. The amendment also created a special management zone with gear restrictions off the Alabama coast, created a framework procedure for establishing future special management zones, required that all finfish except for oceanic migratory species be landed with head and fins attached, and closed the region of Riley's Hump (near Dry Tortugas, Florida) to all fishing during May and June to protect mutton snapper spawning aggregations.

Amendment 6 (EA/RIR/IRFA), implemented in June 1993, extended the provisions of an emergency rule for red snapper endorsements for the remainder of 1993 and 1994, and allowed the red snapper trip limits for qualifying and non-qualifying permitted vessels to be changed under the framework procedure for specification of TAC.

Amendment 7 (EA/RIR/IRFA), implemented in February 1994, established reef fish dealer permitting and record keeping requirements, allowed transfer of fish trap permits and endorsements between immediate family members during the fish trap permit moratorium, and allowed transfer of other reef fish permits or endorsements in the event of the death or disability of the person who was the qualifier for the permit or endorsement. A proposed provision of this amendment that would have required permitted

vessels to sell harvested reef fish only to permitted dealers was disapproved by the Secretary of Commerce and was not implemented.

Amendment 8 (EA/RIR/IRFA), proposed to be implemented in 1996, would have established an individual transferable quota system in the commercial red snapper fishery. A final rule was published in November 1995 to implement the system effective April 1, 1996, but the individual transferable quota system was not implemented. The Sustainable Fisheries Act of 1996 repealed the system and placed a moratorium on any new individual fishing quota program until after October 1, 2000.

Amendment 9 (EA/RIR/IRFA), implemented in July 1994, provided for collection of red snapper landings and eligibility data from commercial fishermen for the years 1990 through 1992 to qualify for shares under the individual transferable quota system in **Amendment 8**. This amendment also extended the reef fish permit moratorium and red snapper endorsement system through December 31, 1995, in order to continue the existing interim management regime until longer term measures could be implemented.

Rejected Amendment 10 was developed in 1994 but was not submitted to NMFS. **Amendment 5** had established a deadline to qualify for fish trap endorsements of November 19, 1992, but the final rule implementing the endorsements and three-year moratorium did not take effect until February 7, 1994. In the interim, NMFS continued to process applications for fish trap permits, and neither NMFS nor the Council provided public notification of the impending moratorium. On February 7, 1994, 421 vessels that had been issued fish trap tags on or before February 7 became ineligible to continue in the fish trap fishery, of which 54 of those vessels had fish trap landings between November 19, 1992 and February 7, 1994. Amendment 10 was drafted to consider changing the endorsement eligibility requirement to allow those vessels with trap landings through February 7, 1994 to qualify. However, in July 1994 the Council voted to reject the amendment.

Amendment 11 (EA/RIR/IRFA) was partially approved by NMFS and implemented in January 1996. The six approved provisions were: (1) limit sale of Gulf reef fish by permitted vessels to permitted reef fish dealers; (2) require that permitted reef fish dealers purchase reef fish caught in Gulf federal waters only from permitted vessels; (3) allow transfer of reef fish permits and fish trap endorsements in the event of death or disability; (4) implement a new reef fish permit moratorium for no more than five years or until December 31, 2000, while the Council considers limited access for the reef fish fishery; (5) allow permit transfers to other persons with vessels by vessel owners (not operators) who qualified for their reef fish permit; and, (6) allow a one-time transfer of existing fish trap endorsements to permitted reef fish vessels whose owners have landed reef fish from fish traps in federal waters, as reported on logbooks received by the Science and Research Director of NMFS from November 20, 1992 through February 6, 1994. NMFS disapproved a proposal to redefine optimum yield from 20% SPR (the same level as overfishing) to an SPR corresponding to a fishing mortality rate of F0.1 until an alternative operational definition that optimizes ecological, economic, and social benefits to the Nation could be developed. In April 1997, the Council resubmitted the optimum yield definition with a new proposal to redefine optimum yield as 30% SPR. The resubmission document was disapproved by NMFS.

Amendment 12 (EA/RIR/IRFA), implemented in January 1997, reduced the bag limit for greater amberjack to 1 fish and established a 20-fish aggregate bag limit for reef fish species for which there is no other bag limit.

Amendment 13 (EA/RIR/IRFA), implemented in September 1996, further extended the red snapper endorsement system through the remainder of 1996 and, if necessary, through 1997, in order to give the Council time to develop a permanent limited access system that was in compliance with the new provisions of the Magnuson-Stevens Act.

Amendment 14 (EA/RIR/IRFA), 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 thereafter only upon death or disability of the endorsement holder, to another vessel owned by the same entity, or to any of the 56 individuals who were fishing traps after November 19, 1992 and were excluded by the moratorium; and prohibited the use of fish traps west of Cape San Blas, Florida. The amendment also provided the Regional Administrator (RA) of NMFS with authority to reopen a fishery prematurely closed before the allocation was reached, and modified the provisions for transfer of commercial reef fish vessel permits. In addition, the amendment prohibited the harvest or possession of Nassau grouper in the Gulf Exclusive Economic Zone (EEZ), consistent with similar prohibitions in Florida state waters, the south Atlantic EEZ, and the Caribbean EEZ.

Amendment 15 (EA/RIR/IRFA), implemented in January 1998, prohibited harvest of reef fish from traps other than permitted reef fish traps, stone crab traps, or spiny lobster traps, and closed the commercial greater amberjack fishery Gulf-wide during the months of March, April, and May.

Amendment 16A (EA/RIR/IRFA), submitted to NMFS in June 1998, was partially approved and implemented on January 10, 2000. The approved measures provided: (1) the possession of reef fish exhibiting the condition of trap rash on board any vessel with a reef fish permit that is fishing spiny lobster or stone crab traps is prima facie evidence of illegal trap use and is prohibited except for vessels possessing a valid fish trap endorsement; (2) NMFS establish a system design, implementation schedule, and protocol to require implementation of a vessel monitoring system (VMS) for vessels engaged in the fish trap fishery, with the cost of the vessel equipment, installation, and maintenance to be paid or arranged by the owners as appropriate; and, (3) fish trap vessels submit trip initiation and trip termination reports. Prior to implementing this additional reporting requirement, there will be a one-month fish trap inspection/compliance/education period, at a time determined by the RA and published in the *Federal Register*. During this window of opportunity, fish trap fishermen will be required to have an appointment with NMFS law enforcement for the purpose of having their trap gear, permits, and vessels available for inspection. The disapproved measure was a proposal to prohibit fish traps south of 25.05 degrees north latitude beginning February 7, 2001. The status quo 10-year phase-out of fish traps in areas in the Gulf EEZ was therefore maintained.

Amendment 16B (EA/RIR/IRFA), implemented in November 1999 set a recreational daily bag limit of one speckled hind and one warsaw grouper per vessel, with the prohibition on the sale of these species when caught under the bag limit.

Generic Sustainable Fisheries Act Amendment (EA/RIR/IRFA), partially approved and implemented in November 1999, set the Maximum Fishing Mortality Threshold (MFMT) for most reef fish stocks at $F_{30\% \text{ SPR}}$. Estimates of maximum sustainable yield, Minimum Stock Size Threshold (MSST), and optimum yield were disapproved because they were based on SPR proxies rather than biomass based estimates.

Amendment 17 (EA/RIR/IRFA), was submitted to NMFS in September 1999, and was implemented on August 10, 2000. This amendment extended the commercial reef fish permit moratorium for another five years, from its previous expiration date of December 31, 2000 to December 31, 2005, unless replaced

sooner by a comprehensive controlled access system. The purpose of the moratorium is to provide a stable environment in the fishery necessary for evaluation and development of a more comprehensive controlled access system for the entire commercial reef fish fishery.

Amendment 18A (EA/RIR/IRFA) was implemented on September 8, 2006, except for VMS requirements which were implemented May 6, 2007. Amendment 18A addresses the following: (1) prohibits vessels from retaining reef fish caught under recreational bag/possession limits when commercial quantities of Gulf reef fish are aboard, (2) adjusts the maximum crew size on charter vessels that also have a commercial reef fish permit and a United States Coast Guard certificate of inspection (COI) to allow the minimum crew size specified by the COI when the vessel is fishing commercially for more than 12 hours, (3) prohibits the use of reef fish for bait except for sand perch or dwarf sand perch, (4) requires devices and protocols for the safe release in incidentally caught endangered sea turtle species and smalltooth sawfish, (5) updates the TAC procedure to incorporate the Southeast Data Assessment and Review (SEDAR) assessment methodology, (6) changes the permit application process to an annual procedure and simplifies income qualification documentation requirements, and (7) requires electronic VMS aboard vessels with federal reef fish permits, including vessels with both commercial and charter vessel permits.

Amendment 19 (FSEIS/RIR/IRFA), also known as the Generic Amendment Addressing the Establishment of the Tortugas Marine Reserves, or Generic Essential Fish Habitat (EFH) Amendment 2, was implemented on August 19, 2002. This amendment establishes two marine reserves off the Dry Tortugas where fishing for any species and anchoring by fishing vessels is prohibited.

Amendment 20 (EA/RIR/IRFA), implemented July 2003, established a three-year moratorium on the issuance of charter and headboat vessel permits in the recreational for-hire reef fish and coastal migratory pelagic fisheries in the Gulf EEZ.

Amendment 21 (EA/RIR/IRFA), implemented in July 2003, continued the Steamboat Lumps and Madison-Swanson reserves for an additional six years, until June 2010. In combination with the initial four-year period (June 2000-June 2004), this allowed a total of ten years in which to evaluate the effects of these reserves and to provide protection to a portion of the gag spawning aggregations.

Amendment 22 (SEIS/RIR/IRFA), implemented July 5, 2005, specified bycatch reporting methodologies for the reef fish fishery.

Amendment 23 (SEIS/RIR/IRFA), implemented July 8, 2005, established a rebuilding plan for vermilion snapper, including an 11 inch total length minimum size limit, a 10-fish vermilion snapper bag limit within the 20-reef fish aggregate bag limit, and an April 22 through May 31 closed season for the commercial fishery.

Amendment 24 (EA/RIR/IRFA), implemented on August 17, 2005, replaced the commercial reef fish permit moratorium that was set to expire on December 31, 2005 with a permanent limited access system.

Amendment 25 (SEIS/RIR/IRFA), implemented on June 15, 2006, replaced the reef fish for-hire permit moratorium that expired in June 2006 with a permanent limited access system.

Amendment 26 (SEIS/RIR/IRFA), implemented on January 1, 2007, established an individual fishing quota system for the commercial red snapper fishery.

Amendment 27 (SEIS/RIR/IRFA), implemented February 28, 2008, except for reef fish bycatch reduction measures that became effective on June 1, 2008. This amendment addressed overfishing and stock rebuilding for red snapper. It also required the use of non-stainless steel circle hooks when using natural baits to fish for Gulf reef fish effective June 1, 2008, and required the use of venting tools and dehooking devices when participating in the commercial or recreational reef fish fisheries effective June 1, 2008.

Amendment 28 is currently under development. It is intended to address grouper allocation issues.

Amendment 29 (EA/RIR/IRFA), implemented January 1, 2010, established an individual fishing quota system for the commercial grouper and tilefish fisheries.

Amendment 30A (SEIS/RIR/IRFA), implemented August 2008, was developed to stop overfishing of gray triggerfish and greater amberjack. The amendment established ACLs and accountability measures (AMs) for greater amberjack and gray triggerfish. For greater amberjack, it modified the rebuilding plan, increased the recreational minimum size limit, set a zero bag limit for captain and crew of for-hire vessels, and set commercial and recreational quotas. For gray triggerfish, it increased the commercial and recreational minimum size limit and set a commercial quota.

Amendment 30B (FEIS/RIR/IRFA), implemented May 2009, proposes to end overfishing of gag, revise red grouper management measures as a result of changes in the stock condition, establish ACLs and AMs for gag and red grouper, manage shallow-water grouper to achieve optimum yield, and improve the effectiveness of federal management measures. The amendment (1) defines the gag minimum stock size threshold and optimum yield; (2) set interim allocations of gag and red grouper between recreational and commercial fisheries; (3) makes adjustments to the gag and red grouper TACs to reflect the current status of these stocks; (4) establishes ACLs and AMs for the commercial and recreational red grouper fisheries, commercial and recreational gag fisheries, and commercial aggregate shallow-water grouper fishery; (5) adjusts recreational grouper bag limits and seasons; (6) adjusts commercial grouper quotas; (7) reduces the red grouper commercial minimum size limit; (8) replaces the one month commercial grouper closed season with a four month seasonal area closure at the Edges, a 390 square nautical mile area in the dominant gag spawning grounds; (9) eliminates the end date for the Madison-Swanson and Steamboat Lumps marine reserves; and (10) requires that vessels with federal commercial or charter reef fish permits comply with the more restrictive of state or federal reef fish regulations when fishing in state waters.

Amendment 31 (FEIS/RIR/IRFA), implemented May 26, 2010, establishes additional restrictions on the use of bottom longline gear in the eastern Gulf of Mexico in order to reduce bycatch of endangered sea turtles, particularly loggerhead sea turtles. The amendment (1) prohibits the use of bottom longline gear shoreward of a line approximating the 35-fathom contour from June through August; (2) reduces the number of longline vessels operating in the fishery through an endorsement provided only to vessel permits with a demonstrated history of landings, on average, of at least 40,000 pounds of reef fish annually with fish traps or longline gear during 1999-2007; and (3) restricts the total number of hooks that may be possessed onboard each reef fish bottom longline vessel to 1,000, only 750 of which may be rigged for fishing. The boundary line was initially moved from 20 to 50 fathoms by emergency rule effective May 18, 2009. That rule was replaced on October 16, 2009 by a rule under the Endangered Species Act moving the boundary to 35 fathoms and implementing the maximum hook provisions.

Regulatory Amendments, Emergency and Interim Rules

A July 1991 regulatory amendment, implemented November 12, 1991, provided a one-time increase in the 1991 quota for shallow-water grouper from 9.2 MP to 9.9 MP to provide the commercial fishery an opportunity to harvest 0.7 MP that was not harvested in 1990 [56 FR 58188].

A November 1991 regulatory amendment, implemented June 22, 1992, raised the 1992 commercial quota for shallow-water grouper to 9.8 MP after a red grouper stock assessment indicated that the red grouper SPR was substantially above the Council's minimum target of 20% [57 FR 21751].

An August 1999 regulatory amendment, implemented June 19, 2000, increased the commercial size limit for gag and black grouper from 20 to 24 inches TL, increased the recreational size limit for gag from 20 to 22 inches TL, prohibited commercial sale of gag, black, and red grouper each year from February 15 to March 15 (during the peak of gag spawning season), and established two marine reserves (Steamboat Lumps and Madison-Swanson) that are closed year-round to fishing for all species under the Council's jurisdiction [65 FR 31827].

An emergency rule, published February 15, 2005, established a series of trip limits for the commercial grouper fishery in order to extend the commercial fishing season. The trip limit was initially set at 10,000 pounds gutted-weight (GW). If on or before August 1 the fishery is estimated to have landed more than 50% of either the shallow-water grouper or the red grouper quota, then a 7,500 pound GW trip limit takes effect; and if on or before October 1 the fishery is estimated to have landed more than 75% of either the shallow-water grouper or the red grouper quota, then a 5,500 pound GW trip limit takes effect [70 FR 8037].

An interim rule, published July 25, 2005, proposed for the period August 9, 2005 through January 23, 2006, a temporary reduction in the recreational red grouper bag limit from two to one fish per person per day, in the aggregate grouper bag limit from five to three grouper per day, and a closure of the recreational fishery, from November - December 2005, for all grouper species [70 FR 42510]. These measures were proposed in response to an overharvest of the recreational allocation of red grouper under the Secretarial Amendment 1 red grouper rebuilding plan. The closed season was applied to all grouper in order to prevent effort shifting from red grouper to other grouper species and an increased bycatch mortality of incidentally caught red grouper. However, the rule was challenged by organizations representing recreational fishing interests. On October 31, 2005, a U.S. District Court judge ruled that an interim rule to end overfishing can only be applied to the species that is undergoing overfishing. Consequently, the reduction in the aggregate grouper bag limit and the application of the closed season to all grouper were overturned. The reduction in the red grouper bag limit to one per person and the November-December 2005 recreational closed season on red grouper only were allowed to proceed. The approved measures were subsequently extended through July 22, 2006 by a temporary rule extension published January 19, 2006 [71 FR 3018].

An October 2005 regulatory amendment, implemented January 1, 2006, established a 6,000 pound GW aggregate deepwater grouper and shallow-water grouper trip limit for the commercial grouper fishery, replacing the 10,000/7,500/5,500 step-down trip limit that had been implemented by emergency rule for 2005 [70 FR 77057].

A March 2006 regulatory amendment (GMFMC 2005a), implemented July 15, 2006, established a recreational red grouper bag limit of one fish per person per day as part of the five grouper per person

aggregate bag limit, and prohibited for-hire vessel captains and crews from retaining bag limits of any grouper while under charter [71 FR 34534]. An additional provision established a recreational closed season for red grouper, gag and black grouper from February 15 to March 15 each year (matching a previously established commercial closed season) beginning with the 2007 season.

An interim rule was implemented on January 1, 2009, at the request of the Council to reduce overfishing of gag pending implementation of permanent rules under Amendment 30B. Measures in the temporary rule: (1) established a two-fish gag recreational bag limit (recreational grouper aggregate bag limit remained at five fish); (2) adjusted the recreational closed season for gag to February 1 through March 31 (the recreational closed season for red and black groupers remained February 15 to March 15); (3) established a 1.32 MP commercial quota for gag; and (4) required operators of federally permitted Gulf commercial and for-hire reef fish vessels to comply with the more restrictive of federal or state reef fish regulations when fishing in state waters for red snapper, greater amberjack, gray triggerfish, and gag [71 FR 66878].

An emergency rule was implemented May 18, 2009 through October 28, 2009 prohibiting the use of bottom longline gear to harvest reef fish east of 85°30′ W longitude in the portion of the EEZ shoreward of the coordinates established to approximate a line following the 50–fathom (91.4–m) contour as long as the 2009 deepwater grouper and tilefish quotas are unfilled. After the quotas have been filled, the use of bottom longline gear to harvest reef fish in water of all depths east of 85°30′ W longitude are prohibited [74 FR 20229].

A rule under the Endangered Species Act was implemented October 16, 2009 that prohibits bottom longlining for Gulf reef fish east of 85°30’W longitude (near Cape San Blas, Florida) shoreward of the 35-fathom depth contour, and it restricts the number of hooks on board to 1,000 hooks per vessel with no more than 750 hooks being fished or rigged for fishing at any given time. The rule replaced the 50 fathom boundary emergency rule in order to relieve social and economic hardship on longline fishermen who were prevented from fishing for shallow-water grouper by the emergency rule, and to keep fishing restrictions consistent with the Amendment 31 actions in place while proposed Amendment 31 is reviewed. The rule was implemented after a Biological Opinion was completed by NMFS on the continued authorization of the Gulf reef fish fishery, as managed under the Reef Fish FMP. That opinion, which considered the proposed actions in Amendment 31, concluded that the continued authorization of the Gulf reef fish fishery was likely to adversely affect sea turtles and sawfish, but was not likely to jeopardize the continued existence of any listed species. An Incidental Take Statement was issued specifying the amount and extent of anticipated take on a three-year basis, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes [74 FR 53889].

In response to an uncontrolled oil spill resulting from the explosion on April 20, 2010 and subsequent sinking of the Deepwater Horizon oil rig approximately 36 nautical miles (41 statute miles) off the Louisiana coast, NMFS issued an emergency rule to temporarily close a portion of the Gulf of Mexico EEZ to all fishing [75 FR 24822]. The initial closed area extended from approximately the mouth of the Mississippi River to south of Pensacola, Florida and covered an area of 6,817 square statute miles. The coordinates of the closed area were subsequently modified periodically in response to changes in the size and location of the area affected by the spill. At its largest size on June 1, 2010, the closed area covered 88,522 square statute miles, or approximately 37 percent of the Gulf of Mexico EEZ. This closure was implemented for public safety.

An August 2010 regulatory amendment, implemented January 1, 2011, reduced the total allowable catch for red grouper from 7.57 million pounds gutted weight to 5.68 million pounds gutted weight, based on the optimum yield projection from a March 2010 re-run of the projections from the 2009 red grouper update assessment. Although the stock was found to be neither overfished nor undergoing overfishing, the update assessment found that spawning stock biomass levels had decreased since 2005, apparently due to an episodic mortality even in 2005 which appeared to be related to an extensive red tide that year. Bases on the 76%:34% commercial and recreational allocation of red grouper, the commercial quota was reduced from 5.75 to 4.32 million pounds gutted weight, and the recreational allocation was reduced from 1.82 to 1.36 million pounds gutted weight. No changes were made to the recreational fishing regulations as the recreational landings were already below the adjusted allocation in recent years.

On August 11, 2009, the Council was notified by NMFS that the Gulf of Mexico gag stock was both overfished and undergoing overfishing based on the results of the 2009 update stock assessment. Because management measures from Amendment 32 which address these issues could not be completed in time, an interim rule was published on December 1, 2010 [75 FR 74654], to reduce gag landings consistent with ending overfishing. This interim rule implemented conservative management measures while a rerun of the update stock assessment was being completed. At issue was the treatment of dead discarded fish in the assessment. The rule reduced the commercial quota to 100,000 pounds gutted weight, suspended the use of red grouper multi-use individual fishing quota allocation so it would not be used to harvest gag, and to temporarily halted the recreational harvest of gag until recreational fishing management measures being developed in Amendment 32 could be implemented to allow harvest at the appropriate levels.

The gag 2009 update stock assessment was rerun in December 2010 addressing the problems with discards identified earlier in 2010. This assessment was reviewed in January 2011 by the Council's Scientific and Statistical Committee and presented to the Council at their February 2011 meeting. The assessment indicated that the gag commercial quota implemented in the December 1, 2010, interim rule could be increased and that a longer recreational season could be implemented. In response, the Council requested an interim rule while they continued to work on long-term measures including a gag rebuilding plan in Amendment 32. The interim rule set the commercial gag quota at 430,000 pounds gutted weight (including the 100,000 pounds previously allowed) for the 2011 fishing year, and temporarily suspended the use of red grouper multi-use IFQ allocation so it cannot be used to harvest gag. It also set a two-month recreational gag fishing season from September 16 through November 15. This temporary rule is effective from June 1, 2011 through November 27, 2011, and can be extended for another 186 days [76 FR 31874].

Secretarial Amendments

Secretarial Amendment 1established a rebuilding plan, a 5.31 MP GW commercial quota, and a 1.25 MP GW recreational target catch level for red grouper. The amendment also reduced the commercial quota for shallow-water grouper from 9.35 to 8.8 MP GW and reduced the commercial quota for deepwater grouper from 1.35 to 1.02 MP GW. The recreational bag limit for red grouper was reduced to two fish per person per day. Rulemaking from this amendment was effective July 15, 2004 [69 FR 33315]. In this amendment bottom longlines were considered for movement out to 50 fathoms which had also been considered under Reef Fish Amendment 18.

Secretarial Amendment 2 was approved on July 3, 2003 [68 FR 39900] and specified a greater amberjack maximum sustainable yield as the yield associated with $F_{30\%\ SPR}$ (proxy for F_{MSY}) when the

stock is at equilibrium, optimum yield as the yield associated with an $F_{40\%\ SPR}$ when the stock is at equilibrium, maximum fishing mortality threshold equal to $F_{30\%SPR}$, and minimum stock size threshold equal to (1-M)*B_{MSY} or 75% of B_{MSY}. It also set a rebuilding plan limiting the greater amberjack harvest to 2.9 MP for 2003-2005, 5.2 MP for 2006-2008, 7.0 MP for 2009-2011, and 7.9 MP for 2012. This was expected to rebuild the stock in seven years. Regulations implemented in 1997 and 1998 (Amendments 12 and 15) were deemed sufficient to comply with the rebuilding plan so no new regulations were implemented. No rulemaking was developed from this amendment

Control Date Notices

Control date notices are used to inform fishermen that a license limitation system or other method of limiting access to a particular fishery or fishing method is under consideration. If a program to limit access is established, anyone not participating in the fishery or using the fishing method by the published control date may be ineligible for initial access to participate in the fishery or to use that fishing method. However, a person who does not receive an initial eligibility may be able to enter the fishery or fishing method after the limited access system is established by transfer of the eligibility from a current participant, provided the limited access system allows such transfer. Publication of a control date does not obligate the Council to use that date as an initial eligibility criteria. A different date could be used, and additional qualification criteria could be established. The announcement of a control date is primarily intended to discourage entry into the fishery or use of a particular gear based on economic speculation during the Council's deliberation on the issues. The following summarizes control dates that have been established for the Reef Fish FMP. A reference to the full *Federal Register* notice is included with each summary.

November 1, 1989 - Anyone entering the commercial reef fish fishery in the Gulf and South Atlantic after November 1, 1989, may not be assured of future access to the reef fish resource if a management regime is developed and implemented that limits the number of participants in the fishery [54 FR 46755].

November 18, 1998 - The Council is considering whether there is a need to impose additional management measures limiting entry into the recreational-for-hire (i.e., charter vessel and headboat) fisheries for reef fish and coastal migratory pelagic fish in the EEZ of the Gulf and, if there is a need, what management measures should be imposed. Possible measures include the establishment of a limited entry program to control participation or effort in the recreational-for-hire fisheries for reef fish and coastal migratory pelagic [63 FR 64031] (In Amendment 20 to the Reef Fish FMP, a qualifying date of March 29, 2001, was adopted).

July 12, 2000 - The Council is considering whether there is a need to limit participation by gear type in the commercial reef fish fisheries in the exclusive economic zone of the Gulf and, if there is a need, what management measures should be imposed to accomplish this. Possible measures include modifications to the existing limited entry program to control fishery participation, or effort, based on gear type, such as a requirement for a gear endorsement on the commercial reef fish vessel permit for the appropriate gear. Gear types which may be included are longlines, buoy gear, handlines, rod-and-reel, bandit gear, spear fishing gear, and powerheads used with spears [65 FR 42978].

October 15, 2004 – the Council is considering the establishment of an individual fishing quota program to control participation or effort in the commercial grouper fisheries of the Gulf. If an individual fishing quota program is established, the Council is considering October 15, 2004, as a possible control date regarding the eligibility of catch histories in the commercial grouper fishery [69 FR 67106].

December 31, 2008 – the Council voted to establish a control date for all Gulf commercial reef fish vessel permits. The control date will allow the Council to evaluate fishery participation and address any level of overcapacity. The establishment of this control date does not commit the Council or NOAA Fisheries Service to any particular management regime or criteria for entry into this fishery. Fishermen would not be guaranteed future participation in the fishery regardless of their entry date or intensity of participation in the fishery before or after the control date under consideration. Comments were requested by close of business April 17, 2009 [74 FR 11517].

1.4 Statement of Annual Catch Limits and Annual Catch Targets

1.4.1 Specification of Annual Catch Limit and Annual Catch Target

The protocol for setting the red grouper and gag annual catch limits and annual catch targets was established in Amendment 30B. Given 2009 update assessments of gag and red grouper, annual catch limits and annual catch targets needed to be reset for these species which is described here.

The overfishing thresholds for these species are based on the equilibrium fishing mortality rate that yields the maximum sustainable yield (GMFMC 2004a, 2008b). Thus, the overfishing limit (OFL) would be the yield associated with this fishing mortality rate. For gag, the SSC recommended an acceptable biological catch level, which the Council uses to set the sector specific annual catch limits, as the yield associated with the fishing mortality rate needed to rebuild the stock within 10 years. This is the maximum harvest rate allowed by the SSC under Section 302 of the Magnuson-Stevens Act and cannot be exceeded. This yield is greater than the yield associated with the fishing mortality rate needed to harvest the optimum yield which is the value selected in Amendment 30B as the basis for setting the sector specific annual catch targets (Table 1.4.1.1).

As with gag, the Council indicated in Amendment 30B that the red grouper annual catch limits would be based on the maximum fishing levels set by the SSC, which is the acceptable biological catch recommendation. Sector specific annual catch limits are the fraction of the acceptable biological catch recommendation allocated to each sector (Table 1.4.1.2). The Council also indicated in Amendment 30B that the annual catch target should be set at the yield based on the fishing mortality associated with optimum yield.

In January 2011, the Standing and Special Reef Fish SSC reviewed re-runs of the 2009 gag and red grouper update assessments. For gag, the SSC made acceptable biological catch recommendations for yields through 2015, corresponding to the first five years of a ten-year rebuilding plan. For red grouper, which is not overfished or considered undergoing overfishing, the Committee provided acceptable biological catch recommendations only through 2012, with the intent that the catch levels remain at the 2012 levels until a new assessment is conducted (except for adjustments that may be needed due to accountability measures).

Table 1.4.1.1 shows the gag annual overfishing limit, acceptable biological catch, and optimum yield yields for 2011-2015+ years, plus the unadjusted sector allocations for the annual catch target. The 2011 catch limits were adopted through a 2011 interim rule and are not part of this amendment. They are included in this amendment for information only. This amendment specifies the 2012-2015+ annual catch limits and annual catch targets along with the unadjusted sector allocations of the annual catch targets are adopted in this amendment following the Amendment 30B protocol.

Table 1.4.1.1. Gag overfishing limits, acceptable biological catch (which is also the annual catch limit), optimum yield (which is also the annual catch target), and unadjusted sector allocations of annual catch limit and annual catch target for 2012-2015. See text for discussion of "unadjusted" allocations. The 2011 catch levels were previously set through an interim rule, and are included in the table for information only. All values are in million pounds gutted weight, and are based on the January 2011 SSC re-evaluation of gag acceptable biological catch.

				Unadjusted Sector ACL		Unadjusted Sector ACT	
	OFL	ABC (= ACL)	OY (= ACT)	Commercial (39%)	Recreational (61%)	Commercial (39%)	Recreational (61%)
2011	1.67	1.58	1.28	0.616	0.964	0.499	0.781
2012	2.11	2.02	1.69	0.788	1.232	0.659	1.031
2013	2.54	2.45	2.11	0.956	1.495	0.823	1.287
2014	2.91	2.82	2.49	1.100	1.720	0.971	1.519
2015+	3.19	3.12	2.80	1.217	1.903	1.092	1.708

Note that the gag sector annual catch targets are referred to as unadjusted. There are two types of adjustments that can affect the final annual catch target levels.

1. Adjustment for dead discards. The stock assessment analyses on which Table 1.4.1.1 is based assumes that reductions in landed catch from baseline levels will be accompanied by reductions in dead discards in the same proportion. This "linked" scenario is unlikely. In the commercial sector, the limited availability of gag individual fishing quota allocation may result in higher regulatory discards. In the recreational sector, changes to bag limits or size limits, or bycatch of gag during closed seasons may also affect regulatory discards. The commercial quota adopted in Action 3 adjusts the commercial sector annual catch target to explicitly account for non-proportional dead discards. Recreational regulatory measures in Action 2 are based on analysis of total removals (landed catch plus dead discards) that achieve desired reduction levels, thus, the recreational landed catch target may be reduced from the above values to account for dead discards. The exact level of the adjustment depends upon the combination of management measures used.

2. Accountability measures. Action 7 contains accountability measures that may temporarily adjust the sector catch targets in a subsequent year if there is an overage in the prior year.

The red grouper stock biomass is currently above its B_{MSY} level, so the annual yield at F_{MSY} in 2012 is higher than the equilibrium maximum sustainable yield. Consequently, in Table 1.4.1.2, for 2012 the overfishing limit was set at equilibrium maximum sustainable yield and the acceptable biological catch (annual catch limit) at equilibrium optimum yield. Because annual optimum yield for 2012 is less than equilibrium, the annual catch target is set equal to the annual optimum yield.

Table 1.4.1.2 shows the red grouper annual overfishing limit, acceptable biological catch, and optimum yield yields for 2011-2012+ , plus the sector allocations for the annual catch target. The 2011 catch limits were adopted through a 2010 regulatory amendment and are not part of this amendment. They are included in this amendment for information only. This amendment specifies the 2012+ annual catch limit and annual catch target along with the sector allocations of the annual catch target are adopted in this amendment following the Amendment 30B protocol.

Table 1.4.1.2. Red Grouper overfishing limits, acceptable biological catch (which is also the annual catch limit), optimum yield (which is also the annual catch target), and sector allocations of annual catch limit and annual catch target for 2012+. The 2011 catch levels were previously set through an interim rule, and are included in the table for information only. All values are in million pounds gutted weight, and are based on the March 2011 re-evaluation of red grouper ABC.

				Sector ACL		Sector ACT	
	OFL	ABC (= ACL)	OY (= ACT)	Commercial (76%)	Recreational (24%)	Commercial (76%)	Recreational (24%)
2011	7.42	6.31	5.68	4.80	1.51	4.32	1.36
2012+	8.10	7.93	7.22	6.03	1.90	5.49	1.73

Red grouper catch levels are being increased relative to 2011. Because the landed catch level is being increased, there will be no increase in regulatory discards. Therefore, adjustments to account for dead discards are not needed. However, the annual catch limit will still be subject to accountability measures.

Note: At the time that this amendment was being prepared, a red grouper regulatory amendment was also being prepared that would increase the red grouper allowable catch for 2011, and for 2012 – 2015 under a revised yield stream. The yield streams in that regulatory amendment, if implemented, will supersede the yield streams in Table 1.4.1.2.

SEDAR assessments for both gag and red grouper are scheduled for 2013, which may result in further revisions to the subsequent yield streams.

1.4.2 Setting of Acceptable Biological Catch

Section 302 of the Magnuson-Stevens Act states that "each scientific and statistical committee shall provide its Council ongoing scientific advice for fishery management decisions, including recommendations for acceptable biological catch (ABC)". The Magnuson-Stevens Act further states that the Council shall "develop annual catch limits for each of its managed fisheries that may not exceed the fishing level recommendations of its scientific and statistical committee".

Update assessments of gag (SEDAR 2009a) and red grouper (SEDAR 2009b) were prepared by the NMFS Southeast Fisheries Science Center and a SEDAR Update Assessment Workgroup during the spring of 2009.

The 2009 red grouper update assessment was conducted using an age-structured assessment model called ASAP (Legault and Restrepo 1998), and projections were estimated using PRO-2BOX (Porch 2002). After reviewing several model runs with varied parameter inputs, the SSC accepted the model run titled "Red Tide Model with Constant Catchability". This model run allowed the natural mortality rate for 2005, a year when there was an extensive red tide event along the West Florida Shelf, to adjust above the base natural mortality rate. The best-fit result indicated that an additional mortality for red grouper corresponding to a little over 20% of the stock occurred in 2005.[5]

[5] E-mail from Clay Porch (NMFS Southeast Fisheries Science Center) to Steven Atran (Gulf Council staff) dated June 24, 2009. There is confusion among some members of the public that the assessment claimed that 30% of the grouper were killed due to red tide. Dr. Porch's e-mail states, "the estimate of the instantaneous episodic natural mortality rate was 0.3, and that this translates roughly to something like 30% of the stock being killed (I emphasized at the time that it wasn't exactly 30%).

As with red grouper, the SSC reviewed several model runs from the 2009 gag update assessment and accepted the model run titled, "Red Tide with Increasing Catchability". The SSC chose a model with increasing catchability for gag because they felt that the tendency of gag to form aggregations made them more susceptible to improvements in gear technology over time. As with red grouper, this model run allowed the natural mortality rate for 2005, a year when there was an extensive red tide event along the West Florida Shelf, to adjust above the base natural mortality rate. The best-fit result indicated that an additional mortality for gag corresponding to 18% of the stock occurred in 2005.[6]

These assessments were reviewed by the Standing and Special Reef Fish SSC in June 2009. Although the SSC made preliminary recommendations of acceptable biological catch, they asked that the projections be re-run after the 2009 landings data were available.

On March 23, 2010, the Council received revised red grouper and gag projections from NMFS using preliminary 2009 landings data. The new projections also provided an estimate of what the catches will be in 2010, and changed the starting date of the gag rebuilding plan from 2010 to 2011.

Based on the revised projections, the SSC recommended a red grouper overfishing limit of 7.42 in 2011 and 7.43 for 2012. The SSC set the red grouper acceptable biological catch at 85% of the overfishing limit to account for scientific uncertainty, resulting in an acceptable biological catch of 6.31 MP in 2011 and 6.32 MP in 2012. The corresponding optimum yield levels were 5.68 MP in 2011and 5.90 MP in 2012. Based on these recommendations, the Council set the 2011 red grouper total allowable catch (also the annual catch limit) at 5.68 MP through an August 2010 regulatory amendment (GMFMC 2010).

In August 2010, a discrepancy was found in the estimated size distribution of undersized released fish from the recreational gag sector. The model had incorrectly set the size of released gag at just less than the 22 inch minimum size limit rather than estimate a more realistic size distribution based on tagging data. In addition, newly available data from observers aboard commercial fishing vessels showed that the dead discards of both gag and red grouper from the commercial sector were much larger than the estimates used in the assessment model, which were based on logbook data plus data on size distribution and mortality rate by depth. In addition, the red grouper projections had not taken into account the reduction in the commercial red grouper minimum size limit from 20 inches to 18 inches that took effect in 2009. As a result, the Council asked the Southeast Fisheries Science Center to re-run the gag assessment with corrected recreational release data and with the observer based commercial discard estimates, and to also evaluate the effect of using the observer based discard estimates on the red grouper assessment.

The re-runs of the gag and red grouper update assessments were conducted in the fall of 2010, and the results presented to the SSC in January 2011. As a result, the overfishing limit, acceptable biological catch and optimum yield for red grouper and gag increased slightly from the March 2010 results. The SSC revised its overfishing limit and acceptable biological catch recommendations for gag in January 2011 and for red grouper in March 2011, as shown in Tables 1.4.1 and 1.4.2.

Later during the meeting John (Walter) calculated the actual percentage for red grouper and it was a little over 20% (which I relayed to the AP, and I think the SSC, later on Tuesday)".

[6] E-mail from Brian Linton (NMFS Southeast Fisheries Science Center) to Steven Atran (Gulf Council staff) dated July 7, 2009.

1.4.3 Use of moving average annual catch limits for recreational fishery

Under Amendment 30B a three-year moving average of actual recreational landings is compared to a 3-year moving average of the annual catch limits to determine if the annual catch limit has been exceeded, triggering accountability measures. When first initiated, the moving average is gradually implemented as follows:

Year 1 – catches for year 1 are compared to the annual catch limit for year 1.
Year 2 – the average catches for years 1 and 2 and compared to the average annual catch limit for years 1 and 2.
Year 3 – the average catches for years 1, 2 and 3 and compared to the average annual catch limit for years 1, 2 and 3.

In subsequent years the most recent three years average catches are compared to the most recent three years average annual catch limits. This applies any time the annual catch limit is steady. If the annual catch limit is reduced or increased, the implementation sequence shown above is reinitiated. The purpose of this is to smooth out occasional spikes in recreational landings and reduce the frequency at which accountability measures are implemented. The moving average method is not used with the commercial sector because that sector is under an individual fishing quota system and has a much smaller likelihood of landings spiking above the annual catch limit. The moving average method will also not be used with gag while it is under a rebuilding plan because the rebuilding plan increases the annual catch limit every year.

Table 1.4.3.1. Moving average test statistic for 2011 and subsequent years to be compared to the annual catch limit. If the test statistic exceeds the annual catch limit, accountability measures will be triggered. Values are in million pounds gutted weight.

	Gag		Red Grouper	
Year	Test criteria – Recreational Sector	ACL	Test criteria – Recreational Sector	ACL
2011	2011 Landings	0.964 MP	2011 Landings	1.51 MP
2012	2012 Landings	1.232 MP	Ave. of 2011+2012 landings	1.92 MP
2013	2013 Landings	1.495 MP	Ave. of 2011+2012+2013 landings	1.92 MP
2014	2014 Landings	1.720 MP	Ave. of 2012+2013+2014 landings	1.92 MP
2015	2015 Landings	1.903 MP	Ave. of 2013+2014+2015 landings	1.92 MP

The annual catch limits for red grouper are based on equilibrium optimum yield. The annual catch limits for gag are based on the yield corresponding to $F_{rebuild}$.

2 MANAGEMENT ALTERNATIVES

2.1 Action 1. Rebuilding Plan for Gag

On August 11, 2009, the NMFS Regional Administrator notified the Council of his determination that the gag stock was both overfished and undergoing overfishing, based on the results of the 2009 update stock assessment of the Gulf of Mexico gag stock (SEDAR 2009a). The stock has shown declines in indices of abundance since 2005. A large part of the decline was attributed to an episodic mortality event in 2005 (most likely associated with red tide) that resulted in an additional 18% of the gag stock being killed on top of the normal natural and fishing mortalities (personal communication, Brian Linton, SEFSC). The 2008 spawning stock biomass was estimated to be at 47% of its minimum stock size threshold and the mean fishing mortality rate during 2005-2007 was estimated to be nearly 2.5 times higher than the maximum fishing mortality threshold. Under the Magnuson-Stevens Act National Standard Guidelines, once a Council is notified of the stock's condition, a rebuilding plan needs to be developed and implemented within two years of notification to end overfishing and rebuild the gag stock.

Alternative 1. No action. Do not specify a rebuilding plan for gag.

Preferred Alternative 2. Establish a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 10 years or less.

Alternative 3. Establish a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 7 years or less.

Alternative 4. Establish a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 5 years (T_{min}).

Discussion:

Section 304 of the Magnuson-Stevens Act states that for a fishery that is overfished, the rebuilding plan shall—

(A) specify a time period for rebuilding the fishery that shall—

(i) be as short as possible, taking into account the status and biology of any overfished stocks of fish, the needs of fishing communities, recommendations by international organizations in which the United States participates, and the interaction of the overfished stock of fish within the marine ecosystem; and

(ii) not exceed 10 years, except in cases where the biology of the stock of fish, other environmental conditions, or management measures under an international agreement in which the United States participates dictate otherwise;

(B) allocate both overfishing restrictions and recovery benefits fairly and equitably among sectors of the fishery; and

(C) for fisheries managed under an international agreement, reflect traditional participation in the fishery, relative to other nations, by fishermen of the United States.

The shortest possible time in which the gag stock can rebuild (T_{min}) is 5 years in the absence of all fishing mortality including bycatch mortality, whereas the maximum time (T_{max}) allowed under the National Standard 1 guidelines is 10 years. The proposed annual catch limits are based on yields that will rebuild

the stock in 10 years. The proposed annual catch targets are yields under the Council's current definition of optimum yield (i.e., yield at 75% of F_{MSY}), which are projected to produce a faster rebuilding, 7 years[7].

Amendment 30B established an interim allocation of the gag stock, based on commercial and recreational landings during the years 1986 through 2005, of 39% commercial, 61% recreational. This allocation was selected by the Council in Amendment 30B and is based on the longest and most robust time series for landings. A long-term time series reduces the influence of short-term shifts in landings resulting from changes in recruitment or regulations. This also is consistent with the intent of Amendment 1 for setting allocations. This allocation complies with above specification (B) with respect to the commercial and recreational allocations, and nothing in this amendment changes the allocation of harvest, including recovery benefits, among these sectors.

Alternative 1, no action, does not specify a rebuilding plan for gag. This is not allowed under the Magnuson-Stevens Act, and is included only for purposes of including a baseline for analysis. As shown in Figure 2.1.1, model trends produced by the "red tide" assessment model suggest that gag were overfished in the 1980's and at that time were at only half the biomass capable of supporting maximum sustainable yield. In the 1990s, gag began a slow recovery, possibly due to the regulations implemented beginning in 1990. By 2000, the stock was fully recovered, and it remained recovered until 2005, when it once again declined into an overfished state. Assessment scientists have suggested that an episodic mortality event such as the massive 2005 red tide contributed to the decline. However, the fishing mortality rate has been consistently above the rate associated with maximum yield per recruit (used as a proxy for maximum sustainable yield). The fishing mortality rate estimated in the most recent year, 2008, should be viewed with caution, because it is considered less reliable until 2009 estimates are incorporated. Yet even without the 2008 estimate, the fishing mortality rate shows an increasing trend over time. This rate of fishing mortality is not consistent with rebuilding or maintaining the stock at its maximum sustainable yield level.

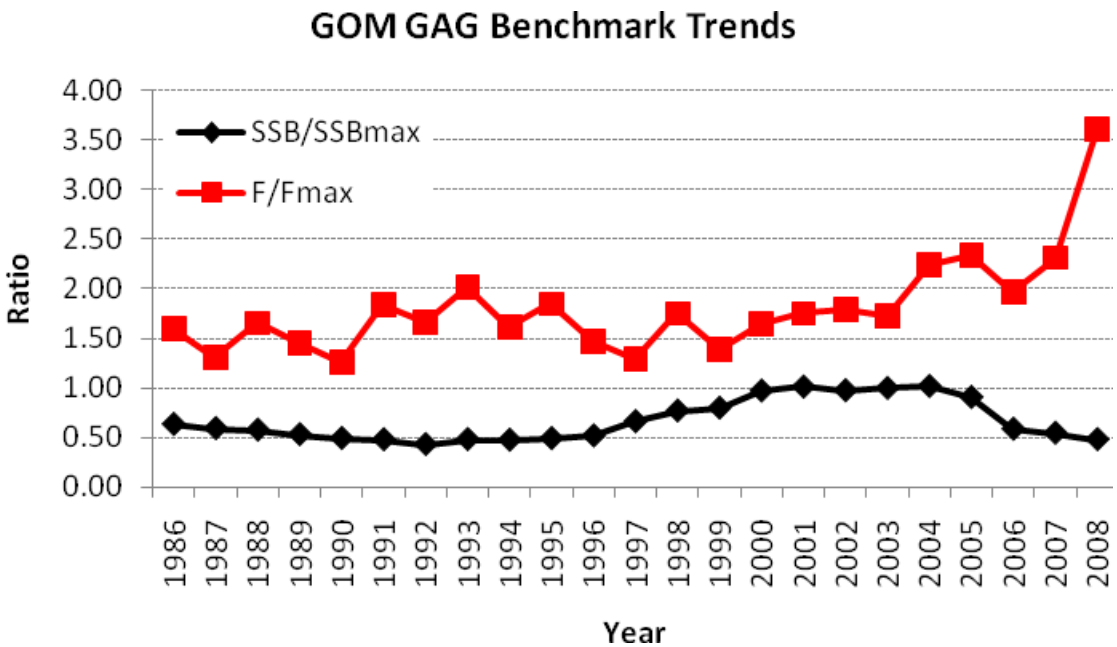


Figure 2.1.1. (Figure 9.2 from 2009 gag update assessment). Red tide model trends in F and SSB relative to corresponding benchmarks.

[7] Personal communication from Brian Linton, Southeast Fisheries Science Center, Miami.

Preferred Alternative 2 establishes a rebuilding plan in 10 years or less in accordance with the maximum time frame allowed under the requirements of the Magnuson-Stevens Act. The assessment estimated that the gag stock would rebuild to its maximum sustainable yield level in 5 years if all sources of fishing mortality (including discard mortality) could be eliminated. Because the stock can recover in less than 10 years, the Magnuson-Stevens Act requires that the rebuilding plan be for no more than 10 years. The Council intends to manage the stock with a target yield at the optimum yield level corresponding to F_{OY} (where F_{OY} is defined as a fishing mortality that is 75 percent of the fishing mortality rate at maximum sustainable yield). At this level, the stock is projected to rebuild in seven years, corresponding to **Alternative 3**. However, given management uncertainties and uncertainties about the stock assessment projections for more than a few years out, **Preferred Alternative 2** allows additional time if needed for achieving the management target. Specifying the rebuilding time to be 10 years or less also allows for fluctuations in catches and leeway to take the needs of fishing communities into account when setting catch levels and management measures.

Alternative 3 establishes a target of 7 years or less to rebuild the gag stock. This is the estimated time to rebuild if the stock is managed at a fishing rate corresponding to optimum yield (F_{OY}) rather than the rate corresponding to a 10-year rebuilding plan ($F_{rebuilding}$). Although the yields under a 7-year rebuilding plan would eventually catch up to those for a 10-year plan, the initial catch targets in the early years would be smaller. However, faster rebuilding could make this a less economically disruptive approach by allowing the yields associated with a fully rebuilt stock to be resumed more quickly. Although, the Council intends to manage the stock at the optimum yield level corresponding to **Alternative 3**, adopting **Alternative 3** for the rebuilding target would only result in a 50% probability of meeting the target date. This is because the yields used under this time period have a 50% chance of success to rebuild the stock in 7 years. Adopting **Preferred Alternative 2** for the target date but managing at the optimum yield level allows greater than 50% probability of success by providing 10 years under the same yield stream as Alternative 3 to rebuild the stock.

Alternative 4 establishes a target of 5 years to rebuild the gag stock. This is the minimum time in which the stock can be rebuilt (T_{min}) if all sources of fishing mortality (including discard mortality) could be eliminated. It would require a complete closure of the gag fishery for at least 5 years. If this alternative is adopted, strong measures to reduce bycatch of gag in other fisheries should be considered. Because a total elimination of discard mortality is unlikely to be achieved, this alternative would likely result in the stock being slightly under the rebuilding target at the end of five years.

The Magnuson-Stevens Act requires that the Council establish a plan to rebuild the stock is as short a time as possible. In this instance, "as short as possible" means five years, which would require eliminating all fishing associated mortality including bycatch (**Alternative 4**). Eliminating all such mortality would be very difficult to achieve, and would require prohibiting virtually all fishing activities where gag are present, including most inshore waters in the state of Florida. The social and economic impacts of such restrictions would be tremendous and are believed to outweigh the benefits associated with a faster rebuilding. **Alternative 3** has similar short comings in that it would require extremely draconian measures at the start of the plan. **Preferred Alternative 2**, which is the longest time allowed under the statute, still only accommodates a four month recreational fishing season. This alternative is believed by the Council to best balance the needs of fishing communities dependent on the harvest of gag with the need to rebuild the stock in a short a time as possible.

2.2 Action 2. Recreational Management Measures

2.2.1 Action 2.1 Gag Bag Limit, Size Limits, and Closed Season Scenarios

The reduced gag catch limits under the initial years of the rebuilding plan will require substantial reductions in both commercial and recreational harvest. The commercial harvest can be reduced through an adjustment to the commercial quota, but the recreational sector has no quota. Recreational catch levels are managed primarily through a combination of bag limits, minimum size limits and closed seasons. A combination of management measures needs to be adopted that will achieve the needed reductions in recreational fishery with the least disruption to the fishery. Consideration also needs to be given to the impact of regulatory changes on discards and discard mortality.

Reductions needed from baseline to achieve the rebuilding plan based on the different baseline years are:

	2006-08 baseline	2009 baseline
2012 $F_{REBUILD}$ (ACL)	53%	36%
2012 F_{OY} (ACT)	61%	47%

Alternative 1. No action. Do not modify the bag limits, size limits or closed seasons for the recreational harvest of gag.

Alternative 2. Set the 2012 gag open season to be the same as in 2011, i.e., September 16 through November 15, 22 inch minimum size limit, 2 fish gag bag limit, 4 fish aggregate bag limit (61 days) (60% reduction from both baselines)

Alternative 3. Split the gag open season to provide two fishing seasons: January 1-31 and April 1-30, 22 inch minimum size limit, 2 fish gag bag limit, 4 fish aggregate bag limit (61 days) (52% reduction from 2009 baseline; 56% reduction from 2006-08 baseline)

Preferred Alternative 4. Set the longest gag season possible: July 1 through October 31, 2 fish gag bag limit, 4 fish aggregate bag limit (123 days)

Preferred Option a. 22 inch minimum size limit (50% reduction from 2009 baseline; 53% reduction from 2006-08 baseline)

Option b. 22-30 inch slot size limit (54% reduction from 2009 baseline; 56% reduction from 2006-08 baseline)

The **Reef Fish Advisory Panel** developed an additional recreational scenario. This was:

Split the gag open season to provide two fishing seasons: a winter season January 1-31 and December 24-31, and a summer season June 1 – July 7, 22 inch minimum size limit, 1 fish gag bag limit, 4 fish aggregate bag limit (76 days, 46% reduction from 2009 baseline, 52% reduction from 2006-08 baseline).

This alternative was presented for discussion purposes during public hearings for Amendment 32. However, because this alternative did not quite meet the removal reduction criteria used by the Council in selecting the **Alternatives 2-4** and has not yet been reviewed by the Council, the alternative has not undergone further analyses. The Advisory Panel's rationale for this recommendation is included in the discussion below.

Additional scenarios are shown in Table 2.2.1.1. Please note that the table contains projected reduction under three effort shifting scenarios; that effort during the open season is the same as it would have been in a year-round fishery (1.0), that effort is 1.5 times what it would have been in a year-round fishery (1.5), and that effort is double what it would have been in a year-round fishery (2.0). At their February 2011 meeting, the Council discussed that it is likely that effort would likely increase during the open season, but a doubling of effort seemed to be too high of an assumption. Therefore, the Council restricted the analyses of projected reductions to an effort shifting of 1.5 for evaluating the alternatives, but recognizes the full range of projected effort shifting should be taken into consideration because an exact number cannot be predicted.

In all Scenarios, recreational closed seasons are closed only to gag, except for the existing February-March closed season, which applies to all shallow-water grouper.

Because part of the total removals consists of dead discards, the landed catch for each scenario is less than the unadjusted annual catch target. Appendix D contains two tables similar to Table 2.2.1.1 below, but expanded to show what the estimated landed catch would be. Appendix D, Table 1 contains several scenarios that are variations on the Reef Fish Advisory Panels split season recommendations, while Appendix D, Table 2 contains the scenarios in Alternatives 1 through 4a and b, along with the adjusted landed catch estimates.

Table 2.2.1.1. Gag Recreational Management Scenarios. Reductions in total removals are calculated for scenarios where effort shifting during the open season is 1.0, 1.5, or 2.0 times historical levels. Reductions stated in alternatives are based on 1.5 effort shifting.

Closed Season	Open Season	Days Open	Min Size Limit	Max Size Limit	Bag Limit		State Con-sisten-cy	Percent Change in Removals for Gag Targ/Dir Trip Elimination Scenario					
								2006-08 base			2009 base		
								Effort Shifting			Effort Shifting		
					Gag	Agg		2.0	1.5	1.0	2.0	1.5	1.0
Alt 1- Feb-March	Jan, April-Dec	306	22	---	2	4	Yes	40% inc	13% incr	14%	60% incr	30% incr	1% incr
Jan-Dec	---	0	---	---	---	---	Yes	73%	73%	73%	68%	68%	68%
Jan-Dec	---	0	---	---	---	---	No	55%	55%	55%	32%	32%	32%
Alt 2- Nov 16-Sep 15	Sep 16-Nov 15	61	22	---	2	4	Yes	56%	60%	64%	58%	60%	62%
Nov 16-Sep 15	Sep 16-Nov 15	61	22	30	2	4	Yes	62%	64%	67%	59%	61%	63%
Alt 3- Feb-Mar, May-Dec	Jan & Apr	61	22	---	2	4	Yes	50%	56%	61%	47%	52%	57%
Feb-Mar, May-Dec	Jan & Apr	61	22	30	2	4	Yes	53%	58%	63%	50%	55%	59%
Oct-Jun 15	Jun 16-Sep	107	22	---	2	4	Yes	45%	51%	58%	42%	48%	54%
Oct-Jun 15	Jun 16-Sep	107	22	30	2	4	Yes	52%	57%	62%	46%	51%	57%
Oct-Jul	Aug-Sep	61	22	---	2	4	Yes	60%	63%	66%	56%	59%	62%
Oct-Jul	Aug-Sep	61	22	30	2	4	Yes	62%	65%	67%	59%	61%	63%
Alt 4a- Nov-Jun	Jul-Oct	123	22	---	2	4	Yes	46%	53%	59%	45%	50%	56%
Alt 4b- Nov-Jun	Jul-Oct	123	22	30	2	4	Yes	51%	56%	62%	49%	54%	58%
Nov 16-Jul	Aug-Nov 15	107	22	---	2	4	Yes	46%	52%	59%	47%	52%	57%
Nov 16-Jul	Aug-Nov 15	107	22	30	2	4	Yes	52%	57%	62%	51%	55%	59%
Nov-Jul	Aug-Oct	92	22	---	2	4	Yes	54%	58%	63%	54%	57%	60%
Nov-Jul	Aug-Oct	92	22	30	2	4	Yes	57%	61%	65%	56%	59%	62%
Dec-Aug	Sep-Nov	91	22	---	2	4	Yes	45%	52%	58%	41%	47%	54%
Dec-Aug	Sep-Nov	91	22	30	2	4	Yes	49%	54%	60%	45%	50%	55%
Nov-Aug	Sep-Oct	61	22	---	2	4	Yes	61%	64%	67%	62%	64%	65%
Nov-Aug	Sep-Oct	61	22	30	2	4	Yes	63%	65%	68%	63%	64%	65%
Reef fish Advisory Panel Feb-May Jul 8 –Dec 23	Jan 1-31 Jun 1-Jul 7 Dec 24-31	76	22	---	1	4	Yes	45%	52%	59%	40%	46%	53%

Color codes: Green – meets both ACL (minimum to rebuild) and ACT (target reductions)
Yellow - meets ACL (minimum to rebuild) but not ACT (target reductions)
Red - fails both ACL (minimum to rebuild) and ACT (target reductions) – rebuilding will not occur in 10 years.

Based on an effort shifting assumption of 1.5, the scenarios presented all meet the annual catch target reduction of 47% based on the 2009 baseline. They are less than the 61% target reduction under the 2006-2008 baseline, but meet the 53% rebuilding annual catch limit.

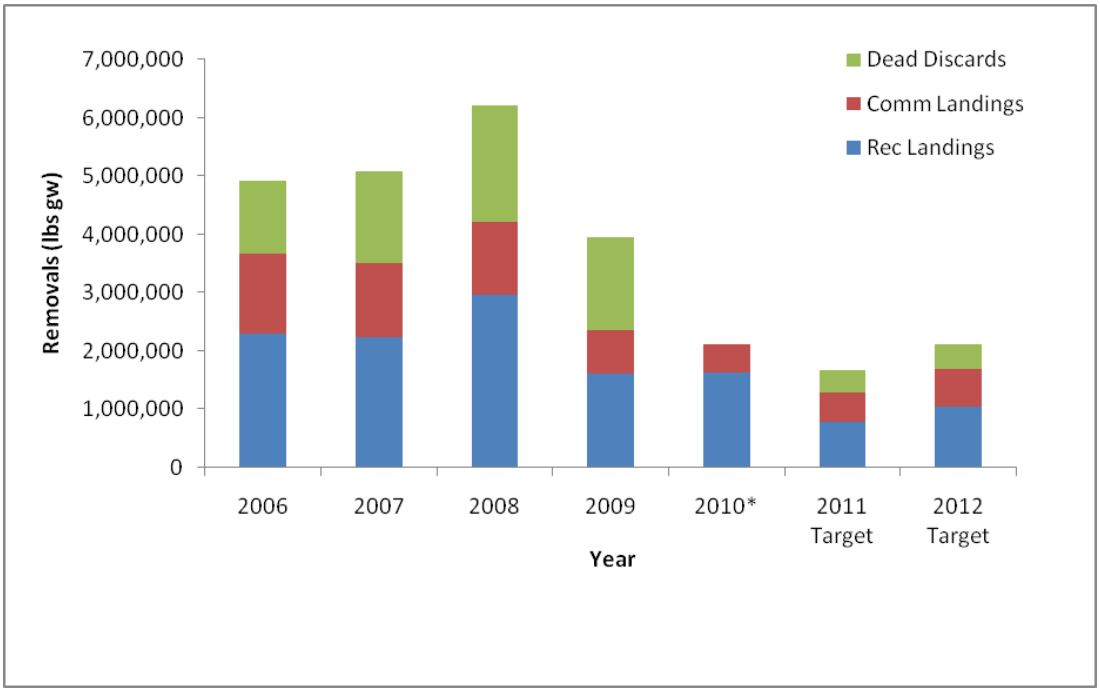
These management scenarios are for 2012 only. The analyses spreadsheets used for this section were designed to analyze reductions in 2011 and 2012. Beyond those years changes in the size distribution of the stock and uncertainties about the stock projections and management success make the use of the spreadsheets invalid. It is the intent that, as the stock recovers and annual catch limits and targets are increased, recreational management actions be re-evaluated on a year-by-year basis and modified when

appropriate under the Generic Framework Procedure being developed in the Generic ACL/AM Amendment.

2006-2008 vs. 2009 Baseline

The gag recreational sector annual catch target in 2012 is 1.03 million pounds (Table 1.4.1). To determine appropriate management actions, the impact of proposed actions is measured against recent harvest levels to determine the percent reduction needed, and achieved. Usually at least three years are averaged together to smooth out any unusual single year spikes or dips in landings, and 2006-2008 was initially selected as a typical baseline. However, catches in 2009 were clearly lower than in the previous years (Figure 2.2.1.1). The 2010 catches appear to be comparable to 2009, although the final numbers are not yet available (Figure 2.2.1).

Figure 2.2.1.1. Landings and dead discards by year, 2006-2010 and projected landings and dead discards for 2011-2012.



*Recreational landings for 2010 are estimated by the SEFSC. Commercial landings for 2010 are from the Gulf of Mexico individual fishing quota program. Dead discard estimates for 2010 are currently not available. Source: An Overview of the Gulf of Mexico Gag Grouper Recreational Decision Model, NMFS Southeast Regional Office.

These reductions in catches have been attributed to be primarily due to a reduction in effort as a result of the declining economic conditions rather than a decline in the gag population. An examination of effort changes reported by MRFSS supports this conclusion. The total average recreational gag catch (landings plus dead discards) were 30% less than the 2006-2008 period to 2009, while the fishing effort in the exclusive economic zone off Florida, where most of the gag fishing occurs, dropped by 29% (Table 2.2.1.2). Although this is just an approximate comparison because the effort attributed to gag fishing has not been partitioned out, it does suggest that effort and catches in 2009 have declined by a similar proportion.

Normally, a single year would not be used to represent a baseline because it might not be a typical year. However, the Florida exclusive economic zone effort in 2010 continued to be reduced according to

MRFSS estimates at 0.75 million angler trips (Recreational Fisheries Statistics Queries website), and 2010 gag catches appear comparable to 2009 (Figure 2.2.1.2). Thus, the 2009 baseline may represent a more typical catch and effort level from which to calculate percent reductions in the near future.

Table 2.2.1.2. Change in gag catch and in total Florida exclusive economic zone effort between the two baselines. Removals include both landed catch and dead discards. Effort is total estimated number of angler trips in the exclusive economic zone off of Florida. Source: NMFS Southeast Regional Office for removals, Recreational Fisheries Statistics Queries website for effort.

Baseline years	**Total recreational removals**	**Florida EEZ effort**
2006-2008 average	3.76 MP	1.24 mil. trips
2009	2.62 MP	0.88 mil. trips
Percent change	**-30%**	**-29%**

Gag Management Scenarios Discussion

The reductions needed in total removals (landed fish plus dead discards) needs to be between 36 and 61% depending on the baseline used to estimate the reductions and what fishing mortality rate value the sector is managed at. One of the challenges in selecting management alternatives is that actions to achieve reductions in the landed catch of gag often increase the number of discards and dead discards. This has been taken into account in calculating the expected reductions from various management scenarios. Changes in fishing effort due to possible changes in the status of the stock due to effects of the Deepwater Horizon oil spill, are unknown at this time and have not been taken into account.

Alternative 1, the no action alternative, would revert the management measures to the 2010 measures which keeps the recreational gag season open year-round except for the current February 1 – March 31 closed season on shallow-water grouper, and maintains the 22-inch TL minimum size limit for gag, 2-gag bag limit, and 4-grouper aggregate bag limit. Unlike the other alternatives which assume effort shifting of 1.5, under no action it's more reasonable to assume no effort shifting. Without effort shifting there is an expected 14% reduction in removals from the 2006-2008 baseline period (due to the 2009 reduction in the aggregate bag limit to 4 grouper, and establishment a 2-gag bag limit). Relative to the 2009 baseline there is an expected 1% increase in removals. This alternative would be insufficient to achieve a rebuilding of the gag stock.

Alternative 2 maintains the Fall recreational season established in 2011 by an interim rule: September 16 through November 15. All other bag and size limits remain unchanged. Relative to the 2009 baseline, this reduces removals by 60%, which exceeds the annual catch target reduction target of 47%. Relative to the 2006-08 baseline, this also reduces removals by 60%. This does not fully meet the annual catch target of 61% relative to the 2006-08 baseline, but it does exceed the annual catch limit and rebuilding yield reduction level of 53%. This alternative maintains the adopted regulations until changed by the Council in a plan amendment or framework action. It is therefore more conservative than **Alternative 4**, which allows less restrictive management measures in 2012.

Alternative 3 adopts a split season to allow fishermen an opportunity to fish for gag at different times of the year. The only combination that will allow at least two of months of fishing is to open the gag season for the months of January (winter season) and April (spring season). These months also coincide approximately with the beginning and ending of the gag spawning season. At an effort shifting of 1.5, relative to the 2009 baseline, this reduces removals by 52%, which exceeds the annual catch target

reduction target of 47%. Relative to the 2006-08 baseline, this reduces removals by 56%. This does not fully meet the annual catch target of 61% relative to the 2006-08 baseline, but it does exceed the annual catch limit and rebuilding yield reduction level of 53%. At a higher effort shifting of 2.0, this alternative does not meet the either the annual catch limit or annual catch target reductions relative to the 2006-2008 baseline. This can be corrected by adopting a 22" to 30" slot limit, which would add an additional 2% to 3% reduction and meet the minimum 53% reduction needed to achieve annual catch limit and rebuilding. This alternative is similar to **Alternative 2** in that it allows 61 days of fishing, but it splits the season into two segments to provide more fishing opportunities. Its impact on the stock should be comparable to **Alternative 2**, but with greater uncertainty due to the insufficient levels of reduction relative to the 2006-2008 baseline at 2.0 effort shifting.

Preferred Alternative 4 sets the longest fishing season that is consistent with the reductions needed to adhere to the rebuilding plan. The season would be open from July 1 through October 31 (123 days). Bag limits would remain the same. There are two options for size limit.

Preferred Option a maintains the current 22" minimum size limit. This reduces removals by 50% from the 2009 baseline, which exceeds the annual catch target reduction target of 47%. Relative to the 2006-08 baseline, this reduces removals by 53%. This does not fully meet the annual catch target of 61% relative to the 2006-08 baseline, but it does equal the annual catch limit and rebuilding yield reduction level of 53% assuming that the 1.5 effort shifting is accurate.

Option b establishes a slot limit of 22" to 30". This reduces removals by 54% from the 2009 baseline, which exceeds the annual catch target reduction target of 47%. Relative to the 2006-08 baseline, this reduces removals by 56%. This also does not fully meet the annual catch target of 61% relative to the 2006-08 baseline, but it does exceed the annual catch limit and rebuilding yield reduction level of 53% assuming that the 1.5 effort shifting is accurate. This was initially a preferred option because it produced greater reduction in removals than Option a. However, due to concerns from the public that this would lead to increased release mortality of the larger spawning size fish, and a strong recommendation from the Reef Fish Advisory Panel that slot limits not be used, the Council switched its preferred option to Option a.

This alternative allows a fairly long season relative to the other alternatives by setting the season during months when gag fishing is at historically low levels. If effort during this period intensifies by more than the 1.5 assumed in the calculations, the catch levels may fail to achieve the reduction needed to rebuild the stock relative to the 2006-08 baseline, however, the annual catch limit reductions needed relative to the 2009 baseline will be met even at higher effort shifting. Given the longer length of the season and less emphasis on squeezing fishing trips into a limited period of time, effort shifting is likely to be less than for other alternatives. Because of the increased uncertainty as to whether the needed reductions relative to the 2006-2008 baseline can be achieved at higher effort shifting levels, **Alternative 4** is less conservative than **Alternative 2** and about equal to **Alternative 3**. **Option b** provides an additional 3% to 4% reduction than **Preferred Option a**, mitigating that uncertainty somewhat, but at the expense of increasing release mortality on spawning size fish..

In evaluating the alternatives developed by the Council, the Reef Fish Advisory Panel suggested another split season alternative consisting of a winter season from the last week of December through January, and a summer season from June through the first week of July. In order to allow this number of days, the bag limit is reduced to 1 gag per person. This satisfies regional needs for a gag fishing season. In southwest Florida the peak demand is for a winter season, particularly during the Christmas break, In the

northern Gulf of Mexico a summer season is preferred, particularly including the fourth of July weekend. Also, the summer season coincides with red snapper season. The AP preferred this arrangement because they felt it would reduce regulatory discards of red snapper while fishing for gag, and would give fishermen another target species besides the 1 gag under the reduced bag limit. Although the alternative contains fewer fishing days than **Alternative 4** (76 days vs. 123 days) the open days occur when there is increased demand for fishing. However, based on an effort shifting of 1.5, the advisory panel's recommendation falls slightly short of the 2009 annual catch target (47% reduction) by 1%, and falls slightly short of the 2006-08 annual catch limit rebuilding plan reduction (53%) by 1%. However, the advisory panel reasoned that there will be little fishing effort on Christmas day, and that throughout the open season there will be less than the 150% effort shifting assumed in the analyses. Under these assumptions the alternative could meet the 2009 target reduction and the 2006-2008 rebuilding reduction. The Council has yet to evaluate this recommendation as a viable alternative.

2.2.2 Action 2.2 Red Grouper Bag Limit

Note: At the time that this amendment was being prepared, a red grouper regulatory amendment was also being prepared that would increase the red grouper bag limit to either 3 or 4 fish beginning in 2011. However, the provision that the bag limit will revert to a lower bag limit if the sector annual catch limit is exceeded is not included in the regulatory amendment. This is a form of accountability measure, and accountability measures cannot currently be modified in a regulatory amendment (this will change when the new generic framework procedure is implemented from the Generic Annual Catch Limit/Accountability Measures Amendment). Consequently, if a bag limit increase is implemented though the regulatory amendment, this action will be used to consider adding the accountability measures to the increased bag limits. If the regulatory amendment is not implanted, then this action will be used to consider both the bag limit increase and its associated accountability measure.

The recreational red grouper allocation has not been met in recent years. With the proposed increase in red grouper total allowable catch, the recreational allocation will be increased, creating a larger difference between the allocation and the actual catch. An increase in the bag limit will allow the recreational sector to more fully harvest its allocation and achieve optimum yield.

> **Alternative 1.** No action. The red grouper bag limit remains at 2 fish per person.
>
> **Alternative 2.** Increase the red grouper bag limit to 3 fish per person. If at the end of any season, it is determined that the recreational sector has exceeded its red grouper annual catch limit, the red grouper bag limit will revert back to 2 fish.
>
> **Preferred Alternative 3.** Increase the red grouper bag limit to 4 fish per person. If, at the end of any season, it is determined that the recreational sector has exceeded its red grouper annual catch limit, the bag limit will be reduced to 3 fish. If, at the end of any subsequent season, it is determined that the recreational sector has exceeded its red grouper annual catch limit again, the red grouper bag limit will revert back to 2 fish.

Red Grouper Bag Limit Discussion

The current (2011) recreational sector annual catch target for red grouper is 1.36 million pounds, and under the specification of annual catch limits and annual catch targets in this amendment (Section 1.4), the annual catch target will increase to 1.73 million pounds (Table 1.4.2). Recreational landings of red

grouper have been well below these targets, 0.82 million pounds in 2008 and 0.98 million pounds on 2009 (Table 1.1.4). Since 2000, recreational red grouper landings have been above the 1.73 million pound target only twice, in 2000 and 2004 (Table 1.1.4).

Red grouper is neither overfished nor undergoing overfishing. The recreational sector has not caught its allocation of red grouper in recent years, and with an increase in catch limits in 2012 it is unlikely to catch its limits. Therefore, a relaxation of the recreational red grouper regulations is warranted to allow the sector to catch more of its allocation. However, because of a lack of recent catch data at increased bag limits, an accurate estimate of catch levels at increased bag limits cannot be made. The alternatives in this section propose increases in the bag limit be combined with an adaptive management approach that includes a feedback mechanism as a precautionary way to raise the bag limit.

Alternative 1 would leave the recreational red grouper bag limit at 2 fish. Given that the recreational sector is landing less than its allocation, this would likely to result in continued ladings below the recreational allocation.

Alternative 2 increases the bag limit to 3-fish per person. However, it includes an adaptive management feedback mechanism that will reduce the bag limit back to 2 fish if, at the end of a subsequent season, it is determined that the recreational sector has exceeded its annual catch limit. Because the stock is neither overfished nor undergoing overfishing, the possibility of a onetime overage is unlikely to harm the stock, but this alternative would allow data collection on the impact of a 3-fish bag limit.

Preferred Alternative 3 increases the bag limit to 4 fish per person. This is the maximum possible under a 4 fish aggregate grouper bag limit. As with **Alternative 2**, this alternative includes an adaptive management feedback mechanism, but this one is operated in two stages. It will initially reduce the bag limit to 3 fish if, at the end of a subsequent season, it is determined that the recreational sector has exceeded its annual catch limit. If, even at 3 fish, the recreational sector exceeds its annual catch limit in a subsequent season, the bag limit will be further reduced back to the original 2 fish bag limit. The bag limit will not be reduced beyond 2 fish in this action. Because the stock is neither overfished nor undergoing overfishing, the possibility of overages in one or two years is unlikely to harm the stock, but this alternative would allow data collection on the impact of a 4 fish or 3 fish bag limit.

For purposes of accountability measures, the adaptive management provisions in **Alternative 2** and **Preferred Alternative 3** will serve as a recreational red grouper accountability measures for the years in which they are implemented. This avoids having double accountability measures imposed on the recreational sector during the adaptive management phase of the regulation. However, this does not preclude the use of other accountability measures if deemed necessary.

2.3 Action 3. Commercial Gag Quota Adjustment to Account for Dead Discards

Reductions in the gag quota under the rebuilding plan assume a proportional reduction in dead discards of gag. However, due to the limited amount of gag individual fishing quota allocation available in the initial years of the gag rebuilding plan, gag bycatch and discards from fishermen targeting red grouper or other fish may be higher than assumed in the assessment projections. Dead discards are accounted for in the analyses of recreational management measures to achieve the recreational annual catch target, but not in the commercial allocation. This section is needed to explicitly account for dead discards in the commercial sector that are not accounted for in the assessment analyses.

Alternative 1. No action. The commercial gag quota will not contain any adjustment for dead discards of gag. Commercial quotas in million pounds gutted weight will be as follows (subject to accountability measure adjustments):

Year	Gag
2012	0.659 MP
2013	0.823 MP
2014	0.971 MP
2015+	1.092 MP

Preferred Alternative 2. Reduce the gag commercial quota to 86% of the annual catch target to compensate for dead discards not being reduced to projected levels needed to achieve 100% of the annual catch target. Commercial quotas in million pounds gutted weight will be as follows (subject to accountability measure adjustments):

Year	Gag
2012	0.567 MP
2013	0.708 MP
2014	0.835 MP
2015+	0.939 MP

Alternative 3. Reduce the gag commercial quota to 47% of the annual catch target to compensate for dead discards not being reduced to projected levels needed to achieve 100% of the annual catch target. Commercial quotas in million pounds gutted weight will be as follows (subject to accountability measure adjustments):

Year	Gag
2012	0.310 MP
2013	0.387 MP
2014	0.456 MP
2015+	0.513 MP

Discussion:

This section specifies gag quotas from 2012 forward. The shallow-water grouper quota will also be adjusted as the sum of the gag and red grouper quotas, plus an allowance of 0.41 million pounds gutted weight for other shallow-water grouper species (this allowance may change under the Generic Annual Catch Limits/Accountability Measures Amendment). Unaccounted for dead discards from red grouper is not an issue because the catch limit for red grouper is being increased from historical levels. The gag annual catch limit and annual catch target are also being increased relative to the 2011 catch levels, but remain well below the 2006-2008 and 2009 baselines from which catch reductions are measured. Due to the limited amount of gag individual fishing quota shares available, fishermen targeting red grouper or other species and who catch gag as a bycatch may be forced to discard gag that they could have kept in the past. Although there may be a reduction in gag bycatch due to fewer fishermen targeting gag, observer data on the level of discards due to limited individual fishing quota allocation does not yet exist. The grouper individual fishing quota system is only one year old and has not yet operated under the reduced rebuilding gag quota. However, as a precautionary measure, in the 2011 interim rule the Council set the commercial gag quota at 86 percent of the annual catch target.

Longline vessels have historically landed about 34 percent of the commercial gag harvest (Table 1.1.1). As a result of the longline endorsement requirements implemented in 2010 under Amendment 31, the number of reef fish longline vessels is expected to have dropped substantially. In 2010, 62 vessels qualified for longline endorsements in communities associated with gag fishing (Table 3.3.3.6). In the past, longline vessels accounted for just 1 percent of the commercial gag discards primarily because of minimum size limit regulations (Table 2.5.1). Additional discards may occur in the future due to limited availability of gag individual fishing quota allocation. Because they are required by regulation to operate in deeper waters (beyond 20 fathoms, 35 fathoms, or 50 fathoms depending upon time and area), the release mortality rate from longline vessels is considered greater than for vertical line vessels.

Alternative 1 is the no action alternative. It leaves the gag quota at the full annual catch target level. This level of harvest assumes that dead discards in the commercial fishery will be reduced by the same proportion as the landed catch. If this assumption is not valid, then total removals of gag (landed plus dead discards) will exceed the levels projected in the assessment. The annual catch target provides a buffer from the annual catch level (for example, the 2012 commercial sector-annual catch limit is 0.788 MP vs. an annual catch target of 0.659 MP, a buffer of 0.129 MP or 16% of annual catch limit), but this may not be enough to offset increased removals from unaccounted for dead discards.

Preferred Alternative 2 follows the precedent of the 2011 gag interim rule and reduces the commercial quota to 86 percent of the annual catch target. At the February 2011 Council meeting, NMFS presented an analysis of best case and worst case scenarios regarding reduction of gag bycatch in proportion to the reduction in gag commercial quota under the temporary rule to set 2011 quota[8]. A new unknown factor was how fishermen would behave under the newly implemented grouper IFQ system. If fishermen with little or no gag allocation actively sought to avoid gag while fishing for red grouper and other shallow-water grouper, then dead discards of gag would be reduced approximately in proportion to the reduction in quota. However, if fishermen maintained their pre-IFQ fishing patterns, then dead discards of gag would not be reduced and could increase. Under the best case scenario, no adjustment for dead discards would be necessary, and the quota could remain at 100% of the commercial allocation. Under the worst

[8] Amendment 32 management measure analyses. PowerPoint presentation by Andy Strelcheck at the February 2011 Council meeting in Gulfport, Mississippi.

case scenario, the quota would need to be reduced to 47% of the unadjusted allocation in order to achieve the necessary reduction in total removals after accounting for dead discards to stay in line with the rebuilding plan. The Council felt that the true scenario would be in between the best and worst case scenarios, but probably closer to the best case. After discussion, the Council decided to place the adjustment at the 75th percentile between worst and best case. This was calculated to be 86% of the unadjusted allocation, or a 14% reduction. This adjustment was applied in the 2011 temporary rule, and has been carried over in **Preferred Alternative 2** of Action as the best available information. In future years, observer data may provide better estimates of the gag discard levels occurring in the commercial grouper fishery during the rebuilding plan, and the quota adjustment can be modified through a framework procedure.

Alternative 3 represents the worst case scenario, which is that dead discards remain at the 2006-2008 level. Analyses presented to the Council by NMFS analysts in February 2011 in conjunction with the 2011 gag interim rule indicated that, if dead discards remain at the 2006-2008 level, the directed quota would need to be reduced to 47 percent of the annual catch target to compensate. If this alternative is adopted, it will result in a reduction rather than an increase in the commercial gag quota from 2011 to 2012.

2.4 Action 4. Adjustments to Multi-use Individual Fishing Quota Shares

Alternative 1. No Action. Do not modify percentages of red grouper and gag individual fishing quota allocation converted into multi-use allocation. At the beginning of each fishing year, 4% of red grouper allocation would be converted into multi-use allocation and 8% of gag allocation would be converted into multi-use allocation.

Alternative 2. Based on the commercial gag annual catch limit, gag allocation, and red grouper allocation, set the percentage of red grouper individual fishing quota allocation converted into multi-use allocation as follows:

> Red Grouper Multi-use (in percent) = 100*[Gag annual catch limit – Gag Allocation]/Red Grouper Allocation

The red grouper multi-use percentage will be recalculated following adjustments in commercial gag annual catch limit, gag allocation, or red grouper allocation.

Preferred Alternative 3. If a the rebuilding plan for red grouper is in effect, set the percentage of gag individual fishing quota allocation converted into multi-use allocation equal to zero. After NOAA Fisheries declares red grouper rebuilt, set the percentage of gag individual fishing quota allocation converted into multi-use allocation as follows

> Gag Multi-use (in percent) = 100*[Red Grouper annual catch limit – Red Grouper Allocation]/Gag Allocation

The gag multi-use percentage will be recalculated following adjustments in red grouper annual catch limit, red grouper allocation, or gag allocation.

Preferred Alternative 4. If a the rebuilding plan for gag is in effect, set the percentage of red grouper individual fishing quota allocation converted into multi-use allocation equal to zero. After NOAA

Fisheries declares gag rebuilt, set the percentage of red grouper individual fishing quota allocation converted into multi-use allocation as follows:

> Red Grouper Multi-use (in percent) = 100*[Gag annual catch limit – Gag Allocation]/Red Grouper Allocation

The red grouper multi-use percentage will be recalculated following adjustments in commercial gag annual catch limit, gag allocation, or red grouper allocation.

Discussion:

In 2010 a multi-species individual fishing quota (IFQ) system was implemented for the commercial grouper and tilefish fisheries (Reef Fish Amendment 29, GMFMC. 2008a). Multi-species IFQ program participants benefit from the creation of catch quota balancing measures such as multi-use shares which help participants respond to temporal fluctuations (e.g., recruitment pulses) and geographical variations (e.g., different areas of the Gulf) in gag and red grouper abundance. To account for varying gag to red grouper ratios, at the beginning of each fishing year a percentage of the gag and red grouper allocations are designated as multi-use allocation, valid for harvesting either red or gag grouper. Amendment 29 established that 4 percent of red grouper allocation and 8 percent of gag allocation be converted to multi-use. However, under the reduced red grouper and gag annual catch limits expected to be implemented in this amendment, it is possible that the use of multi-use allocation could result in commercial harvest of red grouper or gag exceeding its sector allocation. To prevent this from happening, adjustments need to be made to the provision for multi-use allocation in the grouper individual fishing quota system.

Alternative 1 would maintain the multi-use allocation percentages originally set in Reef Fish Amendment 29, i.e., 8% of the gag allocation and 4% of red grouper allocation converted into multi-use allocation valid for the harvest of gag or red grouper. **Alternative 1** (No Action) is expected to result in red grouper or gag harvests that would exceed specified catch limits.

Alternative 2 would set red grouper multi-use allocation based on the difference between the gag annual catch limit and individual fishing quota allocation. The existence of a gap between the annual catch limit and the individual fishing quota allocation implies that the individual fishing quota allocation is set equal to the annual catch target. In the absence of a gap, the commercial gag allocation is equal to the annual catch limit. In setting the percentage of red grouper allocation that could be converted into multi-use allocation, **Alternative 2** accounts for changes in the relative magnitude of the gag and red grouper annual catch limits and allocations considered in this amendment. In addition, under **Alternative 2**, future changes in annual catch limits and/or allocations would result in a recalculation of the percentage of red grouper allocation that can be converted into multi-use allocation while preventing the commercial gag harvest from exceeding the commercial gag annual catch limit.

If red grouper is not under a rebuilding plan, **Preferred Alternative 3** would set gag multi-use allocation based on the difference between the commercial red grouper annual catch limit and allocation. It follows that if the red grouper annual catch limit and allocation are equal, the issuance of gag multi use allocation would result in harvesting red grouper above its specified catch limit. Given the relative magnitude of the red grouper and gag annual catch limits and allocation, it is conceivable that the totality of the gag allocation could be converted to multi-use allocation and used to harvest red grouper without running the risk of exceeding the red grouper catch limit. The percentage of gag allocation converted into multi-use

allocation valid to harvest gag or red grouper is set to zero if red grouper is under a rebuilding plan, affording additional protection to the red grouper stock while it rebuilds.

Preferred Alternative 3 would also result in a recalculation of the allowable amount of multi use allocation whenever commercial red grouper and/or gag annual catch limits or allocations are adjusted. Under **Alternative 2** and **Preferred Alternative 3**, the level of flexibility afforded to individual fishing quota participants, as measured by the amount of multi use allocation issued is proportional to the difference between the commercial red grouper annual catch limit and allocation and between the commercial gag annual catch limit and allocation.

Preferred Alternative 4 would set the percentage of red grouper multi-use allocation equal to zero if a rebuilding plan for gag grouper is in effect. After the gag stock is fully rebuilt, the percentage of red grouper allocation converted into red grouper multi-use allocation valid to harvest red or gag grouper would be determined based on the difference between the gag annual catch limit and individual fishing quota allocation and on the magnitude of the red grouper annual catch limit. In effect, after the gag stock is fully rebuilt, the percentage of red grouper multi-use allocation under **Preferred Alternative 4** is equivalent to the one considered under **Alternative 2**. **Preferred Alternative 4** is expected to provide additional protection to gag while its stock is rebuilding.

Adjustments to multi-use allocations considered under this action are well within the provisions of the grouper and tilefish individual fishing quota program included in Reef Fish Amendment 29. These provisions stipulate that the Council could create new share types and adjust existing share types to further its conservation mission or to improve the management of the individual fishing quota program.

2.5 Action 5. Commercial Gag Size Limit

In 2011, there will be a large difference between the red grouper and gag commercial quotas. The gag bycatch must either be taken into account in managing the gag and red grouper quotas, or gag bycatch needs to be reduced. The commercial sector fishes in deeper waters on average than the recreational sector, and has a higher discard mortality rate. One possible way to reduce gag regulatory dead discards may be to reduce the commercial minimum size limit.

Alternative 1. No action. The commercial gag minimum size limit remains at 24 inches total length.

Preferred Alternative 2. Reduce the commercial gag minimum size limit to 22 inches total length.

Alternative 3. Reduce the commercial gag minimum size limit to 20 inches total length.

Alternative 4. Eliminate the commercial gag minimum size limit.

Discussion:

The SEDAR 10 assessment estimated that the average release mortality rate for gag in the commercial sector was 67% (Ortiz 2006). A major concern is bycatch and bycatch mortality of gag while fishermen target red grouper, due to the disproportionate amount of red grouper harvested versus gag harvested.

A 20 inch minimum size limit for gag was implemented in 1990 under Amendment 1, and remained in place from 1990-1999. During this period, handline discards (in numbers of fish) ranged from approximately 18,000 to 24,000 gag per year, and longline discards ranged from 119 to 229 gag per year. In 2000, the commercial minimum size limit for gag was increased from 20 inches total length to 24 inches total length. As a result, there was an increase in discards in both the handline and longline sectors. From 2000 to 2004, handline annual discards ranged from approximately 85,000 to 97,000 gag, while longline annual discards ranged from 688 to 785. Trip limits for commercial grouper began in 2005, and from 2005 to 2008, the number of gag discards in the handline fishery increased again, ranging from 105,000 to 121,000 fish. The longline fishery did not see any increase in discards due to the trip limit, possibly due to that sector targeting red groper more than gag. Longline discards during 2005-2008 ranged from 550 to 657 gag (Table 2.5.1).

An issue that arose during Council discussion of reducing the size limit is a greater desirability by restaurants for larger sized grouper. A reduction in the minimum size limit could result in a price differential by size and encourage high grading by fishermen. High grading is when fishermen selectively keep larger fish and discard smaller, but legally harvestable fish.

Table 2.5.1. Estimated commercial handline and longline discards in numbers for Gulf of Mexico gag. Source: January 2011 rerun of 2009 gag update assessment using commercial observer data.

	January 2011 Rerun	
Year	**Handline**	**Longline**
1990	18,022	126
1991	28,872	229
1992	22,747	141
1993	20,959	119
1994	26,747	148
1995	24,701	126
1996	24,247	135
1997	22,857	157
1998	21,981	146
1999	23,895	171
2000	97,613	778
2001	84,731	785
2002	93,866	688
2003	96,811	748
2004	91,052	726
2005	105,446	550
2006	111,450	657
2007	120,881	595
2008	110,168	618

Beginning in 2011, there will be a large difference between the red grouper and gag commercial quotas, 4.32 million pounds (red grouper) vs. 0.43 million pounds (gag) in 2011. This will result in a red grouper to gag ratio of 10:1. In 2009, the commercial ratio of red grouper to gag landings was 4:1. If commercial fishermen continue to catch gag in 2011 at the same ratio as in 2009, then 6 out of every 10 pounds of gag caught will have to be discarded due to insufficient individual fishing quota allocation. This could potentially amount as much as 1.08 million pounds of gag, of which 60%, or 648,000 pounds, could be discarded dead.

The primary focus of any additional commercial management measures will need to be on decreasing gag bycatch mortality by reducing the number of gag caught. Time and area closures that direct fishing away from areas of high gag concentrations are a possible approach and are discussed in Action 6. Reducing the minimum size limit may reduce some regulatory discards to the extent that a fisherman has individual fishing quota allocation to retain legal sized catch, but catching smaller fish will increase the number of fish needed to fill the individual fishing quota allocation, which could increase the fishing mortality rate (Table 2.5.2). Furthermore, while the percent reductions in discards may seem large, the absolute number of fish discarded is relatively small, particularly for the longline fishery (Table 2.5.1). A reduction in the size limit to 18 inches would reduce the number of discards in the handline fishery by up to 86 thousand fish, but would reduce the number of discards in the longline fishery by only 420 fish (Table 2.5.2). A reduction to 20 inches would have even less impact, reducing discards in the handline and longline fishery by about 67 thousand fish and 297 fish respectively (Table 2.5.2).

Table 2.5.2. Estimated percent increases in number of gag landed within a given IFQ share and percent and number reductions in total gag discards at minimum size limits of 18" to 24", by gear type. Source: Andy Strelcheck presentation to Council February 2011.

Vertical Line – Numbers of Fish			
Size Limit	Landings increase %	Discard reduction %	Discard reduction Numbers of fish
18"	38.2%	-79.9%	86,132
19"	35.1%	-73.3%	79,017
20"	29.7%	-62.0%	66,836
21"	23.2%	-48.4%	52,175
22"	14.9%	-31.0%	33,418
23"	7.5%	-15.7%	16,925
24"	0.0%	0.0%	0

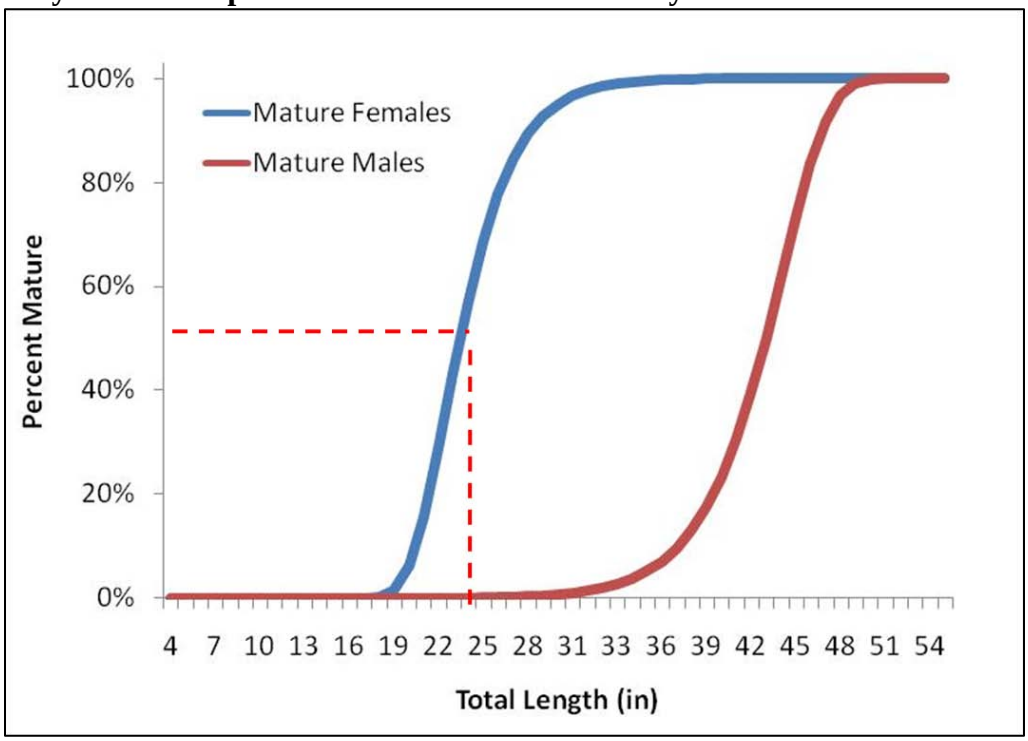
Longline – Numbers of Fish			
Size Limit	Landings increase %	Discard reduction %	Discard reduction Numbers of fish
18"	1.3%	-66.7%	420
19"	1.1%	-58.3%	367
20"	0.9%	-47.2%	297
21"	0.8%	-38.9%	245
22"	0.5%	-27.8%	175
23"	0.4%	-19.4%	122
24"	0.0%	0.0	0

Note: Estimated discard reductions in numbers of fish are based on the average number of discards during 2004-2008 as shown in Table 2.5.1

Due to the small quotas relative to historical catch levels, the primary factor affecting gag discards is expected to be availability of gag individual fishing quota allocation, at least for the first few years of the rebuilding program.

Female gag reach 50% maturity at about 23 inches (Figure 2.5.1). At smaller size limits, the majority of the fish will not yet have spawned. Reducing the size limit will reduce spawning potential and could negatively impact the rebuilding plan.

Figure 2.5.1. Gag percent maturity by size. Source: SEDAR Gag Update Assessment (SEDAR 2009a) and Andy Strelcheck presentation to Council February 2011.



Alternative 1, no action, would leave the commercial gag minimum size limit at 24 inches total length. This is approximately the size at 50% female maturity. Regulatory discards due to the minimum size limit would continue at the current rate. However, in the commercial sector, the average size of a gag caught is already near this size limit, so discards due to the size limit are relatively low.

Preferred Alternative 2 and Alternatives 3 and 4 would reduce gag bycatch by reducing the size limit and converting bycatch that is currently due to regulatory discards into retained catch. Because the 50% female maturity level is at 24", the likelihood of harvested gag being juveniles would increase. However, for commercial longline component, the average size of a gag caught is already near the size limit; thus there will be less effect on the longline component than on the vertical line component from size limit reductions (Table 2.5.2).

Preferred Alternative 2 reduces the commercial minimum size limit from 24 inches to 22 inches, matching the current recreational minimum size limit. It takes approximately six months for a gag to grow from 22 to 24 inches (3 years old to 3.5 years old). Until a fisherman's individual fishing quota allocation is reached, this alternative is expected to reduce total gag discards (live plus dead) by 31% for the vertical line component and by 27.8% for the longline component. At the same time, the number of gag needed to fill an individual fishing quota share is expected to increase by 14.9% for the vertical line component, and by 0.5% for the longline component. This would have the advantage of simplifying enforcement by having a single size limit for both sectors (assuming that the recreational size limit is not changed.) As discussed earlier, there is a potential for a price differential by size to develop due to the greater desirability of larger grouper by restaurants, but this alternative creates a minimal change.

Alternative 3 reduces the commercial minimum size limit from 24 to 20 inches. Until a fisherman's individual fishing quota allocation is reached, this alternative is expected to reduce total gag discards (live plus dead) by 62% for the vertical line component of the fishery and by 47.2% for the longline component. At the same time, the number of gag needed to fill an individual fishing quota allocation is expected to increase by 29.7% for the vertical line component, and by 0.9% for the longline component. It takes approximately one year for a gag to grow from 20 to 24 inches (from 2.5 years old to 3.6 years old). This size limit has a greater likelihood of creating a price differential by size and resulting in high grading.

Alternative 4 eliminates the minimum size limit and requires that all commercially caught gag be retained regardless of size. It also requires that a fisherman control enough allocation of gag shares to cover any gag caught. Grouper sizes in the commercial sector have been recorded as small as 11 inches prior to the implementation of size limits, but the numbers landed are few below 18 inches. At the smallest size limit analyzed, 18 inches, the expected reduction in total gag discards (live plus dead) is 79.9% for the vertical line component and 66.7% for the longline component. At the same time, the increase in number of gag needed to fill an individual fishing quota allocation is expected to be 38.2% for the vertical line component, and by 1.3% for the longline component. At size limits less than 18 inches, these values will only change to a small extent because both gears become less selective for gag at the smaller sizes. The requirement to have enough allocation effectively requires that a vessel stop fishing if it has no additional gag allocation and is in an area where gag may be caught, because it will be illegal both to discard or retain the fish. However, in the absence of on-board observers, some vessels may

continue to discard their gag bycatch, reducing the effectiveness of this requirement. To the extent that there is a market demand for larger fish, this alternative is likely to create a price differential for larger size fish. Given the limited amount of gag individual fishing quota shares being distributed, this could encourage high grading by fishermen in order to maximize the economic return of individual fishing quota shares.

2.6 Action 6. Time and Area Closures

*Note: more than one alternative and option can be selected as preferred

Preferred Alternative 1. No Action, Do not create additional time and area closures that prohibit fishing for gag and other reef fishes.

Alternative 2. Close an area that would expand the Madison-Swanson Restricted Fishing Area to the north and west (approximately 70 square nm additional), making one continuous area.

Boundaries for additional area:

1) 29° 20' N, 85° 55' W (new NW corner)
2) 29° 20' N, 85° 38' W (new NE corner)
3) 29° 17' N, 85° 38' W (current NE corner)
4) 29° 17' N, 85° 50' W (current NE corner)
5) 29° 14' N, 85° 50' W (current NW corner)
6) 29° 14' N, 85° 55' W (SW corner of extension)

Period and type of fishing closure that can be selected:

Option a: all fishing prohibited November 1 through April 30, surface trolling allowed May 1 through October 31 (Identical to Madison-Swanson and Steamboat Lumps regulations).

Option b: all fishing prohibited November 1 through April 30, all fishing allowed May 1 through October 31 (Time of year identical to Madison-Swanson and Steamboat Lumps, but different regulations).

Option c: all fishing prohibited January 1 through April 30, all fishing allowed May 1 through December 31 (Identical to current Edges regulations).

Option d: all fishing prohibited year-round.

Alternative 3. Close an area bracketing the 40 fathom contour between the current closed areas of Madison-Swanson and the Edges (approximately 244 square nm), making it one continuous area.

Boundaries for additional area:

1) 29° 6' N, 85° 38' W (Existing SE boundary of Madison-Swanson)
2) 29° 17' N, 85° 38' W (Existing NE boundary of Madison-Swanson)
3) 28° 51' N, 85° 16' W (Existing NW boundary of the Edges)
4) 28° 51' N, 85° 4' W (Existing NE boundary of the Edges)

Period and type of fishing closure that can be selected:

Option a: all fishing prohibited November 1 through April 30, surface trolling allowed May 1 through October 31 (Identical to Madison-Swanson and Steamboat Lumps regulations).

Option b: all fishing prohibited November 1 through April 30, all fishing allowed May 1 through October 31 (Time of year identical to Madison-Swanson and Steamboat Lumps, but different regulations).

Option c: all fishing prohibited January 1 through April 30, all fishing allowed May 1 through December 31 (Identical to current Edges regulations).

Option d: all fishing prohibited year-round.

Alternative 4. Modify the seasonal closure dates of The Edges 40 fathom contour area (approximately 390 square nm). Currently, all fishing is prohibited January 1 through April 30, all fishing is allowed May 1 through December 31.

Period and type of fishing closure that can be selected:

Option a: all fishing prohibited November 1 through April 30, surface trolling allowed May 1 through October 31 (Identical to Madison-Swanson and Steamboat Lumps regulations).

Option b: all fishing prohibited November 1 through April 30, all fishing allowed May 1 through October 31 (Time of year identical to Madison-Swanson and Steamboat Lumps, but different regulations).

Option c: all fishing prohibited January 1 through April 30, all fishing allowed May 1 through December 31 (Identical to current Edges regulations).

Option d: all fishing prohibited year-round.

Alternative 5. Modify the seasonal closure dates of Madison-Swanson (approximately 115 square nm) and Steamboat Lumps (approximately 104 square nm) areas. Currently, all fishing is prohibited November 1 through April 30 and surface trolling for species other than reef fish is allowed May 1 through October 31.

Period and type of fishing closure that can be selected:

Option a: all fishing prohibited November 1 through April 30, surface trolling allowed May 1 through October 31 (Identical to Madison-Swanson and Steamboat Lumps regulations).

Option b: all fishing prohibited November 1 through April 30, all fishing allowed May 1 through October 31 (Time of year identical to Madison-Swanson and Steamboat Lumps, but different regulations).

Option c: all fishing prohibited January 1 through April 30, all fishing allowed May 1 through December 31 (Identical to current Edges regulations).

Option d: all fishing prohibited year-round.

Note: *In the alternatives, the phrase “all fishing prohibited” means the same fishing restrictions that apply during November through April for the Madison-Swanson and Steamboat Lumps restricted fishing areas as described in 50 CFR 622.34(k)(3), i.e., “all fishing is prohibited, and possession of any fish species is prohibited, except for such possession aboard a vessel in transit with fishing gear stowed as specified in paragraph (k)(4) of this section. The provisions of this paragraph, (k)(3), do not apply to highly migratory species”.

Discussion:

The main objective of time and area closures in Amendment 30B was to protect spawning aggregations of gag and to protect a portion of the male gag population particularly vulnerable to fishing during spawning (Gilmore and Jones 1992; Coleman et al. 1996; Koenig et al. 1996; GMFMC 2008a). Gag spawning occurs on offshore reefs from southeast of Apalachicola to west of Tampa, and possibly further to the south (Koenig et al. 1996). Gag spawn from mid-January until mid-April, but peak spawning occurs in March (SEDAR 10 2006). Red grouper spawn from February until mid-July, with peak spawning occurring in March-May (Fitzhugh et al. 2006). Currently there are three marine protected areas in the Gulf of Mexico (Figure 2.6.1). Two areas, Madison-Swanson and Steamboat Lumps are closed to all fishing November 1 through April 30, with surface trolling allowed May 1 through October 31. These closed areas were established in 1999 through a regulatory amendment (GMFMC 1999) and implemented in 2000. There have been some poaching issues reported within the marine protected areas since their closure in 1999 (discussed later), but a draft report suggests the importance of these marine protected areas may go beyond providing protection for spawning aggregations. For example, the number of male gag (including transitional males) were found to be greater inside the Madison-Swanson protected area compared to outside the reserve not only during the time spawning aggregations were formed (December-March), but also post-spawning (April-July). This information suggests that Madison-Swanson not only provides protection while gag are forming spawning aggregations, but at other times of the year (Draft Final MARFIN Report NA07NMF4330120, FSU Grant No. 022106; C. Koenig and F. Coleman 2011).

The Council added a third marine protected area, the Edges, which is closed to all fishing January 1 through April 30, but open to all fishing May 1 through December 31. This seasonal-area closure was established through Amendment 30B and implemented in 2009 (GMFMC 2008). All of the above alternatives, including the existing Madison-Swanson, Steamboat Lumps, and Edges restricted fishing areas, are located within the dominant spawning areas and seasons for gag.

In addition to protecting spawning aggregations, closed areas where gag and red grouper are abundant could reduce bycatch and therefore bycatch mortality of gag while fishers are targeting red grouper. Strelcheck et al. (2010) used observer data from 2006-2010 and reported gag and red grouper were only caught on the same set 12 to 38% of all the sets fished in statistical zones 4 through 8[9]. Only sets landing at least one gag or one red grouper were included in the analysis of statistical zones 4 through 8 (Figure 2.6.2). This analysis found gag and red grouper were caught together in the current closed areas (Madison-Swanson, Steamboat Lumps, and the Edges) and the two additional alternatives for area closures (**Alternatives 2** and **Alternative 3**). The proposed and current closed areas are within statistical zones 6 and 8 where 18% and 20% of the gag and red grouper were caught on a set together respectively (Figures 2.6.2 and 2.6.3). Due to the release of a limited commercial gag quota and the ratio of gag to red grouper quota being reduced, gag bycatch may increase.

[9] The Gulf of Mexico is divided into 21 statistical zones (fishing areas) developed by NMFS to simplify reporting of fisheries landings and effort data.

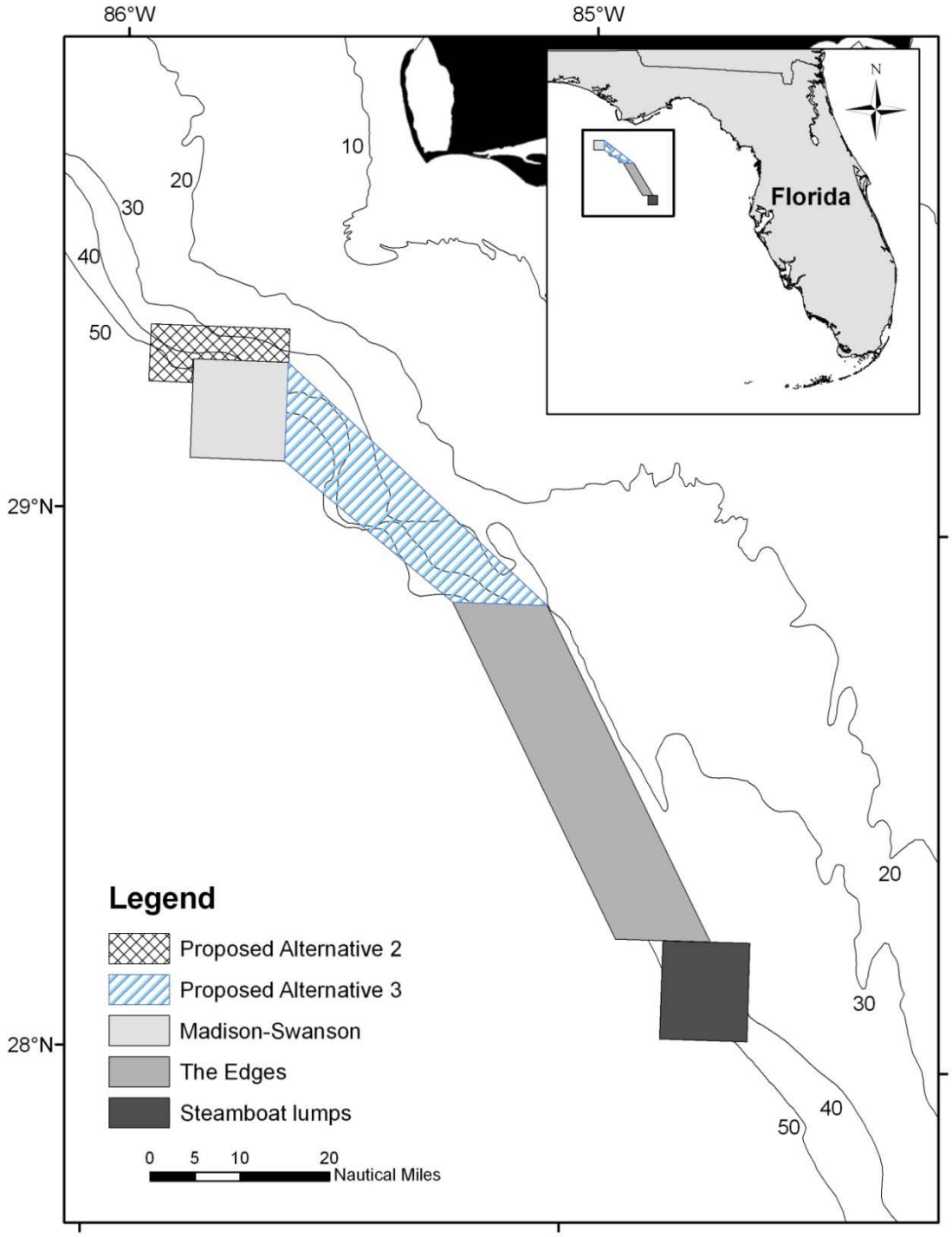


Figure 2.6.1. Current west Florida Marine Protected Areas (Madison-Swanson, the Edges, and Steamboat Lumps) and proposed Alternative 2 and 3 area closures.

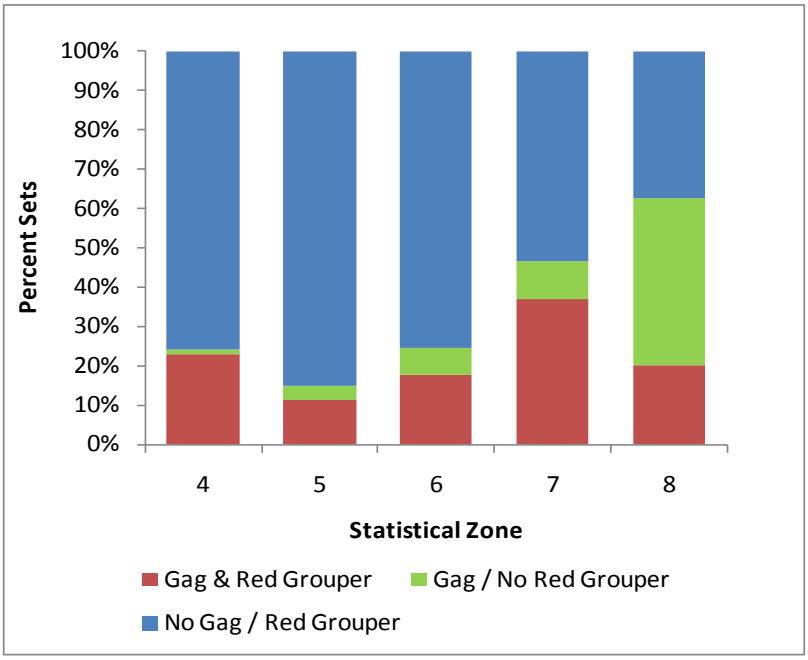


Figure 2.6.2. Percent of observed sets (all gears) from the commercial Reef Fish Observer Program (2006-2010) landing gag and red grouper, gag only, and red grouper only by statistical zone; only sets landing at least one gag or one red grouper were included. Source: A. Strelcheck and N. Farmer, PowerPoint Presentation February 2011.

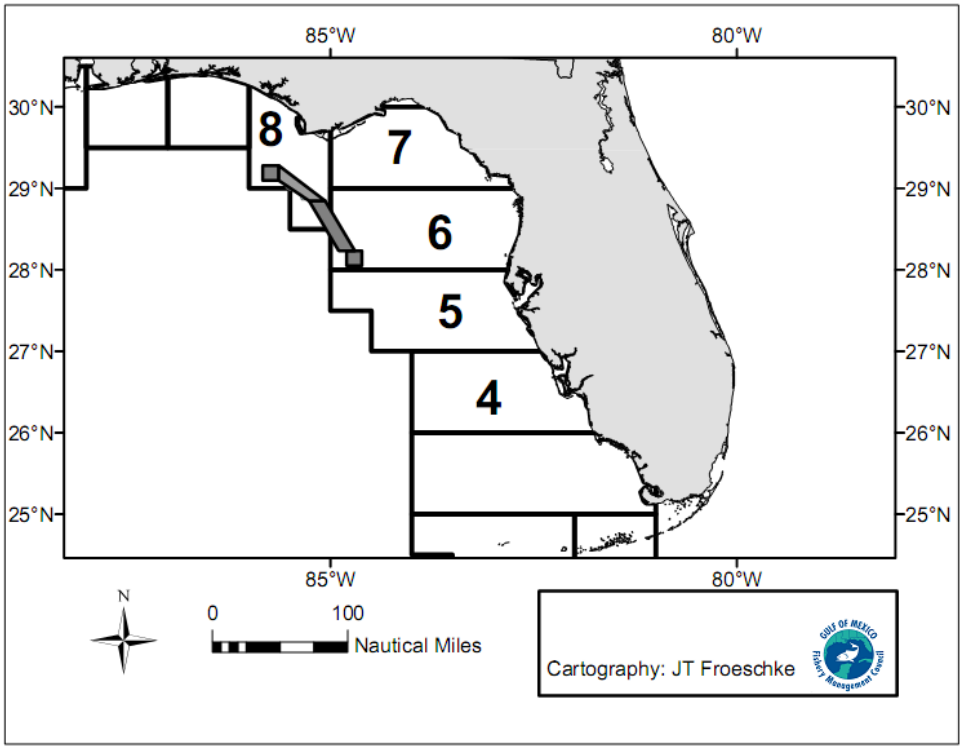


Figure 2.6.3. Statistical zones 4-8 with current and proposed area closures.

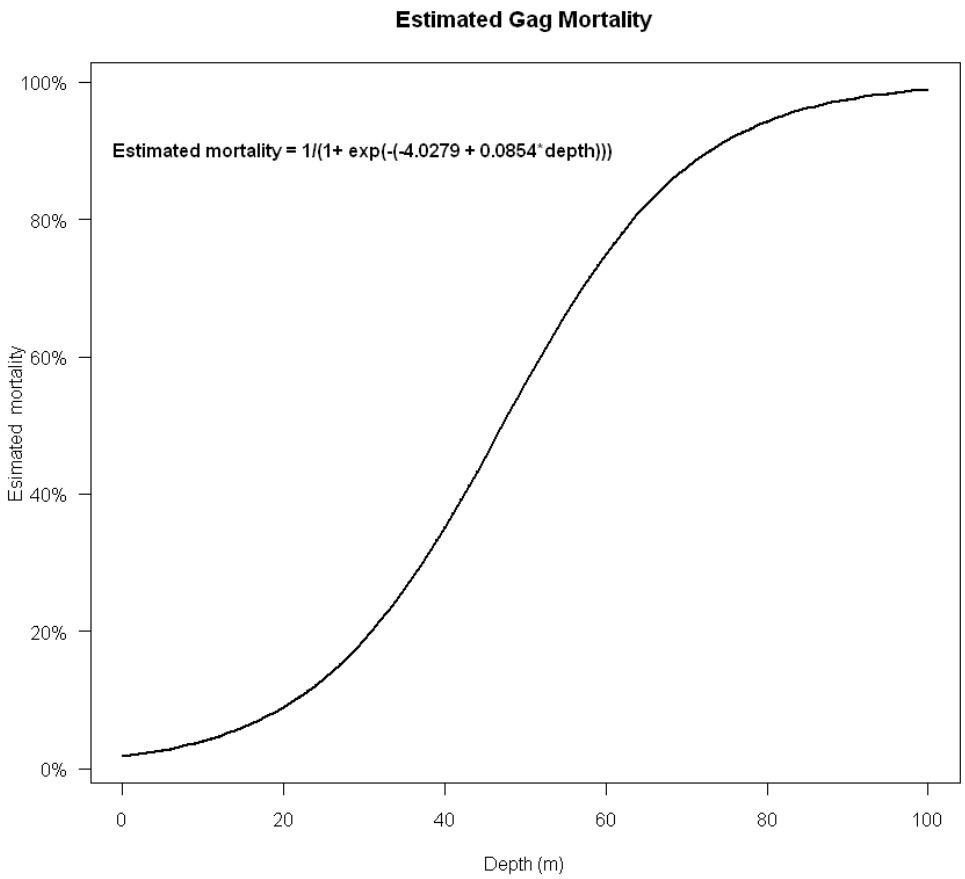


Figure 2.6.4. Estimated discard mortality of gag by depth (m) from the northern Gulf of Mexico. Source: Burns et al. (2002).

Studies conducted on gag and red grouper discards determined that discard mortality increases with increasing depths (Burns et al. 2002; McGovern et al. 2005). Therefore, it may be beneficial to close areas where red grouper and gag are abundant, particularly at greater depths due to increasing mortality as documented by Burns et al. (2002) study of depth-of-capture estimated discard mortality (Figure 2.6.4). This study focused on the commercial component of the reef fish fishery in the northern Gulf, capturing gag and other reef fish species with electric reels and circle hooks. When undersized gag and other reef fish were caught, they were tagged and then returned to capture depth in cages to document depth-of-capture related mortality. Burns et al. (2002) estimated released fish captured from 50 m had a 50% mortality rate and by 100 m a 100% estimated mortality rate (Figure 2.6.4). Using the estimated discard mortality of gag data and applying it to the current and proposed area closures resulted in high estimated discard mortality ranging from 84 to 95% (Figure 2.6.5). In addition to mortality estimates, depth-related trauma was documented to intensify with increasing depths, such as everted (turned outwards or inside out) stomach, intestines, and eyes. A similar study was conducted in the South Atlantic on depth-related mortality of gag from tagging studies utilizing the commercial fleet, but included greater depths than the Gulf study (McGovern et al. 2005). Their study showed similar depth related mortality estimates ranging from 14% at 15 m to 95% at 95 m (McGovern et al. 2005).

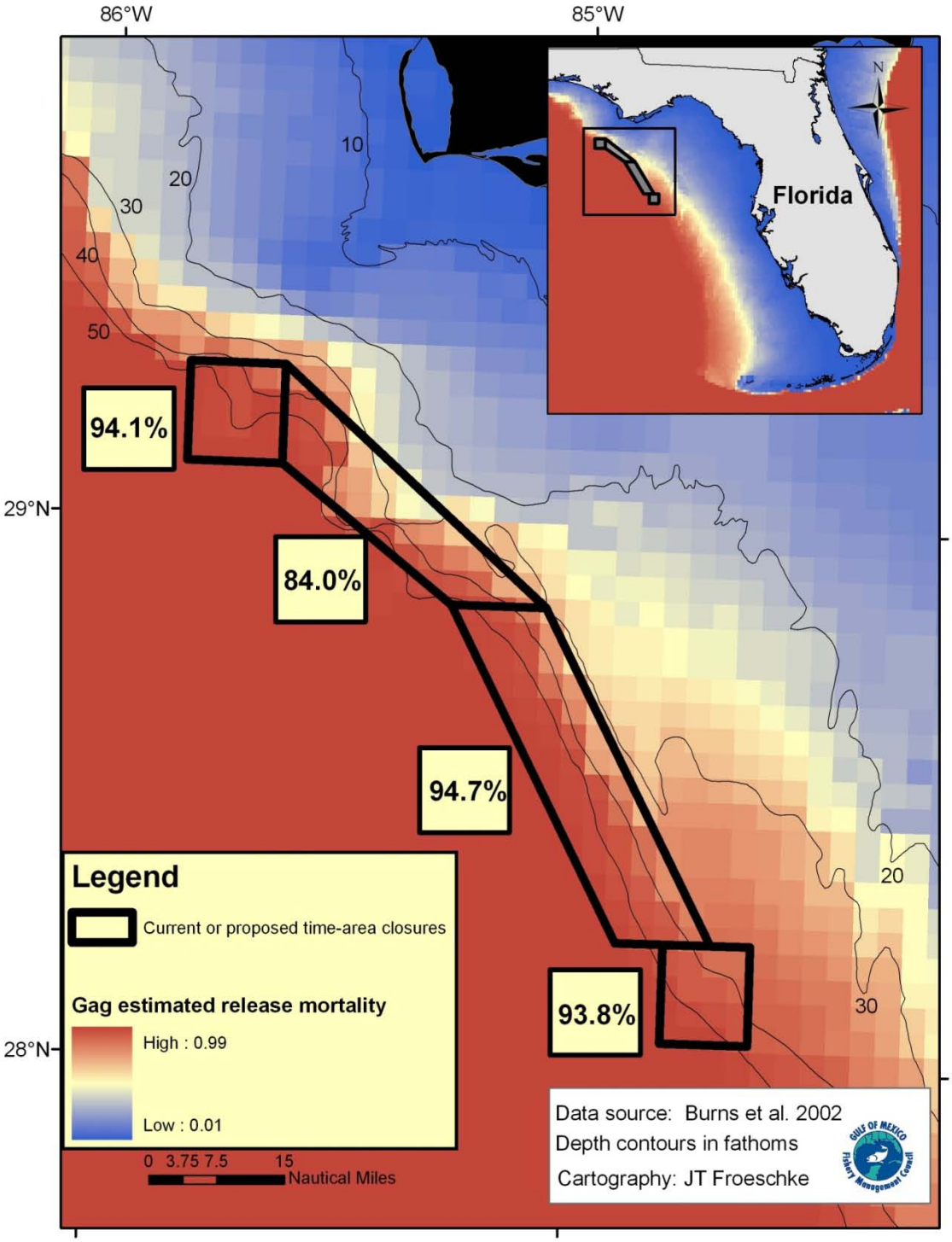


Figure 2.6.5. Estimated discard mortality of gag in current and proposed area closures from the northeastern Gulf of Mexico based on tag returns and the logistic model fit in Figure 2.6.4. Source: Burns et al. (2002).

All current and proposed additional area closures are in deep water (75-150 m), and if fishers were targeting other reef species in those areas, bycatch and bycatch mortality of gag may increase with decreased quota. Adult gag can typically be found over a broad range of depths compared to other shallow-water groupers the Council manages. For example, adult gag typically range from shore to 120 m; whereas, adult red grouper typically range from 40 to 150 m (Parker and Mays 1998; C. Koenig personal communication 2011). Farmer et al. (2010) found red grouper, black grouper, gag, and scamp were caught together most often in the commercial sector. Other reef fish that were caught with gag by the commercial longline component of the reef fish fishery included: red grouper, yellowedge grouper, tilefish (golden), and snowy grouper whereas the commercial vertical line component of the reef fishery caught gag with the following species: red snapper, vermilion snapper, and red grouper.

Reductions in gag fishing effort are expected from closing documented areas where high densities of gag and gag spawning aggregations are known to occur. However, it is difficult to quantify the magnitude of these reductions as well as any reductions in bycatch or bycatch mortality due to effort shifting outside these closed areas. The estimated percent landings within the closed area by period could provide guidance, but are not recommended for use as an equivalent percent reduction in gag landings and bycatch that would be achieved if the areas were closed (Table 2.6.1). This is primarily due to the limited data time series and effort shifting outside the closed areas. **Option a** allows surface trolling May 1 through October 31 with the assumption that surface trolling does not catch reef fish due to the closures being located in deep water, therefore it was excluded from this analysis as it is similar to **Option d**.

Table 2.6.1. Current and proposed seasonal area closures, size of the area in square nautical miles (nm), period of closure, percentage of the west Florida shelf that would be closed (% of shelf closed), and percentage of gag and red grouper landings in the closed area.

Closure	Area (nm^2)	Period	% of shelf closed	% landings in area Gag	Red grouper
Pref. Alt 1-None	**0**	**No Closure**	**0**	**0**	**0**
Alt 2-Extension of Madison-Swanson	70	b. (Nov 1-Apr 30)	0.2	0.63	0.08
Alt 2-Extension of Madison-Swanson		c. (Jan 1-Apr 30)		0.55	0.06
Alt 2-Extension of Madison-Swanson		d. Year round		1.25	0.39
Alt 3-Extension of the Edges	244	b. (Nov 1-Apr 30)	0.7	3.98	0.43
Alt 3-Extension of the Edges		c. (Jan 1-Apr 30)		3.23	0.26
Alt 3-Extension of the Edges		d. Year round		5.92	0.93
The Edges	390	b. (Nov 1-Apr 30)	1.1	5.00	1.08
The Edges		c. (Jan 1-Apr 30)		4.13	0.57
The Edges		d. Year round		8.92	2.41

Source: A. Strelcheck and N. Farmer, Southeast Regional Office, July 2011. Notes: Analysis was derived from vessel monitoring systems linked with logbook landings from January 2008-August 2009.

Preferred Alternative 1 is the no action alternative and would not create time and area closures prohibiting fishing for gag or other reef fishes. The Council selected the no action alternative as preferred primarily because of the negative social and economic impacts compared to the measurable biological benefits. These effects are discussed briefly in this section and in greater detail in Section 5. For

example, by closing a particular area numerous biological and ecological benefits were expected; however, these were not quantifiable due to effort shifting outside the closed areas. As previously discussed, only the percent landings by the commercial sector of gag and red grouper could be obtained by area and season (Table 2.6.1). In general closing fishing areas remains a controversial issue and requires well defined rationale and trade-offs for closing a fishing area, particularly large fishing area(s). The Council had previously selected Alternative 3 option c at the April 2011 meeting as the preferred alternative, but this did not pass during the full Council meeting in August 2011 when the Council took final action on this amendment. Other Councils, such as the South Atlantic Council have used area closures when a species has been declared overfished as an additional effort to rebuild the stock.

Alternative 2 would expand the Madison-Swanson Restricted Fishing Area to the north and west, named the Extended Madison-Swanson area in Amendment 30B (Figure 2.7.1). This area is smaller (approximately 70 square nautical miles) than the other area closures, but has gag densities equal to or higher than the Edges (Harter and David 2009). **Alternative 2** would close waters that range in depth from 25-83 fathoms. Increasing the area of a current closure could also improve the effectiveness of the existing Madison-Swanson reserve by increasing the probability of protecting the home range of adult gag. There is some evidence that upon reaching older ages and moving to outer shelf depths associated with spawning habitats, gag have higher site fidelity (Coleman et al. 1996). Ongoing work suggests large male "copperbelly" gag tagged in spawning areas show relatively high site fidelity suggesting that time and area closures aid in protection of spawning aggregations (C. Koenig, personal communication; SEDAR 10 2006).

Another assumption about effective marine protected areas requires that closed areas are of sufficient size to protect enough individuals to maintain genetic diversity and maintain the species population throughout the stock's range. During an Ecosystem Modeling workshop on red snapper in 2008, the workgroup made preliminary recommendations, but stated they were limited by a lack of information on the spatial distribution of hard bottom habitat. Their preliminary evaluation of marine reserves and ecosystem models based on simulation trials was that the offshore marine protected areas are likely to have almost no impact on fish abundance or fishing rates, because effort would be displaced from the protected offshore areas to potentially target inshore areas where younger fish occur. Only the very large cross-shelf onshore-offshore areas that protect a range of species from fishing throughout their life-cycle had impacts on fishing rates comparable to those achievable through extensive seasonal closures (Ecosystem Modeling Workshop Report 2008). However, increasing the size of a closed area may reduce "edge effects". Edge effects have been documented in areas where multiple closed marine protected areas exist. Fishers "fish the line" or as close to the edge of the reserve as possible hoping to catch species that spill over from the reserve into legally fishable waters (Kellner et al. 2007). Based on analysis of commercial landings in **Alternative 2, Option d** the percent landings attributed to that area for gag and red grouper are 1.3 to 0.4%, respectively (Table 2.6.1). This information suggests that commercial fishers may not be actively targeting red grouper in this area and closing this area may not reduce bycatch mortality of gag.

Alternative 3 would close the area bracketing the 40 fathom contour between the current closed areas of Madison-Swanson and the Edges, an area approximately 244 square nautical miles for a period of four months during peak spawning (**Option c**). Waters in this area range in depth from 22-68 fathoms. The Edges, currently closed January 1 through April 30 to protect spawning aggregations, is 62% larger than **Alternative 3**. The percent landings attributed to the current Edges closure from January 1 through April 30 is 4.1% for gag and 0.6% for red grouper (Table 2.6.1). If the current Edges closure is combined with **Option c** the total percent landings attributed to that area for gag is 7.4% and red grouper is 0.8% (Table 2.6.1). This area was anecdotally documented by fishers as an area with gag spawning aggregations with

a subsequent study by Koenig et al. (1996) providing evidence for the fishers' observations. Spawning depths range from 27 to 66 fathoms, but are concentrated around 44 fathoms (Koenig at al. 1996). Based on commercial landings data from January 2008-August 2009 the percentage of gag and red grouper landings from this area if closed year round are greater than those in **Alternative 2**.

There are four proposed options for modifying the period and type of fishing closure that can be applied to any of the four alternatives. There are numerous benefits to having consistent regulations for all of the areas, such as simplifying the regulations, reducing public confusion, aiding enforcement, and voluntary compliance. **Option a** would prohibit all fishing November 1 through April 30, but surface trolling would be allowed May 1 through October 31. These regulations are identical to the current Madison-Swanson and Steamboat Lumps regulations. The reductions expected from **Option a** are similar to **Option d**. **Option b** would prohibit all fishing November 1 through April 30, but allow all fishing May 1 through October 31. The time period the fishing season is closed is identical to Madison-Swanson and Steamboat Lumps, but the fishing regulations are different. **Option c** would prohibit all fishing January 1 through April 30, and allow all fishing May 1 through December 31. The Council selected these alternatives as preferred to maintain consistency with the adjacent closed area, the Edges. The period this area would be closed is expected to protect gag spawning aggregations and reduce bycatch of gag while fishers are targeting other reef fish species. These regulations are identical to current Edges marine protected area regulations. **Option d** would prohibit all fishing year-round. See Table 2.6.1 for the percentage of gag and red grouper landings attributed to each area by period.

Alternative 4 would modify the seasonal closure dates of the Edges, a marine protected area implemented in 2009 along the 40 fathom contour. Modifying the closed season from the current closure prohibiting all fishing January 1 through April 30 (**Option c**), to any of the other options would provide an increase in the number of months the marine protected area is currently closed, thereby providing additional protection to gag and other reef fish species from fishing and bycatch mortality (**Option a**, **b**, and **d**). However, **Option b** would allow all fishing May 1 through October 31, whereas **Option a** would only allow surface trolling during the same time period providing additional protection to reef fishes. **Option d** would provide year-round protection to all reef fish species. A year-round fishing closure could be more beneficial for rebuilding the gag stock if large resident males are protected from fishing mortality both during and post-spawning. The bycatch mortality of gag could also be reduced based on commercial landings data from January 2008-August 2009. The percentage of gag and red grouper landings attributed to the Edges if closed year round are 8.9% and 2.4%, respectively (**Alternative 4, Option d**).

Alternative 5 would modify the seasonal closure dates of the two current marine protected areas implemented in 1999, Madison-Swanson and Steamboat Lumps. Modifying the closed season from the current closure prohibiting all fishing November 1 through April 30, but allowing surface trolling May 1 through October 31 (**Option a)** would decrease the number of months the marine protected area is currently closed, thereby providing less protection to gag and other reef fish species if **Option c** was selected. **Option b** would provide less protection to reef fish during the open season because all fishing is allowed. **Option d** would close all fishing year-round providing the most protection to gag and other reef fish species. Because these two marine areas have been closed since 1999, the percentage of red grouper and gag landings from these areas was not included.

It is possible that the proposed additional closed areas, **Alternatives 2** and **Alternative 3,** and the current three marine protected areas could be closed during the same period of time. If all areas were selected to be closed at one time, the total area closed would be 923 square nautical miles off the west coast of Florida. This would be a substantial area and could have positive impacts to the physical and biological

environments. The approximate distance from shore to the center of the proposed or current marine protected areas are estimated as follows: **Alternative 2** is 38 miles, **Alternative 3** is 46 miles, Madison-Swanson is 43 miles, the Edges is 85 miles, and Steamboat Lumps is 111 miles. The actual distances from port of origin to the center of the closed marine protected areas are likely greater.

Given the distance from shore for both the current and proposed marine protected areas, it is probable that fewer recreational than commercial fishers would be impacted by these proposed closures. The Council was given two presentations, one in August 2010 and one in February 2011, with additional alternatives for time and area closures closer to shore that are more likely to impact the recreational sector. However, the percent reduction that would be achieved by closing such areas was difficult to quantify and with the available information to date, the Council has not added additional time and area closures that are closer to shore for analysis in this amendment (A. Strelcheck and N. Farmer, NOAA Fisheries Service, Presentations in October 2010 and February 2011 to the Gulf Council).

2.7 Action 7. Gag, Red Grouper, and Shallow-water Grouper Accountability Measures

2.7.1 Action 7.1 Gag, red grouper, and shallow-water grouper commercial accountability measures

The accountability measures implemented in Amendment 30B for red grouper and gag were established under the single quota system and do not fully reflect changes that occurred in the commercial fishery when the individual fishing quota system was implemented in 2010. Individual fishing quota programs are considered accountability measures in and of themselves. Therefore, the accountability measures put in place through Amendment 30B are no longer needed.

> **Alternative 1.** No action. Retain the existing accountability measures for gag, red grouper, and shallow-water grouper where if commercial landings, reach or are projected to reach the red grouper, gag, or shallow-water grouper quota, then the commercial shallow-water grouper fishery will be closed.
>
> **Preferred Alternative 2.** The accountability measures for the gag, red grouper and shallow-water grouper commercial sector will be the current individual fishing quota program.

Discussion:

Alternative 1, no action, would leave the current accountability measures for the commercial sector in place. The measures, as written now, state that if commercial landings, as estimated by the Southeast Fisheries Science Center, reach or are projected to reach the red grouper, gag, or shallow-water grouper quota, then the Assistant Administrator for Fisheries will file a notification closing the commercial shallow-water grouper fishery. In addition, if despite such a closure, commercial red grouper, gag, or shallow-water grouper landings exceed the respective annual catch limits, then the Assistant Administrator would file a notification maintaining the prior year's red grouper, gag, or shallow-water grouper commercial quota in the following fishing year. The problem with these measures is they are inconsistent with the individual fishing quota program put in place through Amendment 29 (GMFMC 2008a). This program allocates pounds to individual fishermen based on the number of shares they have. The fishermen can then use this allocation to land fish throughout the year. They are held to their allocation through a strict reporting system. After an allocation is used up, fishermen can no longer fish for the particular species or species group unless they purchase shares or allocation from another fisherman. They are allowed an overage, but this overage can only occur on their last trip and cannot exceed 10% of the allocation they have left. This overage is deducted from their allocation for the next year.

Preferred Alternative 2 would replace the current accountability measures with the individual fishing quota program already in existence, but has not been declared the accountability measure for shallow-water grouper. Individual fishing programs are considered proactive accountability measures because they put measures in place ahead of time to decrease the likelihood that annual catch limits are exceeded. Individual fishing quota programs are consistent with National Standard 1 guidance in that they provide a mechanism to monitor and prevent catches from exceeding annual catch limits. The current management program to set the quotas used for allocating harvest uses a more conservative catch target based on the fishing mortality rate associated with optimum yield to further minimize the risk of exceeding the annual catch limit.

Some concern has been expressed from the public that species managed under individual fishing quota programs may need additional accountability measures. It is possible some fish (illegally landed fish) may not be counted against the fishery's overall annual catch limit and are vulnerable to overharvest. However, buffers exist in the current individual fishing quota programs that reduce the risk that an annual catch limit will be exceeded. Currently, the annual catch limits are greater than the target catches upon which the species quotas are based. In fact, using annual catch targets can be considered a proactive accountability measure. For red grouper and gag, the respective quotas on which the individual fishing quota allocations are based is the yield associated optimum yield (annual catch target level) and are not based on higher fishing mortality (F) yield streams used for determining the respective annual catch limits and overfishing limits (e.g., F_{MSY}). The quotas the tilefish and deepwater grouper individual fishing quota programs are based on are pro-active quotas and put in place through Secretarial Amendment 1 (GMFMC 2004a) and Amendment 30B (GMFMC 2008b), respectively, to protect the stocks from effort shifting as a result of shallow-water grouper quota closures that were occurring because of reduced red grouper abundances. For shallow-water grouper, the current 0.41 million pound quota for species (GMFMC 2008b) other than gag and red grouper is based on 2001-04 average landings and put in place through Amendment 30B (GMFMC 2008b). This quota is lower than the previous shallow-water grouper allowance (after subtracting out gag) put in place through Secretarial Amendment 1 (GMFMC 2004a). One final note with regard to buffers between the harvest and the annual catch limit is the harvest of fish through all the programs has been less than the quota for the individual species and species complexes. Therefore, the targeted harvests, and consequently the annual catch limits, have not been exceeded.

2.7.2 Action 7.2. Gag and red grouper recreational accountability measures

Current recreational accountability measures for gag and red grouper have no provisions for handling overages or in-season measures as allowed for under National Standard 1 guidelines. Overage adjustments are needed particularly for gag to follow guidance that states stocks and stock complexes in rebuilding plans, the accountability measures should include overage adjustments that reduce the annual catch limits in the next fishing year by the full amount of the overages, unless the best scientific information available shows that a reduced overage adjustment, or no adjustment, is needed to mitigate the effects of the overages.

Alternative 1. No action. Retain the existing accountability measures for gag and red grouper. These measures are if recreational landings, as estimated by the Southeast Fisheries Science Center following the conclusion of the fishing year, exceed the red grouper or gag annual catch limits, the Assistant Administrator for Fisheries will file a notification maintaining the prior year's red grouper or gag target catch level. In addition, the notification would reduce the length of the recreational shallow-water grouper fishing season in the following year by the amount necessary to ensure recreational gag and red grouper landings do not exceed the recreational target catch level for that fishing year.

Alternative 2. Add an overage adjustment to the existing accountability measures should gag or red grouper be overfished.

- If the annual catch limit is exceeded and a stock is under a rebuilding plan, the overage adjustment will be equal to the full amount of the overage, unless the best scientific information available shows that a greater, lesser, or no overage adjustment is needed to mitigate the effects of the overage.

Alternative 3. Add in-season accountability measures to close a season early if needed to the existing accountability measures.

- If gag or red grouper landings are projected to exceed the annual catch limit, as estimated by the Southeast Fisheries Science Center, the Assistant Administrator for Fisheries will file a notification closing the recreational harvest for the species projected to reach its annual catch limit for the rest of the fishing year on the date the annual catch limit is projected to be harvested. If the harvest, as estimated by the Southeast Fisheries Science Center, has been found to exceed the annual catch limit, the Assistant Administrator for Fisheries will file a notification closing the recreational harvest for the species whose annual catch limit was projected to be exceeded immediately for the rest of the fishing year.

Preferred Alternative 4. Add an overage adjustment to be applied when gag or red grouper are considered overfished and in-season accountability measures to close a season early if needed to the existing gag and red grouper accountability measures.

- If the annual catch limit is exceeded and a stock is under a rebuilding plan, the overage adjustment will be equal to the full amount of the overage, unless the best scientific information available shows that a greater, lesser, or no overage adjustment is needed to mitigate the effects of the overage.

- If gag or red grouper landings are projected to exceed the annual catch limit, as estimated by the Southeast Fisheries Science Center, the Assistant Administrator for Fisheries will file a notification closing the recreational harvest for the species projected to reach its annual catch limit for the rest of the fishing year on the date the annual catch limit is projected to be harvested. If the harvest, as estimated by the Southeast Fisheries Science Center, has been found to exceed the annual catch limit, the Assistant Administrator for Fisheries will file a notification closing the recreational harvest for the species whose annual catch limit was projected to be exceeded immediately for the rest of the fishing year.

Discussion:

The purpose of this section is to consider alternatives to enhance the current recreational red grouper and gag accountability measures. Accountability measures are designed to prevent annual catch limits from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The National Standard 1 guidelines for accountability measures identify two types. These are in-season accountability measures and accountability measures for when the annual catch limit is exceeded (post-season). These accountability measures are not mutually exclusive and should be used together where appropriate.

Alternative 1, no action, leaves the current accountability measures for the recreational sector in place. Currently, if recreational landings, as estimated by the Southeast Fisheries Science Center following the conclusion of the fishing year, exceed the red grouper or gag annual catch limits, the Assistant Administrator for Fisheries will file a notification maintaining the prior year red grouper or gag target catch level. In addition, the notification will reduce the length of the recreational shallow-water grouper fishing season in the following year by the amount necessary to ensure recreational gag and red grouper landings do not exceed the recreational target catch level for that fishing year. To compare gag and red grouper recreational landings to the annual catch limits, the recreational landings are averaged over a three-year period and compared to the annual catch limit. If the annual catch limit is exceeded, then an overage adjustment is invoked where target catches, quotas, and annual catch limits will remain at the 2011 levels until a subsequent amendment is implemented. The current accountability measures do not

include in-season management measures or an overage adjustment should either the gag or red grouper stocks be determined as overfished (gag are currently in an overfished condition). These are recommended by the National Standard 1 guidance as components of accountability measures and are currently being considered by the Council for the management of other reef fish species in the generic annual catch limit amendment.

Alternative 2 would add an overage adjustment to the current accountability measures when stocks are undergoing a rebuilding plan. National Standard 1 Guidance (50 CFR 600.310(g)(3)) suggests the overage adjustments reduce the annual catch limit 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 is in addition to the current overage adjustment that would not allow annual catch limits to increase if exceeded in the previous year. **Alternative 2** also follows the National Standard 1 guidance and would simply require any overage to be subtracted from the annual catch limit in the subsequent year if the annual catch limit were exceeded with the caveat that the annual catch limit reduction could be more or less if scientific information indicated otherwise. If this alternative were selected as the preferred alternative, it would apply immediately to gag because it would be subject to the rebuilding plan proposed in this amendment (**Action 1**).

The current gag, red grouper, and shallow-water grouper recreational sector accountability measures do not include any in-season accountability measures. National Standard 1 guidelines indicate in-season monitoring and management measures should be included in fishery management plans whenever possible to reduce the likelihood annual catch limits will be exceeded within a fishing year. Guidance (§ 600.310(g)(2)) also indicates that if the Council were not to select in-season accountability measures for a stock, ''For fisheries without in-season management control to prevent the annual catch limit from being exceeded, accountability measures should utilize annual catch targets that are set below annual catch limits so that catches do not exceed the annual catch limit.'' **Alternative 3** would provide the Council with an in-season accountability measure that would end the fishing season at a time that minimizes the risk the annual catch limit will be exceeded or close the fishery if the annual catch limit has been projected to have been exceeded. It should be noted that the Council does use annual catch targets in its management of both red grouper and gag.

Preferred Alternative 4 would add both the overage adjustment of **Alternative 2** and the in-season accountability measures of **Alternative 3** to the current gag and red grouper accountability measures. Combining these measures would provide a more complete set of accountability measures for gag and red grouper. Rationale for these measures is provided above.

3 Description of the Fishery and Affected Environment

3.1 Description of the Affected Physical Environment

The physical environment for reef fish, including gag and red grouper, has been described in detail in the EIS for the Generic Essential Fish Habitat Amendment and is incorporated here by reference (GMFMC 2004b). The Gulf has a total area of approximately 600,000 square miles (1.5 million kilometers^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, the discharge of freshwater into the northern Gulf, and a semi-permanent, anticyclonic gyre in the western Gulf. Gulf surface water temperatures normally range from 12º C to 29º C (54º F to 84º F) depending on time of year. In the Gulf, adult red grouper are found on coral reefs, flat rock perforated with solution holes, caverns and crevices of limestone reef, and hard bottom habitats as well as artificial reefs (Moe 1969; Bullock and Smith 1991). The vast majority of gag are caught on the west coast of Florida from northern Pinellas County to the northern extent of the state (Schirripa and Goodyear 1994). Adult gag are associated with bottom topographies on the continental shelf which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings (GMFMC, 2004). Eggs and larvae are pelagic with juveniles settling out to coastal seagrass beds.

The Deepwater Horizon MC252 oil spill has affected at least one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The impacts of the Deepwater Horizon MC252 oil spill on the physical environment are expected to be significant and may be long-term. However, the oil remained outside most of the west Florida Shelf where red grouper and gag are particularly abundant (GMFMC 2004b). 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, some even deeper than the location of the broken well head. Floating and suspended oil washed onto shore in several areas of the Gulf as were 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.

Oil could exacerbate development of this year's hypoxic "dead" zone in the Gulf of Mexico as could higher than normal input of water from the Mississippi River drainage. For example, oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant also consume oxygen; this could lead to further oxygen depletion. However, the hypoxic "dead" zone occurs in the northern Gulf of Mexico, not on the west Florida shelf.

Environmental Sites of Special Interest Relevant to Red Grouper (Figure 3.1.1)

Longline/Buoy Gear Area Closure - Permanent closure to use of these gears for reef fish harvest. The closure applies to inshore of 20 fathoms off the Florida shelf from September through May, inshore of 35 fathoms off the Florida shelf from June through August, and inshore of 50 fathoms year round for the remainder of the Gulf (72,300 square nautical miles).

Madison/Swanson and Steamboat Lumps Marine Reserves - No-take marine reserves sited on gag spawning aggregation areas where all fishing except for surface trolling during May through October is prohibited (219 square nautical miles).

The Edges – No-take area closure from January 1 to April 30. All commercial and recreational fishing or possession of fish managed by the Council is prohibited. The intent of the closure is to protect gag and other groupers during their respective spawning seasons. Possession is allowed when transiting the area if gear is stowed in accordance with federal regulations. The boundaries of the closed area are: Northwest corner = 28º 51'N, 85º 16'W; Northeast corner = 28º 51'N, 85º 04'W; Southwest corner = 28º 14'N, 84º 54'W; Southeast corner = 28º 14'N, 84º 42'W.

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

Additionally, Generic Amendment 3 for addressing Essential Fish Habitat requirements establishes an education program on the protection of coral reefs when using various fishing gears in coral reef areas for recreational and commercial fishermen.

Individual reef areas and bank HAPCs of the northwestern Gulf 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 use of some fishing gear that interacts with the bottom (263.2 square nautical miles). Subsequently, some of these areas were made a marine sanctuary by NOS and this marine sanctuary is currently being revised. 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 interfacing with bottom (348 square nautical miles).

Pulley Ridge HAPC - A portion of the HAPC where deep-water 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 square nautical miles).

Stressed Areas for Reef Fish - Permanent closure Gulf-wide of the near shore waters to use of fish traps, power heads, and roller trawls (i.e., "rock hopper trawls") (48,400 square nautical miles).

Alabama Special Management Zone - In the Alabama special management zone, fishing by a vessel operating as a charter vessel or head boat, a vessel that does not have a commercial permit for Gulf reef fish, or a vessel with such a permit fishing for Gulf reef fish, is limited to hook-and-line gear with no more than three hooks. Nonconforming gear is restricted to bag limits, or for reef fish without a bag limit, to 5% by weight of all fish aboard.

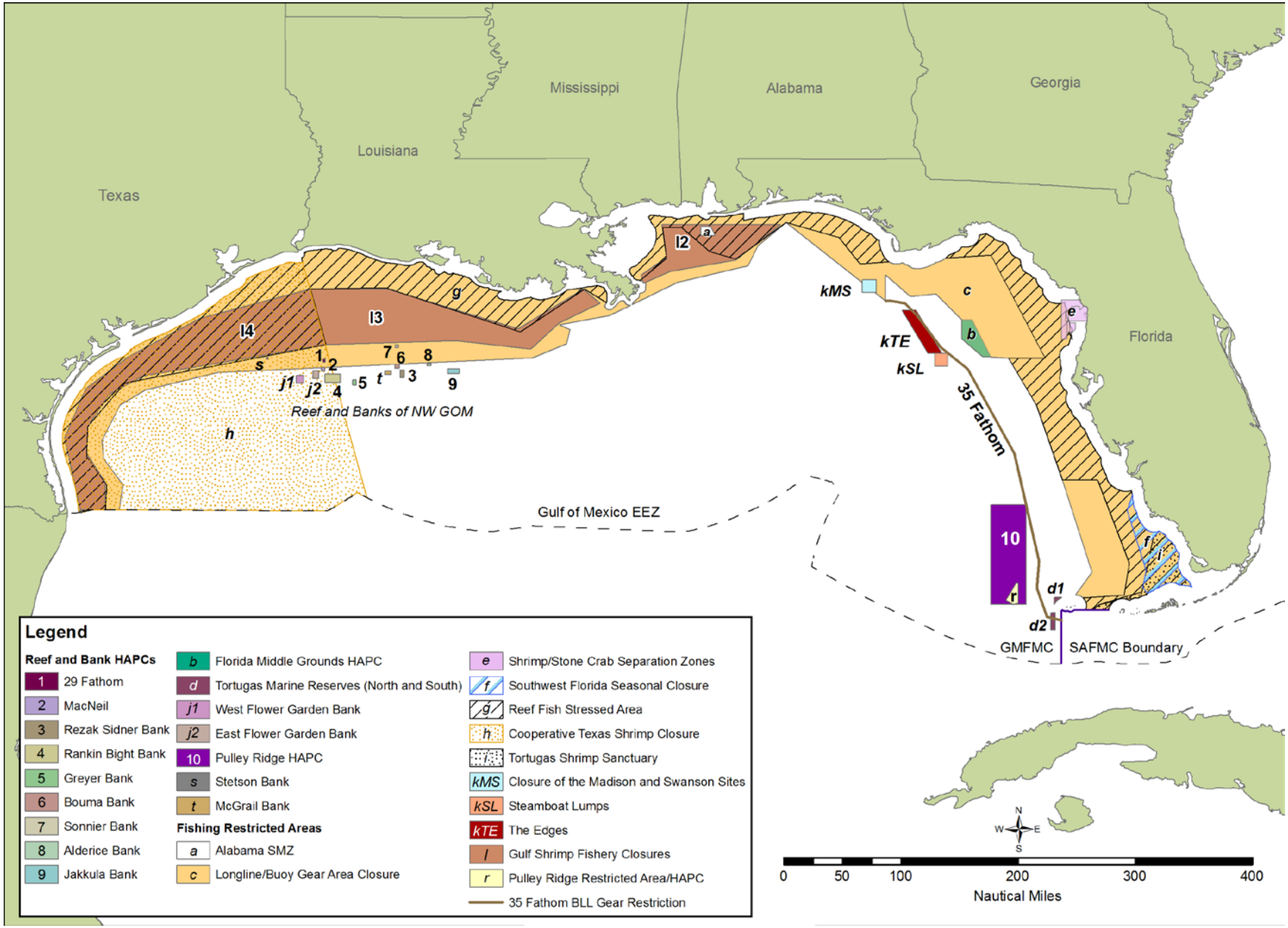


Figure 3.1.1 Map of fishery management closed or gear restricted areas in the Gulf of Mexico

3.2 Description of the Biological Environment

The biological environment of the Gulf of Mexico, including the species addressed in this amendment, is described in detail in the final EIS for the Generic Essential Fish Habitat amendment and is incorporated here by reference (GMFMC 2004b).

3.2.1 Reef Fish

Red Grouper Life History and Biology

In the Gulf, red grouper are commonly caught from Panama City, Florida, to the Florida Keys along the inner to mid-continental shelf in depths ranging from 2 to over 120 m (Moe 1969). Based on reported commercial landings, the Southeast Fishery Science Center's (SEFSC) Headboat Survey, and the Marine Recreational Fisheries Statistics Survey (MRFSS), red grouper are infrequently caught in the western Gulf. The species inhabits flat rock perforated with solution holes, caverns and crevices of limestone reef, and hard bottom areas (Moe 1969; Bullock and Smith 1991). Juveniles live in shallow-water nearshore reefs until reaching approximately 16 inches (40 cm), when they become sexually mature and move offshore (Moe 1969). Red grouper reach a maximum length and weight of 43 inches (110 cm total length) and 50.7 pounds. (23 kg) (Robins et al. 1986). Maximum age of red grouper in the Gulf of Mexico has been estimated at 25 years (SEDAR 12 2007). Clear determinations of size and age of maturity have been difficult for red grouper (Fitzhugh et al. 2006 and references cited therein). Fitzhugh et al. (2006) determined the size and age at 50% maturity was approximately 11 inches (28 cm total length) at age 2. Although previous estimates indicated that red grouper were 50% mature by 5 years of age and 15-20 inches total length (40-50 cm total length) (Moe 1969; Collins et al. 2002). Red grouper are protogynous hermaphrodites, transitioning from females to males at older ages, and form harems for spawning (Dormeier and Colin 1997). Age and size at sexual transition is approximately 10.5 years and 30 inches total length (76.5 cm total length) (Fitzhugh et al. 2006). Red grouper spawn from February until mid-July with peak spawning occurring in the eastern Gulf of Mexico during March through May (Fitzhugh et al. 2006). Over the last 25-30 years, there has been little change in the sex ratio of red grouper, likely because they do not aggregate (Coleman et al. 1996).

The Deepwater Horizon MC252 oil spill has affected at least one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. However, the affected areas are outside west Florida Shelf where red grouper are primarily found. Therefore the effects of the oil spill on red grouper populations and red grouper essential fish habitat will likely be minimal.

Status of the Red Grouper Stock and the Science and Statistical Committee (SSC) Recommendations

The most recent benchmark stock assessment for red grouper (SEDAR 12 2007) was completed in early February 2007. The assessment used an age-structured assessment model called ASAP (Legault and Restrepo 1999) that was the basis for the 2002 assessment and included data from 1986 through 2005. Approximately 99% of the landings were from the west coast of Florida and the rest were from Alabama. The minimum stock size threshold and maximum fishing mortality threshold were defined for red grouper in Secretarial Amendment 1 as $(1\text{-}M)*SS_{MSY}$ and F_{MSY}, respectively. The red grouper stock assessment concluded that spawning stock size exceeded SS_{MSY} starting in 1999. This compares reasonably well with the results of the 2002 assessment which estimated the stock would be rebuilt by 2003 using a stock–recruit steepness relationship of 0.8, which is similar to the 0.84 estimated by the 2007 assessment.

Recovery of the red grouper stock accelerated between 2001 and 2005 as a result of another very strong recruitment year class that occurred in 2000. Additionally, changes in the treatment of natural mortality during the SEDAR 12 assessment resulted in slightly more optimistic results when compared to the 2002 stock assessment. Fishing mortality on red grouper declined below maximum fishing mortality threshold starting in 1995 and has fluctuated but remained below maximum fishing mortality threshold with little trend through 2005. In 2005, fishing mortality was just below the target fishing mortality level of $F_{OY.}$

The 2009 update stock assessment of the red grouper stock in the Gulf of Mexico (SEDAR 2009a) was conducted using the same model as the 2007 assessment, but with catch data and indices of abundance updated through 2008. After reviewing several model runs with varied parameter inputs, the SSC accepted the model run titled "Red Tide Model with Constant Catchability". This model run allowed the natural mortality rate for 2005, a year when there was an extensive red tide event along the West Florida Shelf, to adjust above the base natural mortality rate. The best-fit result indicated that an additional mortality for red grouper corresponding to a little over 20% of the stock occurred in 2005.[10] The stock was found to be neither overfished or undergoing overfishing. However, the stock has declined since 2005, much of which was attributed to an episodic mortality event in 2005 (most likely associated with red tide). The 2010 overfishing limit (OFL) or the yield associated with F_{MSY} for this model was estimated at 6.43 million pounds and the optimum yield (OY), calculated from the Council's default definition as the yield at 75% of F_{MSY}, was estimated at 4.913 for 2010.

The SSC reviewed the 2009 assessment update in June 2009. The model projection used actual catches through 2008, and assumed that the entire TAC would be filled in 2009. However, given that the total allowable catch had not been filled for the past couple of years, and that a longline emergency rule that restricted bottom longlines in order to protect sea turtles was in effect in 2009, the SSC felt that it was unlikely that the TAC would be filled in 2009. As a result, the SSC asked that projections of the red grouper and gag yield streams be rerun using updated landings estimates for 2009. These reruns were presented to the SSC in March 2010. The requested red grouper scenarios used the "Red Tide Model with Constant Catchability", used updated landings estimates for 2009 data, and either set the 2010 harvest level equal to the current TAC or equal to 2009 estimated landings (NMFS 2010). For red grouper, projections were provided for fishing at F_{MSY} and F_{OY}. Given that the 2010 landings, to date, appeared to better match 2009 harvest levels than in previous years, the SSC selected the model runs where the 2010 projected harvest was equal to the estimated 2009 harvest. Thus, the SSC recommended the 2011 overfishing level be set consistent with the Councils current definition of the yield associated with fishing at F_{MSY}, or 7.42 MP GW. Because the revised projections (NMFS 2010) did not provide probabilities of overfishing based on the different landing projection scenarios, the SSC selected a 2011 acceptable biological catch of 6.31 MP GW. This level is equal to 85% of the yield at F_{MSY} and was felt by the SSC to reduce the probability that overfishing might occur in 2011.

The yield projections were again rerun in late 2010 to incorporate new information on red grouper harvest, with the results presented to the SSC in January 2011 and again in March 2011. This new rerun

[10] E-mail from Clay Porch (NMFS Southeast Fisheries Science Center) to Steven Atran (Gulf Council staff) dated June 24, 2009. There is confusion among some members of the public that the assessment claimed that 30% of the grouper were killed due to red tide. Dr. Porch's e-mail states that "the estimate of the instantaneous episodic natural mortality rate was 0.3, and that this translates roughly to something like 30% of the stock being killed (I emphasized at the time that it wasn't exactly 30%). Later during the meeting John (Walter) calculated the actual percentage for red grouper and it was a little over 20% (which I relayed to the AP, and I think the SSC, later on Tuesday)".

used revised estimates of historical discards in the commercial sector that were based on newly available observer estimates from the years 2006-2008. Previous discard estimates were based on logbook records of bycatch, area fished, and fishery independent catch-at-depth mortality analyses. The new rerun also took into account a reduction in the commercial minimum size limit from 20 inches to 18 inches that was implemented in 2009 (Walter 2011). Give these changes, the January 2011 projection rerun indicated that the total allowable catch in the near term could be substantially increased. Based on the January rerun, the SSC recommended that the overfishing limit for red grouper be set at 7.93 million pounds gutted weight (the equilibrium yield at the fishing mortality rate associated with harvesting at the equilibrium maximum sustainable yield, and the acceptable biological catch be set at 7.93 million pounds gutted weight (the equilibrium yield at the fishing mortality rate associated with harvesting at the equilibrium optimum sustainable yield). Since the red grouper stock is not overfished, these equilibrium harvest levels are in effect for all years, until a new stock assessment is conducted.

Gag Life History and Biology

Gag is primarily caught on the west coast of Florida from Tampa Bay to the northern extent of the state (Schirripa and Goodyear 1994). Newly settled juveniles are estuarine-dependent, occurring in shallow seagrass beds during late spring and summer (Koenig and Coleman 1998; Strelcheck et al. 2003). At the onset of the first winter, juvenile gag migrate offshore, although some juvenile gag may remain in inshore waters during winter (Heinisch and Fable 1999). As gag mature, they move to deeper, offshore waters to spawn. Gag is a protogynous hermaphrodite, transitioning from females to males at older ages. Age and size at 50% sexual transition is approximately 11 years and 42-43 inches (108.5 - 110 cm) total length (SEDAR 10 2006). Maximum age is 31 years (Lombardi-Carlson et al 2006) and females are mature by 3.7 years of age and 23 inches (58.5 cm) total length (Fitzhugh et al 2006b). They form spawning aggregations at depths ranging from 160-400 feet (Coleman et al. 1996). In the eastern Gulf the spawning season is estimated to extend from late January to mid-April (with a peak in March) (Fitzhugh et al 2006b). Often immature female gag are found with spawning aggregations (Coleman et al. 1996). Gag can reach a maximum length of 54 inches (138 cm) total length and weight of 68 pounds (31 kg) (Lombardi et al 2006).

Oil from the Deepwater Horizon MC252 incident has affected at least one-third of the Gulf area at its maximum extent from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. However, at this point the affected areas are outside west Florida Shelf where gag are primarily found. Some surface oil may have occurred over the west Florida shelf in offshore waters, however, juvenile and adults are demersal and so likely were not affected. In addition, the oil would not have been present during the January to April spawning period when pelagic eggs and larvae could be susceptible to oil at the surface. Therefore, the effects of the oil on gag populations and gag essential fish habitat would likely be minimal.

Status of the Gag Stock and Scientific and Statistical Committee (SSC) Recommendations

The Gulf gag stock was assessed in both SEDAR 10 and the 2009 Stock Assessment Update using a statistical forward projection catch-at-age model called CASAL (SEDAR 2009). The Council's SSC reviewed several model runs and accepted the model run titled, "Red Tide with Increasing Catchability." The SSC chose a model with increasing catchability for gag because they felt that the tendency of gag to form aggregations made them more susceptible to improvements in gear technology over time. In addition, the model run allowed the natural mortality rate for 2005, a year when there was an extensive red tide event along the West Florida Shelf, to adjust above the base natural mortality rate. The best-fit

result indicated that an additional mortality for gag corresponding to 18% of the stock occurred in 2005.[11] The SSC asked that the projections of the status of red grouper and gag be reanalyzed using updated landings estimates for 2009 and that the 2010 harvest level be set equal to the current TAC or equal to 2009 estimated landings (NMFS 2010a). Projections were provided for fishing mortality rates associated with rebuilding the stock within 10 years ($F_{rebuild}$) and with optimum yield (F_{OY}). Based on the resultant projections, the SSC recommended that the acceptable biological catch be set at the $F_{rebuild}$ level of 1.17 million pounds (MP) gutted weight (GW) and 1.64 MP GW for the 2011 and 2012 fishing years, respectively (Table 2.2.1). This level would be less than the Council's current annual catch limit definition which is the yield associated with F_{MSY}.[12]

In the course of developing management alternatives for gag, potential inconsistencies in estimates of commercial and recreational discards were discovered. One difference was preliminary estimates of commercial gag discards were two orders of magnitude greater when estimated using reef fish observer data[13] rather than from Trip Interview Program (TIP) information. Also, the size and age distributions computed for recreational discards in the 2009 stock assessment indicated most discards were close to the minimum size limit in more recent years, but tagging and observer data indicated a broader size range for discarded fish[4]. The Council discussed these discrepancies at their August 2010 meeting and it was agreed that another review of the gag assessment was needed.

The SEDAR update assessment review panel met in December 2010 and recommended two changes be made to the original assessment reanalyzed[4]. The first was the size distribution of released fish in the charter and private recreational fisheries was revised to provide a better estimate of the size distribution. In the original reanalysis, the size distributions were truncated at just below the minimum size limit (i.e. just sublegal sized fish). The revisions were made by updating Mote Marine Laboratory data already used in the analysis with 2006-2007 data, and by applying the headboat observer data from 2000-2008 to the charterboat sector. In addition, landed undersized gag were excluded from the analyses to avoid biasing the size distribution. These changes resulted in a broader size distribution of discarded fish. The other change was that observer-based commercial discard estimates were used in place of previous estimates based on TIP data. The terminal year of the assessment model remained at 2008 and the $F_{current}$ was estimated as the average Fs of 2005-2007.

The results of the reanalysis produced higher estimates of the number of discards in the commercial handline fishery, but lower estimates of discards in the commercial reef fish longline sector. The spawning stock biomass was lower in the rerun but only slightly (Table 3.2.1.1, Fig. 3.2.1.1). The fishing mortality estimates were nearly unchanged except for the terminal year of 2008, but this year was not used in the calculation of $F_{current}$ (Fig. 3.2.1.2). The end result was that the yield streams for OFL, $F_{rebuild}$, and optimum yield increased slightly for each year, but the stock remained overfished and undergoing overfishing (Table 3.2.1.1, Fig. 3.2.1.1). Based on these results, the SSC recommended an acceptable biological catch for gag for 2011 to be 1.58 MP GW (based on $F_{rebuild}$ to SSB_{MAX}). The SSC also recommended the 2011 OFL for gag to be 1.67 MP GW (based on yield at F_{MAX}).

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[11] E-mail from Brian Linton (NMFS Southeast Fisheries Science Center) to Steven Atran (Gulf Council staff) dated July 7, 2009.

[12] Note: F_{MAX} is used as a proxy for F_{MSY} and is the rate of fishing mortality for a given exploitation pattern rate of growth and natural mortality, that results in the maximum level of yield per recruit.

[13] SEFSC presentation at the August 2010 Council meeting titled "2009 Gulf of Mexico Gag Update Assessment – Commercial Dead Discards"

Table 3.2.1.1. Required SFA and MSRA evaluations for the December 2010 rerun of the Gulf of Mexico gag update assessment. 2009 assessment update values come from the Gulf of Mexico gag 2009 update assessment report, except where otherwise noted. Assessment rerun values come from the December 2010 rerun of the Gulf of Mexico gag update assessment.

Criteria	Definition	2009 Assessment Update Value Table 9.3 except as noted	Assessment rerun revisions
Mortality Rate Criteria			
$F_{MSY\ or\ proxy}$	F_{MAX}	0.22	0.22
MFMT	F_{MAX}	0.22	0.22
F_{OY}	75% of F_{MAX}	0.16	0.17
$F_{CURRENT}$	Geometric mean 2005-2007	0.53	0.55
$F_{CURRENT}$ / MFMT	Geometric mean 2005-2007	2.47	2.50
Base M		0.15	0.15
Biomass Criteria			
SSB_{MAX}	Equilibrium SSB @ F_{MAX}	24.02 MP GW	22.51 MP GW
MSST	(1-M)*SSB_{MAX} M=0.15	20.41 MP GW	19.14 MP GW
$SSB_{CURRENT}$	current = 2008	9.58 MP GW	9.30 MP GW
$SSB_{CURRENT}$ / MSST	current = 2008	0.47	0.49
Equilibrium MSY	Equilibrium Yield @ F_{MSY}	4.28 MP GW	4.19 MP GW
Equilibrium OY	Equilibrium Yield @ F_{OY}	4.17 MP GW	4.08 MP GW
OFL	Annual Yield @ F_{MAX}		
(June 10, 2010 e-mail	2011	1.32 MP GW	1.67 MP GW
From Clay Porch & Brian Linton)	2012	1.81 MP GW	2.11 MP GW
	2013	2.30 MP GW	2.54 MP GW
	2014	2.74 MP GW	2.91 MP GW
	2015	3.08 MP GW	3.19 MP GW
	2016	3.34 MP GW	3.40 MP GW
10-yr rebuild yield (ABC)	Annual Yield @ $F_{Rebuild}$		
(March 22, 2010 revised	2011	1.17 MP GW	1.58 MP GW
assessment with 2009 landings)	2012	1.64 MP GW	2.02 MP GW
	2013	2.12 MP GW	2.45 MP GW
	2014	2.57 MP GW	2.82 MP GW
	2015	2.93 MP GW	3.12 MP GW
	2016	3.20 MP GW	3.34 MP GW
Annual OY (ACT)	Annual Yield @ F_{OY}		
(March 22, 2010 revised	2011	1.01 MP GW	1.28 MP GW
assessment with 2009 landings)	2012	1.44 MP GW	1.69 MP GW
	2013	1.90 MP GW	2.11 MP GW
	2014	2.34 MP GW	2.49 MP GW

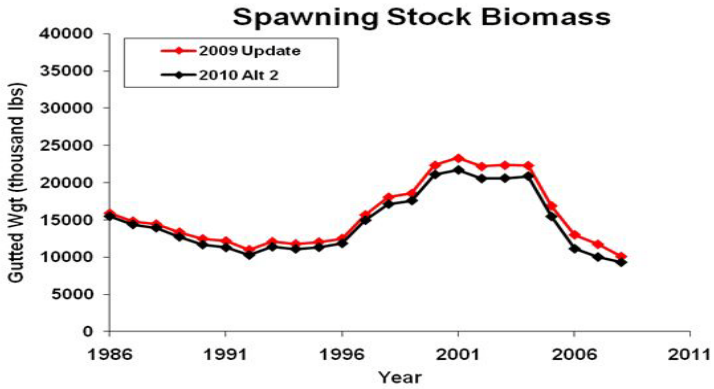

Figure 3.2.1.1. Estimated spawning stock biomass for gag by year from NMFS (2010)

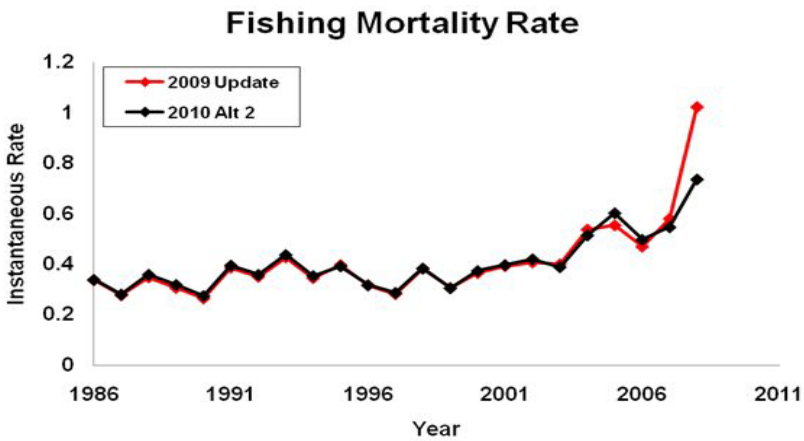

Figure 3.2.1.2. Estimated fishing mortality rate for gag by year from NMFS (2010)

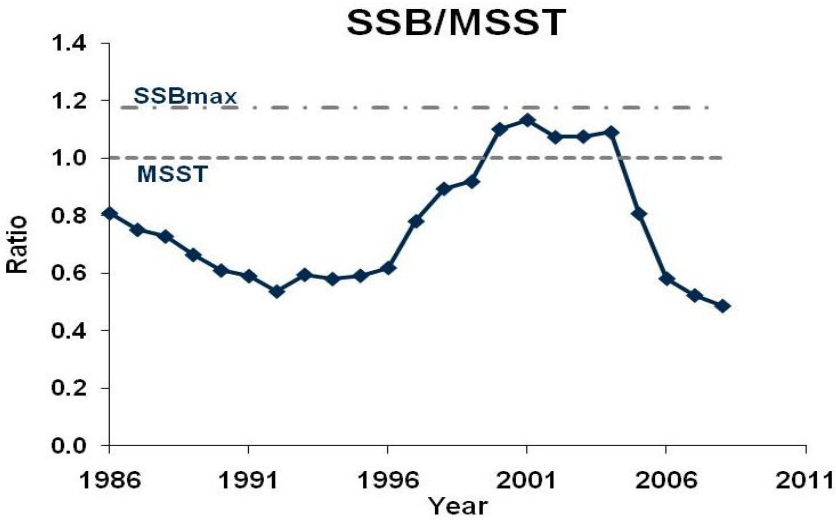

Figure 3.2.1.3. Estimated gag spawning stock biomass relative to the overfishing threshold by year from NMFS (2010)

General Information on Reef Fish Species

The National Ocean Service (NOS) of NOAA collaborated with National Marine Fisheries Service and the Council to develop distributions of reef fish (and other species) in the Gulf (SEA 1998). NOS obtained fishery-independent data sets for the Gulf, including 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). NOS staff analyzed the 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.

Habitat types and life history stages can be found in more detail in GMFMC (2004b). In general, reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. In general, both eggs and larval stages are planktonic. 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 (<100 m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. Juvenile red snapper are common on mud bottoms in the northern Gulf, particularly off Texas through Alabama. Also, some juvenile snappers (e.g. mutton, gray, red, dog, lane, and yellowtail snappers) and groupers (e.g. goliath grouper, red, gag, and yellowfin groupers) have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems (GMFMC 1981). More detail on hard bottom substrate and coral can be found in the FMP for Corals and Coral Reefs (GMFMC and SAFMC 1982).

At this time, it is unknown what the effects of the Deepwater Horizon MC252 oil spill will be on reef fish species. The oil has affected at least one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. For species that are distributed within the area impacted by the spill, the populations are likely to be affected. However, because reef fish species are demersal as juveniles and adults, the impacts are likely to be minimal. Eggs and larvae are found in surface waters, so species that spawn during the time period oil affected surface waters may suffer from increased egg and larval mortality rates.

Status of Reef Fish Stocks

The Reef Fish FMP currently encompasses 42 species. Stock assessments have been conducted on 11 species: red snapper (SEDAR 7 2005; SEDAR 7 Update 2009), vermilion snapper (Porch and Cass-Calay, 2001; SEDAR 9 2006a), yellowtail snapper (Muller et al. 2003; SEDAR 3 2003), gray triggerfish (Valle et al. 2001; SEDAR 9 2006b), greater amberjack (Turner et al. 2000; SEDAR 9 2006c), hogfish (Ault et al. 2003; SEDAR 6 2004a), red grouper (Schirripa and Legault 1999; NMFS 2002; SEDAR 12 2007, SEDAR 2009a), gag (Turner et al. 2001; SEDAR 10 2006, SEDAR 2009b), yellowedge grouper (Cass-Calay and Bahnick 2002), and goliath grouper (Porch et al. 2003; SEDAR 6 2004b). A review of the Nassau grouper's stock status was conducted by Eklund (1994), and updated estimates of generation times were developed by Legault and Eklund (1998).

Of the 11 species for which stock assessments have been conducted, the first quarter report of the 2010 Status of U.S. Fisheries (http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm) classifies four as overfished (greater amberjack, grey triggerfish, gag, and red snapper), and the same four as undergoing overfishing. Although it should be noted that greater amberjack, grey triggerfish, and red snapper are under rebuilding plans, and a rebuilding plan for gag is presently being developed in Amendment 32. In the most recent red snapper stock assessment update, red snapper overfishing was projected to have ended in 2009. Many of the stock assessments and stock assessment reviews can be found on the Council (www.gulfcouncil.org) and SEDAR (www.sefsc.noaa.gov/sedar) Websites.

3.2.2 Protected Species

There are 28 different species of marine mammals that may occur in the Gulf. All 28 species are protected under the Marine Mammals Protection Act 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 include five sea turtle species (Kemp's Ridley, loggerhead, green, leatherback, and hawksbill); two fish species (Gulf sturgeon and smalltooth sawfish), and two *Acropora* coral species (elkhorn [*Acropora palmata*] and staghorn [*A. cervicornis*]). Information on the distribution, biology, and abundance of these protected species in the Gulf is included in final EIS to the Council's Generic Essential Fish Habitat amendment (GMFMC 2004b) and the October 2009 ESA biological opinion on the reef fish fishery (NMFS 2009). Marine Mammal Stock Assessment Reports and additional information are also available on the National Marine Fisheries Service Office of Protected Species website: http://www.nmfs.noaa.gov/pr/species/.

The Gulf reef fish fishery is classified in the 2011 Marine Mammal Protection Act List of Fisheries as Category III fishery (November 8, 2010; 75 FR 68468). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from the fishery is less than or equal to 1% of the potential biological removal[14]. Dolphins are the only species documented as interacting with this fishery. Bottlenose dolphins may predate and depredate on the bait, catch, and/or released discards of the reef fish fishery.

All five species of sea turtles may be adversely affected by the Gulf reef fish fishery via incidental capture in hook-and-line gear (NMFS 2009). Incidental captures of sea turtle species occur in all commercial and recreational hook-and-line components of the reef fishery, but recent observer data indicate they are most frequent in the bottom longline component of the reef fish fishery. On an individual set basis, incidental captures may be relatively infrequent, but collectively, these captures sum to a high level of bycatch. Observer data indicate loggerhead sea turtles are the species most affected by the bottom longline component of the reef fish fishery and that is why a more detailed description of this species is included below. Mortality of sea turtles caught is particularly problematic in this fishery component, because many are dead or in poor condition upon retrieval of the gear as a result of forced submergence (i.e., drowning). Rulemaking from Amendment 31 constrains the bottom longline component of the fishery to limit sea turtle take. All sea turtles caught on hook-and-line and 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

[14]The potential biological removal is 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

handling protocols are required to reduce the amount of gear on released animals and minimize post-release mortality.

Smalltooth sawfish are also affected by the Gulf reef fish fishery, but to a much lesser extent than hardshell sea turtles. Smalltooth sawfish primarily occur in the Gulf off peninsular Florida. Although the long, toothed rostrum of the smalltooth sawfish causes this species to be particularly vulnerable to entanglement in fishing gear, incidental captures in the commercial and recreational hook-and-line components of the reef fish fishery are rare events. Only eight smalltooth sawfish are estimated to be incidentally caught annually, and none are expected to result in mortality (NMFS 2009). Fishermen in this fishery are required to follow smalltooth sawfish safe handling guidelines.

The Deepwater Horizon MC252 oil spill may have adverse effects on protected species populations. Cetaceans, manatees, and sea turtles may be exposed to oil or dispersants. These toxic chemicals can affect them externally by swimming in oil or dispersants or internally from eating or swallowing oil, consuming prey that has also come in to contact with oil, or breathing volatile compounds that the oil gives off. Sea turtles could be at additional risk from oil washing ashore on nesting beaches where nesting females and/or their nests may be exposed to chemicals, which may result in decreased survival of eggs and/or developmental defects in hatchlings.

The most recent biological opinion for the reef fish fishery, dated September 29, 2011, concluded this fishery in the Gulf of Mexico is not likely to jeopardize the continued existence of sea turtles, smalltooth sawfish, other listed species, or their designated critical habitat. This opinion incorporated findings on the Deepwater Horizon MC252 oil spill and updated the findings of an earlier opinion (NMFS 2009).

3.3 Description of the Fishery and Economic Environment

3.3.1 Description of the Economic Environment

The economic environment of the Gulf grouper sector of the reef fish fishery was described in the 2010 Red Grouper Regulatory Amendment (GMFMC 2010) and the EA for the 2011 Gag interim rule (NMFS 2010a). Information on the performance of the Gulf commercial grouper sector of the reef fish fishery prior to the implementation of the current individual fishing quota program is provided in NMFS (2010b). Discussion of the expected effects of the individual fishing quota program is provided in GMFMC (2008a) and is incorporated herein by reference. The individual fishing quota program became effective January 1, 2010, though the determination of shares and allocations was made based on information available as of October 1, 2009. Further, restrictions on the use of bottom longline to particular vessels operating in particular areas at certain times of the year were implemented under GMFMC (2009) in order to reduce sea turtle interactions, and discussion of the expected effects of such are incorporated herein by reference. GMFMC (2010) and NMFS (2010a) provide a description of the individual fishing quota program in terms of eligible participants, the distribution of shares and allocations among initial shareholders, as well as vessels qualifying for bottom longline endorsements. Emphasis is placed on entities with initial shares and allocations of red grouper and gag, though individual fishing quota dealers are also described. GMFMC (2010) and NMFS (2010a) also provide a description of the Gulf recreational red grouper and gag sectors of the reef fish fishery. The description provides information regarding target effort, catch effort, and total recreational trips from 2005-2009 by State and mode. In addition, information regarding the economic value of the recreational sector and permits held by for-hire operations in that sector are provided. GMFMC (2010) and NMFS (2010a) also indicate the economic impacts of the commercial and recreational sectors of the Gulf reef fish fishery.

A revision to the description of the economic environment of Gulf grouper sector of the reef fish fishery is not needed in order to properly analyze the actions and alternatives being considered in Amendment 32. Therefore, the information from GMFMC (2010) and NMFS (2010a) is incorporated herein by reference. The Red Grouper Regulatory Amendment and the EA for the 2011 Gag interim rule can be found at: http://sero.nmfs.noaa.gov/sf/pdfs/2010_Red_Grouper_Regulatory_Amendment_91710_final.pdf and http://sero.nmfs.noaa.gov/sf/pdfs/draft_EA_2011_gag_interim_rule.pdf respectively.

3.3.2 Description of the Social Environment

This amendment addresses two species: gag and red grouper. Recently passed regulatory actions include a description of the social environment that identifies communities with a strong relationship with these species and are included by reference here.

Gag: Temporary Rule, November 2010. Section 2.4 can be found at:
http://sero.nmfs.noaa.gov/sf/pdfs/Gag_EA_111510.pdf

Red grouper: Regulatory Amendment to the Reef Fish Fishery Management Plan, September 2010. Section 2.4 can be found at:
http://sero.nmfs.noaa.gov/sf/pdfs/2010_Red_Grouper_Regulatory_Amendment_91710_final.pdf

The referenced descriptions focus on available geographic and demographic data to identify communities with a strong relationship to the grouper fishery. A strong relationship is defined by having significant landings and revenue for gag and red grouper. Thus, positive or negative impacts from regulatory change are expected to occur in places with greater grouper landings. These communities are located primarily in the state of Florida.

To summarize the referenced documents, communities were examined according to available landings and permit data for gag and red grouper, across the commercial and recreational sectors. For both species, Pinellas County clearly has the strongest relationship to the fishery of any county in the Gulf of Mexico region. For red grouper, the individual communities of Panama City, Madeira Beach, and Apalachicola have the strongest relationship with the fishery, though St. Petersburg, Clearwater, Tarpon Springs, and Redington Shores also have relatively strong ties to the fishery. Steinhatchee, Crystal River, Tampa, and Panacea also have somewhat strong relationships with the red grouper fishery. For the gag fishery, Apalachicola has the strongest relationship of all communities in the Gulf. Steinhatchee, Panacea, Panama City, Clearwater, and St. Petersburg also have relatively strong relationships with the gag fishery. Destin, Ft. Myers Beach, Tarpon Springs, and Madeira Beach have somewhat strong relationships with the fishery.

It is highly likely that, other factors being equal, these communities would be the most affected, in absolute terms, by management actions expected to reduce commercial and recreational landings or effort. The magnitude of these effects will vary according to the exact nature of those actions, particularly with respect to their relative effects on the recreational and commercial sectors.

In addition to the importance of gag and red grouper to communities in terms of landings, there is an inverse relationship in allocation of gag and red grouper for the commercial and recreational sectors, as shown in Table 3.3.2.1. The variation in allocation for the two species reflects a difference among

fishermen in effort and, for recreational fishermen, preference (see summary minutes from Scoping Meetings, section 12). In addition to geographical considerations, then, this difference in effort for gag and red grouper is likely to translate into differentiated impacts for each sector. Actions that implement change to red grouper regulations will likely impact commercial fishermen more than recreational fishermen, and vice versa for the gag fishery. It is important to note that the allocation of grouper quota is a highly contentious issue among fishermen and a significant feature of the social environment deserving further analysis.

Table 3.3.2.1. Breakdown of the sector allocation for gag and red grouper.

	Red Grouper	**Gag**
Commercial	**76%**	**39%**
Recreational	**24%**	**61%**

3.3.3 Environmental Justice Considerations

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

Persons employed in the gag fishery and associated businesses and communities along the Gulf coast of Florida would be expected to be affected by this proposed action. However, information on the race and income status for groups at the different participation levels (vessel owners, crew, dealers, processors, employees, employees of associated support industries, etc.) is not available. Because this proposed action could be expected to affect fishermen and associated industries in numerous communities along the west Florida coast, census data (available at the county level, only) have been assessed to examine whether any counties have poverty or minority rates that exceed the EJ thresholds.

The threshold for comparison that was used was 1.2 times the Florida state average such that, if the value for the county was greater than or equal to 1.2 times the state average, then the county was considered an area of potential EJ concern. Census data for the year 2007 was used and the estimate of the minority (interpreted as non-white, including Hispanic) population was 38.7%, while 12.6% of the total population was estimated to be below the poverty line. These values translate in EJ thresholds of approximately 46.4% and 15.1%, respectively. Based on the demographic information provided, for the counties of the west coast of Florida, no potential EJ concern is evident with regard to the percent of minorities. Levy County exceeds the threshold with regard to poverty (18.2%); Escambia just barely exceeds the threshold (15.2%) by .08%. No potential EJ concern is evident for the remaining counties which fall below the thresholds with regard to poverty and percent of minorities.

Section 3.3.2 provided a summary of communities considered substantially dependent on gag and red grouper. Pinellas was identified as the county with the strongest relationship to the gag and red grouper fishery of any Gulf county; Pinellas also falls below the EJ thresholds with regard to poverty and percent

of minorities. The individual communities determined to have a strong relationship to the gag and red grouper fishery are located within Pinellas, Bay, Franklin, Taylor, Okaloosa, Lee, Citrus, Hillsborough, and Wakulla counties. None of these counties exceed the EJ thresholds for poverty or percent of minorities.

There are no individual communities within Levy and Escambia counties determined to have a strong relationship to the gag and red grouper fishery. A strong relationship is defined by having significant landings and revenue for gag or red grouper and is calculated by examining the proportion of gag or red grouper landings for a given community out of the total landings for that community. There are communities within these counties that are involved in the gag and red grouper fishery (Yankeetown in Levy County and Pensacola in Escambia County); however no data are available on the race and income status for those involved in the grouper fishery in these communities. Although no EJ issues have been identified or are expected to arise, the absence of potential EJ concerns cannot be assumed. Nevertheless, because the gag and red grouper fishery does not represent a substantial proportion of landings in the respective communities, no EJ concerns are expected to arise in these communities as a result of the actions in this amendment. Additionally, no negative environmental consequences are expected to accrue to this proposed rule.

Although adverse social and economic consequences are expected to accrue to fishermen in the gag fleet and associated industries and communities due to the reduction of expenditures and revenues associated with an expected change in fishing behavior and harvest levels, the environmental consequences of this proposed rule are expected to be positive. This proposed rule is expected to result in a net short-term reduction in the mortality of gag by the commercial and recreational sectors of the fishery. Reduced mortality would be expected to increase the environmental benefits this species contributes to the marine environment and the general health and condition of this environment.

3.4 Description of the Administrative Environment

3.4.1 Federal Fishery Management

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

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 Section 10. In most cases, the Secretary has delegated this authority to NMFS.

The Council is responsible for fishery resources in federal waters of the Gulf. These waters extend to 200

nautical miles offshore from the nine-mile seaward boundary of the states of Florida and Texas, and the three-mile seaward boundary of the states of Alabama, Mississippi, and Louisiana. The length of the Gulf coastline is approximately 1,631 miles. Florida has the longest coastline of 770 miles along its Gulf coast, followed by Louisiana (397 miles), Texas (361 miles), Alabama (53 miles), and Mississippi (44 miles).

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

Regulations contained within fishery management plans are enforced through actions of the NOAA's Office for Law Enforcement, the United States Coast Guard, and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. Council's Law Enforcement Advisory Panel and the Gulf States Marine Fisheries Commission's Law Enforcement Committee have developed a five-year "GOM Cooperative Law Enforcement Strategic Plan - 2006-2011."

3.4.2 State Fishery Management

The purpose of state representation at the council level is to ensure state participation in federal fishery management decision-making and to promote the development of compatible regulations in state and federal waters. The state governments of Texas, Louisiana, Mississippi, Alabama, and Florida have the authority to manage their respective state fisheries. Each of the five Gulf States exercises legislative and regulatory authority over their states' natural resources through discrete administrative units. Although each agency is the primary administrative body with respect to the states natural resources, all states cooperate with numerous state and federal regulatory agencies when managing marine resources. A more detailed description of each state's primary regulatory agency for marine resources is provided in Amendment 22 (GMFMC 2004c).

4 Bycatch Practicability Analysis

Background/Overview

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

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

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

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

As described in Amendment 30B and incorporated by reference here, the harvest of shallow-water grouper and other reef fish species are currently regulated through measures such as quotas, size limits, bag limits, and seasonal closures. These measures are intended to protect these species during spawning and limit fishing mortality, the size of fish targeted, the number of targeted fishing trips, and the time fishermen spend pursuing a species. However, these management tools have the unavoidable adverse effect of creating regulatory discards, which reduces yield from the directed fishery. In addition, there is bycatch of other reef fish species caught when shallow-water grouper are targeted (see “other bycatch” and Criterion 3 below). Consequently, the Council is considering in this amendment the practicability of taking additional action to further minimize directed fishery reef fish bycatch.

Gag Release Mortality Rates and Bycatch

As described in the bycatch practicability analysis in Amendment 30B (GMFMC 2008b), the 2001 Gulf of Mexico gag assessment used discard mortality rates of 20 percent for the recreational sector and 30 percent for the commercial sector based on different depths fished. However, these rates were revised based on subsequent work that were incorporated into SEDAR 10 (SEDAR 10 2006) that showed a positive relationship between release mortality and depth. SEDAR 10 estimated the average release mortality rate for commercially caught gag was 67 percent and 20 percent for recreationally caught gag. Although the release mortality rate was estimated higher in the commercial sector than in the recreational sector, the number of discards is significantly lower in the commercial sector because of lower encounter rates of undersized fish.

As determined by SEDAR 10, commercial gag discards are primarily due to minimum size regulations, which began in federal waters in 1990. However, as described in Amendment 30B (GMFMC 2008b), the magnitude of commercial discards was estimated to be a small fraction of total removals. In the course of developing management alternatives in this amendment for gag, potential inconsistencies in estimates of commercial discards were discovered. Preliminary estimates of commercial gag discards provided by the NMFS (2010d) indicated commercial discards were two orders of magnitude greater when estimated using reef fish observer data. Based on SEDAR 10, under a 20 inch minimum size limit (1990-1999), commercial dead discards were estimated to account for about 0.03 percent of the total commercial removals by weight, and under a 24-inch TL minimum size limit (since 2000), dead discards have accounted for about 1.3 percent of the of the total commercial removals by weight. Under the revised values as estimated from 2006-2009 in NMFS (2011), the estimated weight of dead discards averaged 26% of the removals by weight (Table 4.1.1).

Like the commercial sector, recreational discards were also attributed primarily to the minimum size limit. During 1990-1999 (20-inch TL minimum size limit), the recreational dead discards were 16 percent of total recreational removals (GMFMC 2008b). After the increase to a 22-inch TL minimum size limit in 2000, recreational dead discards were estimated at 23 percent of the total recreational removals by weight. This estimate has been revised to an average of 35% of the total recreational removals by weight for the time period between 2006-2009 (Figure 4.1.1). A small number of recreational discards were estimated to occur prior to implementation of federal size limits (1986-1989), accounting for about 3 percent of total recreational removals (note: an 18-inch TL gag minimum size limit was implemented in Florida state waters beginning in 1985).

Table 4.1.1. Gag recreational, commercial, and total landings and dead discards by weight, and as a percentage of the total fish killed for discards, in the Gulf of Mexico from 2006-2009 (From NMFS 2011).

Removal type	Year	Recreational	Commercial	Total
Landings	2006	2,286,440	1,369,985	3,656,425
	2007	2,231,762	1,262,181	3,493,943
	2008	2,958,027	1,248,481	4,206,509
	2009	1,613,316	733,292	2,346,608
	Average	2,272,386	1,153,485	3,425,871
Dead discards	2006	904,294	357,397	1,261,691
	2007	1,218,783	371,134	1,589,917
	2008	1,694,804	301,260	1,996,064
	2009	1,003,761	596,291	1,600,052
	Average	1,205,411	406,520	1,611,931
Percent dead discards of total fish killed	2006	28%	21%	26%
	2007	35%	23%	31%
	2008	36%	19%	32%
	2009	38%	45%	41%
	Average	35%	26%	32%

Red Grouper Release Mortality Rates and Bycatch

Red grouper release mortality rates and bycatch are discussed in detail in the bycatch practicability analysis for Amendment 30B and are incorporated by reference here. The estimation of red grouper release mortality rates are described in detail in SEDAR 12 (2007) and the 2009 red grouper assessment update (SEDAR 2009b). In SEDAR 12 (2007), a 10 percent release mortality rate was estimated for the recreational, handline, and trap sectors and a 45 percent release mortality rate was estimated for the longline sector.

As described in Sections 1.1 and 3.2, commercial discards in the red grouper update assessment based on logbook information was lower than observer-based estimates resulting in a rerun of the assessment. For the handline sector, observer-based estimates were approximately double the previous logbook based estimates used in the 2009 update (Walter 2011). For the longline sector, logbook and observer estimates were generally similar to each other. Because commercial handline landings are relatively low compared to longline landings (Table 1.1.3) and the estimated discard mortality rate is higher for longline gear (45% compared to 10%), these changes to the discard numbers had a relatively minor impact on the historical assessment. Discards from the longline sector generally account for approximately 80% of the total discards by weight (unpublished data supporting Walter 2011).

Total estimated commercial dead discards by weight for 2006-2008 (the last three years of the assessment update) are shown Table 4.1.2 and ranged from 17% to 26% of the total commercial removals (dead discards and landed catch). This removal amount may have declined as a result of the commercial minimum size being reduced from 20 to 18 inches in 2009 through Amendment 30B. Walter (2011)

reported there was an approximately 12% higher probability of a red grouper being retained for age 4 and 9% higher probability for age 5. These higher probabilities result in reducing discards and higher numbers of retained fish in ages 4 and 5. This effectively reduces the harvest of older fish and would lead to a different long-term pattern of fishing mortality and different benchmark values.

For the recreational sector, observer-based discard information from the headboat sector was applied to both private and charter-vessel landings in the assessment. To estimate the magnitude of discards in the recreational sector, a 10% discard mortality rate was applied to number of red grouper released alive (B2 catch type in the Marine Recreational Information Program) and multiplied by an average weight for released fish[15]. Total estimated recreational dead discards by weight for 2006-2008 (the last three years of the assessment update) are shown Table 4.1.2. The total estimated weight of discards ranged from 22 to 49% of removals for this sector between 2006 and 2008 and average 35%. However, as illustrated in Table 4.1.2, the weight of removals (both as landings and through dead discards) is much higher for the commercial than the recreational sector.

Table 4.1.1. Red grouper recreational, commercial, and total landings and dead discards by weight, and as a percentage of the total fish killed for discards, in the Gulf of Mexico from 2006-2008.

Removal type	Year	Recreational	Commercial	Total
Landings	2006	960,890	5,162,527	6,123,417
	2007	1,016,807	3,708,863	4,725,670
	2008	892,998	4,739,295	5,632,293
	Average	956,898	4,536,895	5,493,793
Dead discards	2006	272,627	1,428,385	1,701,012
	2007	385,147	1,293,782	1,678,929
	2008	875,121	963,679	1,838,800
	Average	510,965	1,228,615	1,739,580
Percent dead discards of total fish killed	2006	22%	22%	22%
	2007	27%	26%	26%
	2008	49%	17%	25%
	Average	35%	21%	24%

Other Bycatch

Species incidentally encountered by the directed gag and red grouper fisheries include sea turtles, sea birds, and other reef fishes, such as snappers and groupers. The Gulf commercial reef fish fishery is listed as a Category III fishery under the Marine Mammal Protection Act (November 8, 2010; 75 FR 68468)). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is very low (see Section 3.2.2 for further information). The risk of serious injury or mortality to marine mammals resulting from the recreational sector of the reef fish fishery, which uses similar gear (i.e., handlines, rod and reel, spears, etc.), is also expected to be low, although interactions with dolphins and sea turtles are known to occur.

[15]Personal communication, John Walter, Southeast Fisheries Science Center, Miami, FL

The most recent biological opinion for the reef fish fishery completed on September 29, 2011, concluded this fishery in the Gulf of Mexico is not likely to jeopardize the continued existence of sea turtles, smalltooth sawfish, other listed species, or their designated critical habitat. The 2011 biological opinion supported the determinations of an earlier 2009 biological opinion (NMFS 2009). Specific actions taken by the Council to reduce the impact of the fishery on listed species include actions taken in Amendment 18A to the Reef Fish Fishery Management Plan (GMFMC 2005b) that established regulations to minimize stress to endangered species incidentally caught in the reef fish fishery, and actions taken in Amendment 31 (GMFMC 2009) to reduce interactions between sea turtles and the longline sector of the fishery.

Three primary orders of seabirds represented in the Gulf 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, 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. There is no evidence that the directed grouper fisheries adversely affect seabirds.

Other species of reef fish are also incidentally caught when targeting red and gag grouper. In the eastern Gulf, scamp, black grouper, other shallow-water grouper, red snapper, greater amberjack, and vermilion snapper are caught as bycatch when targeting grouper. Vermilion snapper are not overfished or undergoing overfishing (SEDAR 9 2006a) and bycatch is not expected to jeopardize the status of this stock. Greater amberjack (SEDAR 9 2006c, SEDAR 2010) and red snapper (SEDAR 7 2005, SEDAR 2009) are overfished and undergoing overfishing. Greater amberjack release mortality is estimated to be fairly low, ranging from 10 to 20 percent. Discards are higher for commercially caught greater amberjack than they are for recreationally caught greater amberjack because of differences in minimum size limits (36 inches FL commercial vs. 30 inches FL recreational). Because greater amberjack are pelagic and grouper are bottom fish, bycatch of greater amberjack is relatively low in the shallow-water grouper fishery and likely not greatly affected by changes in grouper management measures. In contrast, red snapper have been increasing in abundance in the eastern Gulf over the past two decades and fishermen have indicated they are discarding more red snapper. Most commercial grouper fishermen in the eastern Gulf were allocated few red snapper individual fishing quota shares and therefore are unable to retain large quantities of red snapper when fishing for grouper. Bycatch is a significant source of mortality in the red snapper fishery, resulting in the Council approving actions in Amendment 27/14 to reduce directed fishery bycatch. The statuses of other shallow-water grouper species, such as scamp are unknown. Most trips target red, gag, and black grouper, and capture other shallow-water groupers incidentally. Bycatch is not known to be significant for these species, because many (e.g., yellowmouth grouper, rock hind, and red hind) have no or small minimum size limits (e.g., scamp – 16 inches TL).

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

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

Currently, dead discards in weight account for 24%, on average for the last three years of the assessment update, of the total biomass removed from the red grouper stock each year (Table 4.1.2). In the gag stock, dead discards account for an even greater percentage of the total biomass removed (32% for 2006-2009) and the proportion of dead discards to landings has increased greatly in recent years.

The following describes current management measures and their relative impact on bycatch and bycatch mortality for shallow-water grouper. The commercial harvest of shallow-water grouper has been managed with trip limits, quotas, gear restrictions, minimum size limits, and a one-month closed season (applies to gag, red grouper, and black grouper only), while the recreational harvest of shallow-water grouper has been managed with size limits, bag limits, and a one-month closed season (applies to gag, red grouper, and black grouper only). There are also several restricted fishing areas intended to protect reef fish, and in particular gag spawning aggregations.

Size limits

As described in Amendment 30B bycatch practicability analysis GMFMC (2008b), grouper minimum size limits is the greatest factor contributing to bycatch of shallow-water grouper. Size limits are intended to protect immature fish and reduce fishing mortality. For red grouper, the minimum size limit is above the size at 50 percent maturity (Moe 1969; Collins et al. 2002), while the gag minimum size limits are at or slightly above the size at 50 percent maturity (SEDAR 10 2006). For other grouper species, the minimum size limit is above the sizes at maturity for most species, however for some like black grouper, the size limit is below the size at 50 percent maturity.

As described in Amendment 30B (2008b), several yield-per-recruit analyses were conducted for gag and red grouper (Ortiz 2007; Walter 2007) to identify the sizes that best balance the benefits of harvesting fish at larger sizes against losses due to natural mortality. For both species, the size where the yield per recruit was maximized was less than the current minimum size limits. However, although decreasing the minimum size limit for either of these species positively benefits yield per recruit and reduces bycatch as described in Section 5.5.2, it also negatively affects spawning potential. For both species, the spawning potential ratio is below the spawning potential ratio at maximum sustainable yield if the minimum size limit is reduced to too much.

Closed Seasons and Quota Closures

The recreational shallow-water grouper sector is closed in the exclusive economic zone from February 1 through March 31. The impact of the two-month recreational closed season on recreational grouper discards is unknown and because it crosses waves, is hard to evaluate. In addition, this closure was only recently implemented. MRFSS data for March-April in general indicates the number of discards in waves 1-2 (January –April) for gag and red grouper are less than other waves. Although this may be a result of the closed season and reduced effort, the reduction is confounded by reductions in gag availability. More years of data will be needed to determine the actual impact of the recreational closed season on bycatch.

The commercial sector was subject to a one-month closure (February 15-March 15) implemented in 2000, and quota closures. The closure prohibited the harvest of gag, black, and red grouper and was designed to protect spawning. However, with the implementation of the shallow-water grouper individual fishing quota program, this closure has been rescinded and replaced by "The Edges" seasonal area closure (see below under "time/area closures").

Bag and Trip Limits

The recreational sector of the shallow-water grouper fishery is regulated by a 2-red grouper and 2-gag daily bag limit per person and a 4-grouper aggregate bag limit per person. Grouper discards while harvesting the daily bag limit are primarily the result of incidental capture of undersized fish prior to reaching the bag limit and targeting of other reef fish residing in similar habitat as grouper once the grouper bag limits have been reached. SERO (2007) reported 90 percent or more of MRFSS trips catching gag landed 2 gag or less per angler. Based on these catch rates, the current grouper bag limit is not limiting and proposed bag limits of 2 or more gag would not limit the catch on most trips. With regard to red grouper, the proposed increase in the 2-fish bag limit would likely reduce the number of red grouper discards as discussed in Section 2.2.2.

Trip limits have been used in the past to limit commercial harvests of shallow-water grouper. However, the need for trip limits was superseded by the shallow-water grouper individual fishing quota program.

Allowable Gear

Vertical hook-and-line gear (bandit rigs, manual handlines) and longlines are the primary gears used to commercially harvest grouper. During 2001-2005, fish traps accounted for 14 percent of the total commercial red grouper landings. However, as of February 7, 2007, fish traps are prohibited in federal waters of the Gulf of Mexico. In 2008, new regulations were implemented requiring commercial and recreational fishermen to use circle hooks, venting tools, and dehooking devices when harvesting reef fish in the Gulf of Mexico. Circle hooks were commonly used in the commercial grouper industry prior to implementation of this new regulation. It is unknown how extensively venting tools and dehooking devices were used prior to these new gear requirements.

Longlines account for a majority of the red grouper commercial discards, although estimates of dead discards are not well estimated. Discards of gag by all commercial sectors are relatively low, primarily because gag caught in deeper water are larger and more likely to be legal-size. The use of longlines had been prohibited from waters less than 20 fathoms, however, due higher estimates of sea turtles caught in longline gear, measures were put in place through Amendment 31 to reduce this bycatch. These included the prohibition of the use of bottom longline gear in the Gulf reef fish fishery, shoreward of a line approximating the 35-fathom contour east of Cape San Blas, Florida from June through August; reducing the number of bottom longline vessels operating in the Gulf reef fish fishery through an endorsement based on catch history; and restricting the total number of hooks that may be possessed onboard each Gulf reef fish bottom longline vessel to 1,000, only 750 of which may be rigged for fishing at any given time.

Recreational discards are primarily due to the recreational size limit; however, allowable gears can affect release mortality rates. Rod-and-reel is the primary gear used by the recreational sector. Circle hooks are required by recreational anglers to harvest grouper and other reef fishes to reduce the incidence of gut hooking which is often fatal to the fish. Recreational anglers also use spears to capture grouper.

Spearfishing does not affect release mortality because all fish caught are killed. Only undersized grouper mistakenly killed while spearfishing would contribute to dead discards.

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

Time/Area Closures

The Council created two restricted fishing areas to specifically protect spawning aggregations of gag in 2000. The Madison-Swanson and Steamboat Lumps marine restricted fishing areas are located in the northeastern Gulf of Mexico at a depth of 40 to 60 fathoms. Both areas prohibit bottom fishing. In addition, the Council created the "The Edges" seasonal-area closure. This no-take area is between the Madison-Swanson and Steamboat Lumps marine restricted fishing areas and is closed from January 1 to April 30. Bottom fishing is also prohibited in the Tortugas North and South marine reserves in the southern Gulf of Mexico near the Dry Tortugas. In addition, actions from Amendment 31 prohibit the use of bottom longline gear in the Gulf reef fish fishery, shoreward of a line approximating the 35-fathom contour east of Cape San Blas, Florida from June through August.

Marine reserves and time/area closures benefit fish residing within reserve boundaries by prohibiting their capture during part or all of the year. Within marine reserves, fish that are undersized potentially have an opportunity to grow to legal size and are no longer caught as bycatch. If these fish emigrate from the marine reserve (i.e., spillover effect), then they may be caught as legal fish outside the reserve, thereby reducing bycatch. However, anglers and commercial fishermen may redistribute their effort to areas surrounding the marine reserve. If fishing pressure in these areas is increased, then any benefits of reduced bycatch of fish in the marine reserve will likely be offset by increases in bycatch of fish residing outside the marine reserve. Within restricted fishing areas or time/area closures, fishing is allowed under restrictions that are intended to protect certain components of the populations within the area (e.g., prohibitions on bottom fishing gear), or to protect populations during a critical phase of their life history, such as during spawning. The time/area closures evaluated in this amendment are primarily in deeper water, where larger, legal-size gag occur. Establishing time/area closures in deeper water is unlikely to reduce bycatch by any significant amount. If such areas are sited in shallow-water, where juvenile and sub-adult grouper are more prevalent, then reductions in bycatch may be more likely to occur in the area where the time/area closure is sited.

Alternatives being considered to minimize bycatch

Reductions in dead discards can be accomplished either by reducing the number of red grouper and gag discarded or reducing the release mortality rate of discards. To reduce the number of grouper discards, management measures must limit fishing effort or change the selectivity of fishing gears in such a way that reduces the harvest of sublegal fish. To reduce the discard mortality rate of red grouper, gag, and other shallow-water grouper, sources of release mortality must first be identified (i.e., depth, hooking, surface interval) and management measures must be imposed to reduce discard mortality rates.

This amendment considers several management measures to reduce shallow-water grouper discards and discard mortality. Alternatives that either directly or indirectly could reduce shallow-water grouper bycatch, include higher red grouper bag limits (Action 2.2), an adjustment for discarded fish in setting the gag quota (Action 3), gag minimum size limits (Action 5), time and area closures (Action 6). Other alternatives considered in this amendment that may increase grouper bycatch include a gag grouper slot limit (Action 2.1) and longer recreational closed seasons (Action 2.1 and 7.2).

Practicability Analysis

Criterion 1: Population effects for the bycatch species

As described in Amendment 30B (GMFMC 2008b), for both the red and gag grouper stocks, total dead discards have increased significantly because the implementation of minimum size limits. For red grouper, commercial dead discards on average have been greater than recreational discards, and for gag, recreational dead discards on average have been greater than the commercial discards. Therefore, management measures to reduce bycatch will have the greatest effect on commercially caught red grouper and recreationally caught gag.

Measures being considered to end overfishing of gag including the rebuilding plan, setting the commercial quota, restricting the allocation of red grouper multi-use shares, and restricting the recreational harvest are likely to increase gag bycatch when compared to 2010 levels. However, if management measures are less restrictive than the more austere measures put in place through temporary regulations in 2011 to reduce overfishing, the amount of bycatch would be reduced because more fish will be kept rather than be discarded. If the management measures proposed in this amendment are not taken, stock rebuilding could be delayed, further jeopardizing the stock's condition. Therefore, the overall benefits to the stock resulting from these management measures are expected to exceed the losses associated with increasing bycatch.

For other reef fish species including red grouper, management measures to end gag overfishing and rebuild the stock could lead to increased discards for these species. The more restrictive the gag management measures, the more likely fishermen will target other species. This could increase discards in two ways. One would be in targeting these other species, the fishermen would be more likely to have regulatory discards, either by catching undersized fish or maximizing bag or trip limits, fishing during closed seasons, or individual fishing quota allocations. The other source of discards could result from annual catch limits (assuming these measures are implemented through the Generic Annual Catch Limits/Accountability Measures Amendment) being exceeded through the redirected effort, thus causing season closures and regulatory discards resulting from those closures.

The bycatch minimization methods being considered for this amendment are expected to benefit the stocks. These include reducing the minimum size limit for commercially caught gag, season and area closures, and increasing the bag limit for red grouper.

Reducing the size limit of gag for the commercial sector is estimated to reduce bycatch. The extent and magnitude of bycatch reduction depends on the minimum size limit chosen, the gear used for harvest, and the overall release mortality for each gear. Lowering the commercial gag minimum size limit is expected to provide little benefit to the population because most fish harvested are legal size and not discarded. This amendment does not consider lowering the recreational gag minimum size limit. Although this might reduce dead discards and provide net benefits to the population, the decrease in the size limit, would increase angler catch rates and result in a longer recreational closed season. This action should have no effect on bycatch of other species.

Season and area closures considered in the amendment could decrease gag bycatch if the areas closed are areas where gag are more prevalent and shift effort to areas where gag are less prevalent. As discussed above, this shift in effort could result in increased discards for other reef fish species, particularly if these species are subject to minimum sizes, closed seasons, bag or trip limits, or closures due to meeting or

exceeding annual catch limits. Ultimately, the Council elected to go with the no action alternative and not set any season area closures. With the exception on non-governmental organizations, most comments were against additional closures because of concerns including concentrating effort and possible inter-sector conflict within the areas left open to fishing. Therefore, lack of quantifiable biological benefits from a new closure did not seem to balance out the opposition by fishermen to additional restrictions, especially given the other new restrictions under the gag rebuilding plan.

Increasing the red grouper bag limit would reduce the number of red grouper discards because more fish may be kept. However, fish would still be discarded if they were below the minimum size limit. This management measure could reduce discards for other reef fish species if the bag limit increase causes fishermen to target red grouper over other species. This benefit would be seen most for species that do not inhabit the same areas as red grouper.

Amendments 27/14 to the Reef Fish and Shrimp FMPs (GMFMC 2007) and Amendment 31 (GMFMC 2009) recently required fishermen to change their fishing practices. This includes using specific gear like circle hooks, dehooking devices, and venting tools, to fishing in deeper waters where fewer undersized fish and sea turtles are found. These are all intended to reduce bycatch and release mortality. The benefits of such actions are discussed in detail in these amendments.

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

The relationships among species in marine ecosystems are complex and poorly understood, making the nature and magnitude of ecological effects difficult to predict with any accuracy. The most recent gag and red grouper stock assessment updates (SEDAR 2009a, 2009b) indicated an episodic mortality event in 2005 (possibly due to red tide) reduced both the red grouper and gag stocks. Although the red grouper stock was not reduced sufficiently to be considered overfished, the gag stock was. The red grouper stock has been recovering and allows the Council to increase TAC and the red grouper bag limit (Action 2.2 and a proposed 2011 red grouper regulatory amendment) which should reduce discards. Management measures in this amendment also propose to decrease fishing mortality for the gag stock and allow the stock to rebuild until it is capable of supporting fishing at the optimum yield level. Stock biomass for red grouper is estimated to recover even if red grouper management measures remain unchanged. Reductions in bycatch and fishing mortality will allow the gag stock to increase in abundance, resulting in increased competition for prey with other predators. Consequently, it is possible that forage species and competitor species could decrease in abundance in response to an increase in grouper abundance. Changes in the bycatch of gag, red grouper, and other shallow-water grouper are not expected to directly affect other species in the ecosystem. Although birds, dolphins, and other predators may feed on grouper discards, there is no evidence that any of these species rely on grouper discards for food.

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

Population and ecosystem effects resulting from changes in the bycatch of other species of fish and invertebrates are difficult to predict. As discussed in Amendment 30B (GMFMC 2008b), snappers, greater amberjack, gray triggerfish and other reef fishes are commonly caught in association with shallow-water grouper. Many of these species are in rebuilding plans (red snapper, gray triggerfish, and greater amberjack) with the stocks improving. Regulatory discards significantly contribute to fishing mortality in all of these reef fish fisheries, except gray triggerfish and vermilion snapper.

No measures are proposed in this amendment to directly reduce the bycatch of other reef fish species. Bycatch minimization measures implemented through Amendment 27/14 and Amendment 31 are expected to benefit reef fish stocks. Lowering the commercial gag minimum size limit is estimated to reduce commercial discards, however, these reductions are somewhat tempered by the gag quota reductions. Decreasing the size limit will increase catch rates and allow the individual fishing quota shareholders to potentially catch their allocation faster. The individual fishing quota program eliminates the need for mid-season quota closures of shallow- and deepwater grouper, tilefish, and red snapper, which have the unintended consequences of shifting fishing effort to other species. For species with quotas (greater amberjack, gray triggerfish, and recreational red snapper), this could lead to a shift in fishing effort during quota closures and negatively impact reef fish stocks not currently constrained by annual quotas or individual fishing quota programs. The magnitude of this impact would depend on the size of the quota, the length of the closure, and the amount of effort shifting that occurs. Proposed annual catch limits and accountability measures are now being developed for species not considered undergoing overfishing or overfished, thus potential for effort shifting and changes in bycatch may be lessened for these species.

Criterion 4: Effects on marine mammals and birds

The effects of current management measures on marine mammals and birds are described above. Bycatch minimization measures evaluated in this amendment are not expected to significantly affect marine mammals and birds. There is no information to indicate marine mammals and birds rely on grouper for food, and measures in this amendment are not anticipated to alter the existing prosecution of the fishery, and thus interactions with marine mammals or birds.

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

Lower commercial gag size limits will reduce costs associated with fishing operations. Decreasing the gag minimum size limit will increase efficiency and will reduce the number of fish released, especially in the longline sector. Expanding the recreational seasonal gag closure will likely have direct impacts to the recreational sector. Anglers and for-hire fishermen would incur losses in consumer surplus resulting from a seasonal closure or a lower bag limit. Increases in consumer surplus would be expected from a higher red grouper bag limit. For a more complete discussion of the changes in fishing costs associated with the various management actions see Sections 2 and 5.

Criterion 6: Changes in fishing practices and behavior of fishermen

All bycatch minimization measures proposed are expected to change fishing behavior and fishing practices in a manner that reduces bycatch for species targeted by the regulations. Individual fishing quota shareholders will need to determine if their gag allocation is sufficient to target gag, or to use the allocation to keep incidentally caught gag while targeting other species. Decreases to minimum size limits (commercial gag) will increase catch rates, reduce bycatch, and affect decisions about where to fish. Seasonal closures and higher bag limits will alter angler effort and may affect decisions about when and where to fish. A higher red grouper bag limit may encourage anglers to shift their effort and take more fishing trips targeting red grouper. This would potentially result in less discards for species found in other habitats than were red grouper are found, but could result in higher discards for species sharing the same habitat as red grouper. Anglers may also choose to fish closer to shore because of higher fuel prices and a longer gag closed season.

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

Proposed management measures are not expected to significantly impact administrative costs. Size limits, bag limits, quotas, and closed seasons are currently used to regulate the commercial and recreational sectors harvesting shallow-water grouper. None of the commercial actions are expected to diminish regulatory effectiveness. All of these measures will require additional research to determine the magnitude and extent of impacts to bycatch and bycatch mortality.

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

Reducing the commercial gag minimum size limits may positively impact these stocks by reducing regulatory discards and increasing efficiency, however, with the reduced quota, the positive impacts may be minimized. This would result in lower harvest costs for commercial fishermen (i.e., less time to cull undersized fish, less bait, potentially greater catches per trip). However, these benefits would only accrue until commercial fishermen run out of their gag allocation. At this point, the minimum size limit would not be effective because all incidentally caught gag would have to be discarded. For anglers, increasing the red grouper bag limit would result in increases in consumer surplus for recreational anglers.

Imposing recreational closed seasons will positively benefit the gag stock by reducing fishing mortality assuming the times of the closures occur during times of high directed gag effort and that fishermen can avoid gag when targeting other species. These closures, however, have different effects relative to economic losses as to how they would influence angler behavior. This is in part related to the extent anglers are likely to alter their behavior to fish for gag during time periods when the availability of gag is either high or low (see Section 5.2.3). If effort shifting towards gag would occur during the open period, then this could reduce discards of other targeted reef fish species.

Recovery of the gag stock and maintenance of a healthy red grouper stock will positively affect the social and economic value of fishing activities. For a more complete discussion of the changes in fishing costs associated with the various management actions see Sections 2 and 5.

Criterion 9: Changes in the distribution of benefits and costs

Currently, the commercial and recreational red grouper minimum size limits are different and there is a two-inch difference between the recreational and commercial gag minimum size limit. This amendment proposes reducing size limits for the gag commercial sector. Reductions to commercial minimum size limits may be perceived by the recreational sector as inequitable, especially if equivalent reductions are not considered for the other sector. No or minimal changes in gag allocation are expected, resulting in little change to the distribution of benefits and costs associated with bycatch.

Criterion 10: Social effects

Bycatch is considered wasteful because it reduces overall yield obtained from the fishery. Measures that reduce bycatch to the extent practicable will increase efficiency, reduce waste, and benefit stock recovery, thereby resulting in net social benefits. Lower minimum size limits and higher recreational bag limits should all have positive social benefits because these actions would reduce bycatch or bycatch mortality.

Shorter seasons and reduced quotas/allocations should have short-term negative effects on the different sectors and could increase bycatch. However, the long-term benefits of stock rebuilding and accounting for discards in setting these restrictions should outweigh the short-term costs.

CONCLUSIONS

Analysis of the ten bycatch practicability factors indicates there would be positive biological impacts associated with further reducing bycatch and bycatch mortality in the reef fish fishery. The main benefits of reducing grouper bycatch are: 1) less waste and 2) increased yield in the directed fishery. Reducing discards and discard mortality rates would result in less forgone yield.

When determining reductions associated with various management measures, release mortality was factored into the analyses, in order to adjust the estimated reductions for losses due to dead discards. The increases in discards associated with each of these management measures varies and is contingent on assumptions about how fisherman's behavior and fishing practices will change. In this action, reducing the commercial gag minimum size limit appears to be a practical option for reducing discards as long as landings are constrained to the quota under the individual fishing quota program. Lowering the gag minimum size limit for the recreational sector will reduce bycatch, but this decrease would increase angler catch rates and require a longer closed season. The longer closed season will partially offset benefits resulting from the lower minimum size limit. Therefore, the Council had to weigh the benefits of reducing bycatch with the negative social effects of longer seasonal closures. Increased minimum size limits are expected to have the greatest effect on increasing bycatch, followed by seasonal closures, and lower bag/trip limits. In some instances, the benefits of reducing harvest and ending overfishing may outweigh the benefits of further reducing discard mortality.

The Council needed to consider the practicability of implementing the bycatch minimization measures discussed above with respect to the overall objectives of the Reef Fish Fishery Management Plan and Magnuson-Stevens Act. Therefore, given actions in this amendment combined with previous actions, management measures, to the extent practicable, minimize bycatch and to the extent bycatch cannot be avoided, minimize the mortality of that bycatch.

5 Environmental Consequences

5.1 Action 1. Rebuilding Plan for Gag

5.1.1 Direct and Indirect Effects on Physical Environment

Sections 3.1, 3.2, and GMFMC (2004b) describe the physical environment and habitat use by groupers, particularly for red grouper and gag. In general, eggs and larvae are pelagic. Depending on the species, juveniles either share the same habitat as adults, or are found in different habitats and undergo an ontogenetic shift as they mature. For red grouper, juveniles are found in nearshore waters until they reach approximately 16 inches and move offshore (GMFMC 2004b). Adults are associated with rocky outcrops, wrecks, reefs, ledges, crevices, caverns, as well as "live bottom" areas, in depths of 3 to 190 m. Juvenile gag are estuarine dependent and are found in seagrass beds (GMFMC 2004b). Adult gag are associated with hard bottom substrates, including offshore reefs and wrecks, coral and live bottom, and depressions and ledges. Spawning adults form aggregations in depths of 50 to 120 m, with the densest aggregations occurring around the Big Bend area of Florida. Females undergo a migration from shallower waters to the deeper waters where spawning occurs, while males generally stay at the same depths where spawning occurs (Koenig 1999).

In the commercial sector, most red grouper are caught with longlines and most gag are caught with vertical lines (mostly bandit rigs and electric reels) (SEDAR 10 2006). Vertical-line gear is used to harvest most (>60%) commercial and nearly all recreational gag. Prior to 2007, longline gear accounted for 36% of the commercial gag landings and 59% of the commercial red grouper landings. Vertical line gear accounted for 27% of the commercial red grouper landings and nearly all of the recreational red grouper landings. Traps (14% of red grouper commercial landings), spears (2.2% of gag commercial landings), and other gears (< 1%) accounted for the remainder of landings. Traps became illegal for harvest of reef fish after February 7, 2007.

Longlines

Longline gear is deployed over hard bottom habitats using weights to keep the gear in direct contact with the bottom. Its potential for adverse impact is dependent on the type of habitat it is set on, the presence or absence of currents and the behavior of fish after being hooked. In addition, this gear upon retrieval can abrade, snag, and dislodge smaller rocks, corals, and sessile invertebrates (Bohnsack in Hamilton, 2000; Barnette 2001). Direct underwater observations of longline gear in the Pacific halibut fishery by High 1998 noted that the gear could sweep across the bottom. Some halibut were observed pulling portions of longlines 15 to 20 feet over the bottom. Although the gear was observed in contact with or snagged on a variety of objects including coral, sturdy flexible corals usually appeared unharmed while hard corals often had portions broken off. However, in another study that directly observed deployed longline gear (Atlantic tilefish fishery) found no evidence that the gear shifted significantly, even when set in currents. This was attributed to anchors set at either end of the longline as well as sash weights along the line to prevent movement (Grimes et al. 1982). Based on the direct observations, it is logical to assume that bottom longline gear would have a minor impact on sandy or muddy habitat areas. However, due to the vertical relief that hardbottom and coral reef habitats provide, it would be expected that bottom longline gear may become entangled, resulting in potential negative impacts to habitat (Barnette 2001).

Vertical lines

Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus vertical line gear fishing generally occurs over hard bottom areas (GMFMC 2004b). Vertical lines include multi-hook lines known as bandit gear, handlines, and rod-and-reels. Vertical-line gear is less likely to contact the bottom than longlines, but still has the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001).

In using bandit gear, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). The gear is in direct contact with the bottom for only a short period of time. Barnette (2001) suggests that physical impacts may include entanglement and minor degradation of benthic species from line abrasion and the use of weights (sinkers).

Commercial or recreational fishing with rod-and-reel and handlines also puts gear on the bottom. The terminal part of the gear is either lifted off the bottom like fishing with bandit gear, or left contacting the bottom. Sometimes the fishing line can become entangled on coral and hard bottom outcroppings. The subsequent algal growth can foul and eventually kill the underlying coral (Barnette 2001). Researchers conducting studies in the restricted fishing area at Madison-Swanson reported seeing lost fishing line on the bottom, much of which appeared to be fairly old and covered with growth (personal communication, Andrew David), a clear indication that bottom fishing has had an impact on the physical environment prior to fishing being prohibited in the area (GMFMC 2003). The National Fish and Wildlife Foundation, in issuing grants to remove marine debris, established monofilament fishing line is a priority marine debris issue[16].

Anchor damage is also associated with vertical-line fishing vessels, particularly by the recreational sector where fishermen may repeatedly visit well marked fishing locations. Bohnsack (in Hamilton 2000) points 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 grouper occurs.

Fish traps

Fish traps were an important part of commercial reef fish sector landings and previously accounted for as much as 14% of the annual red grouper landings. Traps are often set on live substrate and can cause damage to corals, gorgonians, sponges, and submerged aquatic vegetation. In addition, lost traps can continue to move on the bottom with currents continuing to damage adjacent bottom habitat. However, the Council phased out this gear in February 2007 so it is no longer allowed to be used. Thus, this gear no longer impacts habitat in the Gulf of Mexico.

Spear and Powerhead

Spearguns and slings are used in both commercial and recreational grouper fishing but are a relatively minor component of both. Barnette (2001) cited a study by Gomez (1987) that concluded that spearfishing on reef habitat may result in some coral breakage, but damage is probably negligible. In

[16] National Fish and Wildlife Foundation 2006 Marine Debris Grants Program Recipients web page, http://www.nfwf.org/Content/ContentFolders/NationalFishandWildlifeFoundation/Programs/MarineDebrisPreventionandRemovalProgram/2006MarineDebrisProjectBriefs.pdf

addition, there could be some impacts from divers touching coral with hands or from resuspension of sediment by fins (Barnette 2001). Such impacts should be negligible to non-existent for well-trained and experienced spearfishermen who stay in the water column and avoid contact with the bottom.

This action simply establishes a target biomass level and a target date to achieve stock rebuilding. As such, it has no direct effects on the physical environment as described above. Indirectly, the targets set in this action will determine the management measures needed, including closed seasons and seasonally closed areas. These actions affect the time amount and time that fishing gear can interact with the physical environment. Fishing line can get entangled on bottom structures and lead to local fouling of areas in some situations. In this respect, **Alternative 1**, the no action alternative, will have the least indirect impact on the physical environment. **Alternative 2**, which established a 10-year rebuilding plan will have some indirect positive impact by the resulting closed seasons and areas that reduce the amount of time that gear can impact the bottom. **Alternative 3**, a 7-year rebuilding plan, will require more restrictive measures and longer closed seasons. The longer closed seasons under **Alternative 3** will provide greater positive impacts on the physical environment than **Alternative1 or 2** while the rebuilding plan is in effect, while **Alternative 4**, a 5-year rebuilding plan, will require a complete shut-down of the fishery for the duration of the rebuilding period, and will therefore provide the greatest positive impact on the physical environment while the rebuilding plan is in effect. These indirect impacts are expected to be very minor.

5.1.2 Direct and Indirect Effects on the Biological/Ecological Environment

Gag and red grouper 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 method's ability to target and capture organisms by size and species. For gag and red grouper fishing, this would include the number of discards, mostly sublegal fish or fish caught during seasonal closures, and the mortality associated with releasing these fish. Another factor would be the timing of fishing and if fishing coincides with important seasonal components of a species' life history such as spawning.

Maximum sustainable yield is the largest average catch that can be taken at a sustained level of harvest from a stock under average environmental conditions, and for gag and red grouper is also considered the overfishing limit. Associated with maximum sustainable yield is a fishing mortality and stock biomass that would sustain this harvest (F_{MSY} and B_{MSY}, respectively) from which the acceptable biological catch, annual catch limits, optimum yield, minimum stock size threshold, and maximum fishing mortality rate are generally derived. If fishing is allowed to exceed F_{MSY} (overfishing) for several years, then the stock size will decline to a level where the harvest can no longer be maximized. This overfishing can manifest itself in two ways. The first is growth overfishing where the fishing pressure on smaller fish is too high to allow the fishery to produce MSY. The second is recruitment overfishing where the fishing pressure is so high that the population is no longer able to replace itself. Recruitment overfishing for an extended period of time could 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 could result in the economic and biological extinction of a stock.

Fishing can affect life history characteristics of reef fish. Lombardi-Carlson et al. (2006) found that the mean size of gag at age was larger pre-1990 than in post-1990 years and suggests this decrease may be

due to fishing. Although this trend has not been observed for Gulf red grouper, it has been noted in other reef fish species such as vermilion snapper (Zhao et al. 1997, Hood and Johnson 1999) and red snapper (Cowan et a. 2010). Fishing can also affect a gag and red grouper reproduction. Fitzhugh et al. (2006) reported the size at 50% maturity and 50% transition from females to males was smaller in their studies compared to earlier year. This has also been noted for other reef fish species (Cowan et al. 2010). In addition, for hermaphroditic species, fishing pressure has been suggested for changes in sex ratios. The proportion of male gag in the population has decreased from historical levels of 17% (Hood and Schlieder 1992) to 2-10% in the 1990s (Coleman et al. 1996, June 8, 1998 memo from Fitzhugh, Collins and White), leading to concerns by the Council's Reef Fish Stock Assessment Panel that the reduction in proportion of males may have a potentially negative consequence on population reproductive potential (GMFMC 1998). It has been suggested the resulting reduction in the number of males is a consequence of males being more aggressive feeders than females. Thus, hook-and-line fishing on gag spawning aggregations tends to selectively remove males before females (Gilmore and Jones 1992, Koenig at al. 1996). A decline in the ratio of male to female gag in the Gulf of Mexico has been an ongoing source of concern. Furthermore, for species that aggregate such as gag, the species is particularly vulnerable to fishing because they are concentrated at specific locations. This problem is confounded because of the depth gag spawn (from 27-66 fathoms, but concentrated around 44 fathoms; Koenig at al. 1996). At these depths, gag are vulnerable to mortality from barotrauma through the capture process.

Discard mortality from fishing is a problem for gag and red grouper populations, particularly at deeper depths. Fish with swim bladders can experience air expansion problems when brought to the surface, particularly when raised quickly from deep water. As air expands in the swim bladder, internal organs are pushed out of place and compressed, potentially causing injury and death (Rummer and Bennett 2005). If the bladder bursts, the gas can be retained in the body cavity and continue to cause damage. Management measures have been put in place to reduce this mortality through requiring venting tools (GMFMC 2007). For red grouper, even in shallow water (< 38m) 75% of red grouper had distended stomachs from swim bladder expansion, and in deeper water (> 41m) 95 percent had distended stomachs (Bacheler and Buckel 2004). For gag, no fish had distended stomachs in shallow water (< 24m), but over 60 percent had distended stomachs in deeper water (> 36m). Bacheler and Buckel (2004) indicated that if fish are released while still inflated, they may not be able to return to depth or even move off the surface. The resulting increased exposure to air and predators could increase mortality of discarded fish. The use of venting tools allowed fish to swim normally and return to depth; however, this does not mean the fish survive because mortality may be delayed (Rummer and Bennett 2005).

Discard mortality from fishing may also come from excessive handing of fish in the release process. Dehooking devices can decrease the time and amount of handling needed to remove a hook from a fish. Hook removal time contributes significantly to release mortality (Cooke and Suski 2004). Long-handled dehookers can be used without removing the animal from the water, which can decrease stress and injury from handling and exposure. Even when a fish is removed from the water, exposure and handling time may be reduced by using a dehooker. Management measures have been put in place to reduce this mortality through requiring venting tools through Amendment 27 and contains further discussion of the impacts of venting tools and dehooking devices on survival of fish (GMFMC 2007).

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 gag and red grouper management measures. Currently, the only model for the Gulf that could address

these issues is an Ecopath model being developed by the Florida Marine Research Institute and NOAA Fisheries (Behzad Mahmoudi, personal communication). 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 red grouper or gag 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, and gray triggerfish 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 gag stock and maintaining the red grouper 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 gag feed primarily on fish (>95%) (Naughton and Saloman, 1985; Nelson 1988; Bullock and Smith, 1991) and red grouper feed on a variety of shrimp, crabs, and lobsters (Bullock and Smith 1991). Less of these prey items may be available to other reef fish species if red grouper and gag stocks are allowed to increase.

Red grouper have a role in shaping the offshore environment. Direct underwater observations of red grouper have shown this species utilizes flat areas with veneer of sand over solution holes, which they excavate to form depressions exposing the underlying carbonate rock[17]. Their excavations harbor suites of fish and invertebrate species whose abundances increase as a result, including vermilion snapper, black grouper, and spiny lobster (Coleman and Williams 2002). In this way, red grouper act as ecosystem engineers that alter the habitat and create interdependencies with other important species.

The reef fish fishery can affect species outside the reef fish complex. Specifically, sea turtles have been observed to be directly affected by the longline sector of the Gulf reef fish fishery. These effects occur when sea turtles interact with fishing gear and result in an incidental capture injury or mortality and are summarized in GMFMC (2009). 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 listed species, the most recent biological opinion for the Reef Fish fishery management plan concluded authorization of the Gulf of Mexico reef fish fishery managed under the reef fish plan is not likely to jeopardize the continued existence of sea turtles, smalltooth sawfish, or *Acropora* species (NMFS 2009). For marine mammal species, the reef fish fishery was classified in the 2011 List of Fisheries (75 FR 69468) as a Category III fishery because it is prosecuted primarily with longline and hook-and-line gear. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population.

As discussed in Section 5.1.3, the setting of a biomass target and date has no direct impact on the biological/ecological environment. However, establishing a target biomass level will result in management actions that will rebuild the gag stock from its present level. This will benefit the gag stock

[17] PowerPoint presentation titled, "Red Grouper on the West Florida Shelf", given by Felicia Coleman at the October 29 – November 1, 2007 Gulf Council meeting in Biloxi, Mississippi.

by rebuilding it to a level where it can support higher catch levels without becoming overfished. In addition, it can better resist periodic environmental impacts. An example is the 2005 episodic mortality event described in the 2009 gag update assessment, which has been attributed to a massive red tide that year. At the start of the event, the gag stock was at or slightly below its B_{MSY} biomass level, and the additional mortality from the event, combined with the normal level of natural mortality and fishing mortality, is believed to have driven the stock below its minimum stock size threshold and into an overfished state. Red grouper, in contrast, was estimated in the 2006 SEDAR benchmark assessment to be at its B_{OY} biomass level, well above the B_{MSY} level. Although red grouper also experienced a severe decline in 2005, it remained above its minimum stock size threshold and avoided becoming overfished. Thus, rebuilding stocks to B_{MSY} and above produces long-term benefits for the health of the stock.

Given that a rapid rebuilding will, for the reasons discussed above, provide the greatest biological benefits to the gag resource, **Alternative 4**, which will rebuild the stock in 5 years, will provide the greatest benefits to the biological/ecological environment, followed by **Alternative 3**, which will rebuild the stock in 7 years, and then **Alternative 2**, which will rebuild the stock in 10 years. **Alternative 1**, the no-action alternative, will not rebuild the stock. It is possible that some rebound of the stock will occur naturally, but is it unlikely to fully rebuild to the MSY target levels in 10 years or less without additional actions, and therefore **Alternative 1** provides the least benefits to the biological/ecological environment.

5.1.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

Action 1 considers alternatives with respect to establishing a rebuilding plan for gag. A rebuilding plan would instruct the implementation of future management measures intended to achieve the rebuilding objectives. As discussed above, the setting of a rebuilding plan is an administrative action, and thus has no direct effects on the economic environment. However, establishing a target biomass level and rebuilding plan will result in management actions that will rebuild the gag stock from its present level, which will allow the stock to support higher catch levels without being overfished. As such, establishing a rebuilding plan for gag would only potentially result in indirect economic effects on fishing participants. The actual management measures implemented during the rebuilding period would have direct economic effects on fishing participants.

Alternative 1 (No Action), which does not provide a rebuilding plan, would potentially imply the least restrictive regulations and thus generate the least adverse indirect economic effects on fishing participants in the short-term. Specifically, if a rebuilding plan is not implemented, the total allowable catch (TAC), commercial annual catch limit, annual catch target, and quota, and the recreational annual catch limit and annual catch target for gag would revert back to what was established in Amendment 30B. The Council set the 2009-2011 TAC based on constant F_{OY} projections. For 2011 and subsequent years, this yield was 3.82 MP GW, of which 1.49 MP GW is the commercial allocation (39% of TAC) and 2.33 MP GW is the recreational allocation (61% of TAC). The Council selected this approach to setting TAC and the resultant quota because the harvest can increase or decrease based on the condition of the stock.

However, the fishing mortality rate for gag has shown an increasing trend over time and fishing mortality rates in recent years are not consistent with rebuilding or maintaining the gag stock at its maximum sustainable yield level. Moreover, because the gag stock has been determined to be overfished and undergoing overfishing, **Alternative 1 (No Action)** does not comply with Magnuson-Stevens Act requirements regarding rebuilding plans.

In the absence of all fishing mortality, including bycatch mortality, the shortest possible time in which the gag stock can rebuild is 5 years. Under the National Standard 1 guidelines, the maximum time allowed for rebuilding the gag stock is 10 years. In the Generic annual catch limit/AM Amendment, the proposed annual catch limits are based on yields that are projected to rebuild the stock in 10 years, while the proposed annual catch targets are based on yields that are projected to rebuild the stock in 7 years.

Preferred Alternative 2 establishes a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 10 years or less. Specifying the rebuilding time to be 10 years or less allows a buffer to account for fluctuations in abundance due to unforeseen events (e.g., red tide) and leeway to take the needs of fishing participants into account when setting catch levels and management measures. **Preferred Alternative 2** would potentially imply the less restrictive regulations and thus generate less adverse indirect economic effects on fishing participants in the short-term relative to **Alternative 3** and **Alternative 4**, but potentially more restrictive regulations and thus more adverse indirect economic effects in the short-term relative to **Alternative 1 (No Action)**.

Alternative 3 establishes a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 7 years or less. Seven years is the estimated time to rebuild if the stock is managed at a fishing rate corresponding to optimum yield (F_{OY}) rather than the rate corresponding to a 10-year rebuilding plan ($F_{rebuilding}$). Although the yields under a 7-year rebuilding plan would eventually catch up to those for a 10-year plan, the initial catch targets in the early years would be smaller under a 7-year rebuilding plan relative to a 10-year rebuilding plan. Thus, **Alternative 3** would potentially imply more restrictive regulations and thus more adverse indirect economic effects in the short-term relative to **Preferred Alternative 2** and **Alternative 1 (No Action)**, but less restrictive regulations and thus less adverse indirect economic effects on fishing participants in the short-term relative to **Alternative 4**.

Alternative 4 establishes a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 5 years. If **Alternative 4** is adopted, strong measures to reduce bycatch of gag in other fisheries also need to be considered. Because a total elimination of discard mortality is unlikely to be achieved, this alternative would likely result in the stock being slightly under the rebuilding target at the end of five years. Most importantly, this alternative would require a complete closure of the gag component of the reef fish fishery for at least 5 years. **Alternative 4** would therefore eliminate all net revenue from the commercial sector and all consumer and producer surplus from the recreational sector for at least 5 years. As such, **Alternative 4** would lead to the most restrictive regulations and thus more adverse indirect economic effects in the short-term relative to **Alternative 1 (No Action)**, **Preferred Alternative 2**, and **Alternative 3**.

The choice of a rebuilding plan under each of the various alternatives will lead to different economic costs and benefits. The actual costs and benefits associated with each alternative depend on the difference between current and target biomass level for gag and the length of the rebuilding period. In terms of productive capacity, a wide gap exists between current and potential production of the gag stock, and this gap necessitates the introduction of more stringent measures in order to reach full productive capacity. The length of the rebuilding plan will determine how stringent the management measures will be. In general, the shorter the rebuilding period, the more stringent the required management measures will be, and thus the greater the indirect economic costs on fishing participants in the short-term. On the other hand, the indirect economic benefits resulting from larger yields will also accrue sooner as well. Conversely, longer rebuilding periods will require less stringent management measures in the short-term

and thus smaller indirect economic costs on fishing participants in the short-term. The indirect economic benefits from larger yields would accrue farther into the future.

Regardless of the length of the rebuilding period chosen, the long-term benefits from the fishery would depend on, among others, the regulatory regime adopted over time. Regulatory regimes that promote economic efficiency generally have a higher likelihood of generating higher economic values while preserving the sustainability of the fish stock. Other regulatory regimes could very well erode the economic benefits over time, even at higher stock levels. For example, if regulations proposed in this amendment were successful in rebuilding the gag stock, higher levels of harvest approaching the chosen optimum yield (OY) would be allowed. However, if overcapacity and other open-access issues in the recreational sector are not addressed, the economic status of the gag component of the reef fish fishery could fall back to its current, or possibly worse, condition. Regardless, without knowledge of the actual management measures that would be implemented under the rebuilding plans associated with each alternative, and the associated estimates of costs and benefits over time, it cannot be determined whether a shorter rebuilding period would provide larger net economic benefits than a longer rebuilding period, or vice-versa.

The issue of rebuilding periods in fisheries management was explored by Larkin et al. (2006). They constructed a dynamic programming bioeconomic model and applied it to two hypothesized fisheries, one involving moderate-live stock and the other, a long-lived stock. They noted the possibility of generating a higher net present value (NPV) when moving from a 10-year rebuilding timeframe to 20-year and 30-year timeframes, with a higher discount rate resulting in larger increases than a lower one. One of the additional regulations they simulated was a 10-year fishery closure within a 40-year rebuilding period. Their results showed minimal changes in the NPV and total allowable catch (TAC) under a low discount rate, but an increase in TAC with a slight reduction NPV under a higher discount rate.

Some additional statements on relative costs and benefits can be made based on the respective characteristics of the various rebuilding plans and the current management of fishing for gag. Specifically, as discussed in section 3.3.1, the commercial sector is currently managed under the grouper/tilefish individual fishing quota program. It is assumed the commercial sector for gag will continue to be managed under individual fishing quota program during the course of any rebuilding plan chosen by the Council. Further, the individual fishing quota program is assumed to keep the commercial sector operating within its quota. Economic theory suggests the average allocation price per pound approximates the average net revenue per pound harvested in the commercial sector. In 2010, the first year of the individual fishing quota program, the average price per pound of gag allocation was $1.00. In each year, the expected total net revenue in the commercial sector would be estimated by multiplying its quota by $1.00, assuming a constant average price per pound of gag allocation. The net present value (NPV) of the commercial sector's expected total net revenue would be estimated by discounting it by the appropriate rate, which is currently 3%.

Conversely, the recreational sector is currently managed through the use of a bag limit, size limit, and seasonal closures, which are intended to keep it from harvesting more than its allocation. Because the private and for-hire subsectors are not managed separately (e.g. via allocations to each subsector), the allocation of landings between the two subsectors cannot be determined. Further, the management measures used to restrain the recreational sector's harvest and landings are subject to change, as evidenced by measures in the two recent interim rules and Action 2 in this Amendment. As such, net operating revenue (NOR) for the for-hire sector cannot be estimated. However, Carter and Liese (2010) estimated the average consumer surplus (CS) per fish is $85 (2008 dollars). The average weight per fish

from 2006-2008 was 7.23 pounds GW. Thus, the average CS per pound of fish landed by the recreational sector is estimated to be $11.76 (2008 dollars). Expected total consumer surplus in the recreational sector can be estimated by multiplying its landings in each year by $11.76. As in the commercial sector, the net present value (NPV) of the recreational sector's expected total consumer surplus would be estimated by discounting it by the appropriate rate, which is currently 3%.

Direct and Indirect Effects on the Social Environment

Effects from fishing regulations on the social environment are difficult to analyze due to complex human-environment interactions and a lack of quantitative data about that interaction. Generally, social impacts can be categorized according to changes in: human behavior (what people do), social relationships (how people interact with one another), and human-environment interactions (how people interact with other components of their environment, including enforcement agents and fishery managers). It is generally accepted that a positive correlation exists between economic impacts and social impacts. Thus, in the preceding section, Direct and Indirect Effects on the Economic Environment, alternatives predicting positive or negative economic impacts are expected to have correlating positive or negative social impacts. At this time, however, social impacts may only be described qualitatively.

National Standard 8 (NS8) specifies that consideration be given to the impacts of regulatory action on fishing communities. However, the specific wording of the Magnuson Stevens Act (MSA) and the National Standards mandates priority to end overfishing within a limited time frame, relegating potential impacts on human communities as secondary. Amendment 32 is driven by the mandates of National Standard 1 and MSA to rebuild the gag stock within a limited time frame. Although each of the actions has a status quo alternative, the selection of the status quo alternative conflicts with the mandates of MSA and is not allowable. Additional alternatives are proposed that vary by severity of change to current regulations regarding gag and red grouper. To the extent practicable, the Council selected as preferred the alternative in each action that provides the most fishing while still fulfilling the required rebuilding plan. It is the Council's intention that the Preferred Alternative incurs the least negative social impacts. In this way, the Council is negotiating its requirement to fulfill the restrictive mandates of NS1 and MSA, with balancing consideration for the impacts on fishing communities thereby satisfying NS8.

Thus, although **Alternative 1**, no action, would result in the least negative social impacts by not implementing a rebuilding plan for gag, meaning no further restrictions on the harvest of gag would be implemented, this alternative is not allowable under MSA. With the rebuilding plan outlined in this action, and detailed in subsequent actions of this amendment, negative impacts are expected to occur in the short-term as the stock rebuilds. It is anticipated that these immediate impacts will be met with improved benefits in the long-term as the stock rebuilds.

Of the remaining alternatives, **Preferred Alternative 2** will entail the least negative impacts in the short term, by providing the longest time frame for rebuilding the gag stock. Under any rebuilding plan, harvest yields will be decreased, affecting fishermen by restricting the quantity of fish that may be caught. A longer time frame for rebuilding allows for larger harvest yields during the rebuilding process than does a shorter rebuilding time frame. This corresponds with lesser social impacts, given the requirement to rebuild, than may be expected under a shorter rebuilding time frame. For example, the 10 years or less rebuilding plan under **Preferred Alternative 2** will allow more fish to be harvested each year than the 7 years or less (**Alternative 3**) or 5 years or less (**Alternative 4**). Each year's total allowable catch will be greater under a 10 year rebuilding plan, than a 5 year rebuilding plan. A greater total allowable catch will allow more fishermen to harvest more fish in the early years of the rebuilding plan. Under **Alternative 3**,

the initial catch targets would be smaller than under **Preferred Alternative 2**, resulting in greater short-term social impacts as fishermen's harvests are more restricted in the early years of the rebuilding plan. On the other hand, more restrictive catch levels in the early years of the rebuilding plan may allow for yields associated with a fully rebuilt stock to be resumed more quickly. This would mean that the greater short-term impacts under **Alternative 3** may be short and be followed by larger catch levels for the duration of the rebuilding plan.

The complete closure of the harvest of gag for at least five years, required in order to rebuild the gag stock within that time frame (**Alternative 4**), would incur the greatest negative social impacts. Although these impacts may be ameliorated in the long-term as the stock rebuilds faster, it is possible that such a closure could lead to non-compliant fishermen behavior, including practices that may be difficult to change at a later date.

5.1.4 Direct and Indirect Effects on the Administrative Environment

The setting of a target for biomass and a target date is an administrative action and it will have administrative effects. The act of setting a target, whether it be 5, 7 or 10 years, is a one-time event, and thus **Alternatives 2, 3 and 4** have equivalent though minor direct administrative impacts. **Alternative 1**, the no-action alternative, is not compliant with the 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 gag management into compliance. Thuse, **Alternative 1** has a greater negative effect on the administrative environment than **Alternatives 2, 3 and 4**.

Indirect effects include more restrictive management measures, which may require increased enforcement. From this aspect, **Alternative 4** is the most restrictive rebuilding time period and will require the most active enforcement. **Alternative 3** requires restrictive rebuilding actions and enforcement, while **Alternative 2** even fewer restrictions. **Alternative 1** makes no changes and thus requires no additional enforcement. Therefore, indirect effects on the administrative environment, from greatest to least, result progressively from **Alternative 4, Alternative 3 Alternative 2, and Alternative 1**.

5.2 Action 2. Recreational Bag Limits, Size Limits, and Closed Seasons

5.2.1 Direct and Indirect Effects on the Physical Environment

With respect to **Action 2.1**, fishery management actions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat, either through gear impacts to bottom habitat or through the incidental harvest of bottom habitat as described in Section 5.1.1. The degree a habitat is affected by fishing gear depends largely on the vulnerability of the affected habitat to disturbance, and on the rate that the habitat can recover from disturbance (Barnette 2001). For example, the complex structure and vertical growth pattern of coral reef species makes reef habitat more vulnerable to adverse impacts from fishing gear and slower to recover from such impacts than is sand and mud bottom habitat (Barnette 2001). Juvenile gag are found in seagrass beds and oyster shell reefs while adult gag primarily occur over mid-to-high relief natural reef habitat. Red grouper are also associated with hard bottom habitat, but tend to prefer lower relief habitat than gag.

The primary effects of recreational grouper fishing on the physical environment generally result from

fishing gear interactions with the sea floor. Most grouper are caught with hook-and-line fishing gear, although some spearfishing does occur. Fishing gear can damage or disturb bottom structures and occasionally incidentally harvest such habitat.

The primary difference between the alternatives in this action are in the length of the fishing season. Longer seasons and increased fishing effort can result in increased gear interactions and lost or discarded fishing line, which could foul the hard bottom. Such fouling could cause marine life to become entangled or overgrown with algae (Hamilton 2000; Barnette 2001).

Alternative 1, the no action alternative, is likely to have the greatest potential impact on the physical environment due to the length of the open season and amount of fishing effort. If no action is taken to modify the recreational fishing regulations, then one the interim gag rule expires, the recreational gag fishery will be open year round, except for February-March, a total of 306 days.

Alternative 2 has 61 days, which along with Alternative 3, is the shortest season length of the alternatives. This also occurs at a time of the year when gag effort is historically low. This alternative exceeds the reductions needed for gag rebuilding, and is likely to have the greatest positive impact on reducing effect on the physical environment.

Alternative 3 also has 61 open days. However, the length of the season is not necessarily an indicator of the amount of fishing effort and gear interaction. Relative to **Alternative 2**, the open days for Alternative 3 have historically had higher fishing effort. As a result, there will be more effort and greater impacts to the physical environment than **Alternative 2**, although less than **Alternative 1**.

Preferred Alternative 4 has 123 fishing days, the next longest season after **Alternative 1**. However, this open season occurs during a period of relatively low gag fishing effort. Therefore the overall effort and impacts to the physical environment are likely to be similar to **Alternative 3**. **Option a** maintains the current 22 inch minimum size limit, while **Option b** implements a 22” to 30” slot limit. The slot limit will slow down the rate of retained catch, and could result in slightly higher fishing effort if fishermen choose to fish longer to attempt to catch more keeper size fish.

For **Action 2.2**, as previously stated, the primary effects of the recreational grouper sector on the physical environment generally result from fishing gear interactions with the sea floor. The longer fishing occurs, the greater the potential for gear interactions. In this respect, increasing the bag limit could encourage fishermen to fish longer on a trip in the expectation of catching more fish.

Alternative 1, the no action alternative, leaves the red grouper bag limit at its current level of 2 fish, and provides no incentive for longer fishing trips. Therefore, this alternative will result in no change to the physical environment.

Alternative 2 raises the bag limit to 3 fish and could provide some incentive for fishermen who catch two fish to stay out longer, resulting in increased impacts with the physical environment.

Likewise, **Preferred Alternative 3**, with raises the bag limit to 4 fish, could provide even more incentive to stay out fishing longer and greater impacts on the physical environment.

However, under **Alternatives 2 and 3**, the assumption of greater impacts assumes that fishermen catch their bag limit of red grouper and stay out to catch more fish. Although anecdotal information suggests

that in the 1950s and 60s, headboat and charterboat anglers off southwest Florida were catching 4 or 5 red grouper per angler, by the 1980s catch rates had declined drastically (SEDAR 12, 2007a). During the period 1981-1985, the red grouper catch estimates off southwest Florida were 0.25 fish per angler trip from headboats, 0.579 fish per angler trip from charter boats, an 0,918 fish per angler trip from private boats (SEDAR 12, 2007a). Off northwest Florida, catch rates were even lower, and red grouper were rarely caught before Hurricane Camille in 1969 (personal comm., Bob Zales, SEDAR 12, 2007a). Although the red grouper stock has recovered since the 1980s as a result of the various management measures put in place under the Reef Fish Fishery Management Plan, it remains unlikely that most anglers are able to catch even the current 2 fish bag limit. Thus, for most anglers, the bag limit is not the controlling factor in the length of a fishing trip, and an increase in bag limit will not affect the length of time fishing for most anglers. There will be some increase in length of fishing by some anglers, and thus some increase in impacts to the physical environment from **Alternatives 2 and 3**, but the increase will not be in proportion to the increase in the bag limit.

5.2.2 Direct and Indirect Effects on the Biological/Ecological Environment

With respect to **Action 2.1**, the primary differences between the alternatives in this action are in the length and time of year of the fishing season. All of the alternatives retain the 2 fish gag bag limit and 4 fish aggregate grouper bag limit. All of the alternatives retain the 22 inch recreational minimum size limit for gag except for **Alternative 4, Option b**, which implements a 22 to 30 inch slot limit.

Alternative 1, the no action alternative, will have the greatest negative impact on the gag stock. It will allow the recreational fishery to operate year round, except for a fixed February-March shallow-water grouper closed season (306 days). Gag harvest will exceed rebuilding levels and will not allow rebuilding to proceed. This alternative will not only result in the highest amount of landed catch, but also the highest amount of dead discards due to the increased effort relative to the other alternatives.

Alternative 2 retains the recreational season that was implemented by interim rule in 2011, September 16 through November 15. This alternative has 61 open days, which along with Alternative 3, is the shortest season length of the alternatives. This also occurs at a time of the year when gag effort is historically low. This alternative exceeds the reductions needed for gag rebuilding. At an effort shifting level of 1.5 (i.e., effort during the open season is assumed to be 150% of what it would have been during the same time period in a year-round fishery), this alternative is expected to achieve reductions in total gag removals of 60% under both baselines. This exceeds the reductions needed for rebuilding, and will provide positive benefits to the gag stock. However, this alternative, along with Alternative 3, also results in the greatest number of days closed to recreational gag fishing, which could result in increased effort shifting to red grouper or other species. Red grouper are neither overfished nor undergoing overfishing, and the recreational sector has not caught its allocation in recent years, so while increased harvest of red grouper would be a negative impact, it is not expected to increase to the point where overfishing would occur.

Alternative 3 implements a split season, with part of the fishing season open in the winter (January 1-31), and part of the season open in the spring (April 1-30). This alternative also has 61 open days. However, the length of the season is not necessarily an indicator of the amount of fishing effort. Relative to **Alternative 2**, the open days for **Alternative 3** have historically had higher fishing effort. As a result, this alternative will achieve a smaller reduction in total removals, 52% to 56%. However, these reductions are still sufficient to achieve rebuilding. Along with **Alternative 2**, this alternative also results in the greatest number of days closed to recreational gag fishing, which could result in increased effort shifting to red grouper or other species. However, it is not expected to increase to the point where

overfishing would occur.

Preferred Alternative 4 establishes the longest recreational fishing season consistent with the rebuilding plan, July 1 through October 31. It has 123 fishing days, the next longest season after **Alternative 1**. However, this open season occurs during a period of relatively low gag fishing effort. Therefore the overall effort and impacts on retained gag and dead discards are likely to be similar to **Alternative 3**, with reductions of 50% to 56% depending upon which option is selected. However, this alternative results in the shortest closed season other than Alternative 1 (which does not achieve rebuilding). Thus, it has the fewest number of days when effort shifting to red grouper or other stocks might occur, resulting in a more positive biological effect on those stocks than **Alternatives 2 or 3**.

Within **Preferred Alternative 4**, **Preferred option a** maintains the current 22 inch minimum size limit, while **Option b** implements a 22" to 30" slot limit. In terms of total removals of gag, **Preferred option a** produces a smaller reduction in removals (50% to 53%) than **option b** (54% to 56%). Both of these reduction are sufficient to achieve rebuilding. However, analysis of the retained catch vs. dead discards using the gag management analyses spreadsheets prepared by the Southeast Regional office indicates that, under **Preferred option a**, a smaller percentage of the total removals will consist of dead discards (59% to 67%) than under **option b** (66% to 73%). Furthermore, under option b, a portion of the dead discards will consist of larger fish above the slot limit. These fish produce more eggs in a spawning season. Thus, the slot limit could negatively impact the spawning potential ratio.

In terms of reductions to achieve rebuilding of gag, all alternatives except for **Alternative 1** meet or exceed the reductions needed to achieve rebuilding. **Alternative 2** achieves the greatest reduction, followed by **Alternative 4b**, **Alternative 3**, and **Preferred Alternative 4a**. However, in terms of minimizing dead discards or effort shifting to other stocks, **Preferred Alternative 4a** provides the greatest benefits, followed by **Alternative 4b**, **Alternative 2**, and **Alternative 3**.

For **Action 2.2**, as previously stated, the primary effects other than **Alternative 1** will be to allow an increase in the recreational harvest of red grouper.

Alternative 1, the no action alternative, leaves the red grouper bag limit at its current level of 2 fish. There could be some increase in red grouper harvest due to effort shifting from gag during the closed season, but it is unlikely to result in the recreational red grouper allocation being exceeded, particularly if the red grouper annual catch limit is increased.

Alternative 2 raises the bag limit to 3 fish and could provide some increase in the number of red grouper caught. However, during 2009-2010 only 5% of MRFSS intercepts where red grouper were caught had landings of more than 1 red grouper (personal communication, Andy Strelcheck, May 25, 2011). Thus, an increase in the bag limit is unlikely to have a major impact on increasing the recreational harvest. Any increase in catches is likely to come more from effort shifting away from gag.

Likewise, **Preferred Alternative 3**, with raises the bag limit to 4 fish, could provide some increase in the number of red grouper caught. However, as noted above, less than 5% of fishermen who catch red grouper are reported to have caught more than one. Thus, this increase in the bag limit is unlikely to have a major impact on increasing the recreational harvest. Any increase in catches is likely to come more from effort shifting away from gag.

It is possible that, under **Alternative 2** and **Preferred Alternative 3**, an increase in the bag limit could

provide an incentive for fishermen to stay out longer in order to attempt to catch more fish. Anecdotal information suggests that in the 1950s and 60s, headboat and charterboat anglers off southwest Florida were catching 4 or 5 red grouper per angler, but by the 1980s catch rates had declined drastically (SEDAR 12, 2007a). During the period 1981-1985, the red grouper catch estimates off southwest Florida were 0.25 fish per angler trip from headboats, 0.579 fish per angler trip from charter boats, an 0,918 fish per angler trip from private boats (SEDAR 12, 2007a). Off northwest Florida, catch rates were even lower, and red grouper were rarely caught before Hurricane Camille in 1969 (personal comm., Bob Zales, SEDAR 12, 2007a). Although the red grouper stock has recovered since the 1980s as a result of the various management measures put in place under the Reef Fish Fishery Management Plan, it remains unlikely that most anglers are able to catch even the current 2 fish bag limit. Thus, for most anglers, the bag limit is not the controlling factor in the length of a fishing trip, and an increase in bag limit will not affect the length of time fishing for most anglers. There could be some increase in length of fishing by some anglers, but the increase will not be in proportion to the increase in the bag limit. A small number of anglers may catch their increased bag limits. Therefore **Preferred Alternative 3** might produce marginally higher total landings and greater impacts on the stock than **Alternative 2**. However, the difference in impacts between the alternatives will likely be so small as to be negligible, and unlikely to result in overfishing.

5.2.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

For **Action 2**, the potential economic effects on the recreational sector of **Alternative 2**, **Alternative 3, and Preferred Alternative 4** relative to **Alternative 1 (no action)** on the gag component of the reef fish fishery are analyzed. Regarding the red grouper bag limit, the potential economic effects of **Alternative 2** and **Preferred Alternative 3** relative to **Alternative 1 (no action)** on the red grouper component of the reef fish fishery are also analyzed.

Conceptual Model

The procedure for calculating the economic effects of these two sets of alternatives on the recreational sector, from the standpoint of costs and benefits to the nation, involves estimating the expected changes in consumer surplus (CS) of anglers (regardless of mode) and in producer surplus (PS) of the for-hire sector (charter vessels and headboats). CS per trip is the amount of money that an angler would be willing-to-pay for a fishing trip over and above the cost of the trip. The CS per fish measures how much the CS per trip changes when the number of fish that the angler is able to harvest changes by one. The CS per fish measure is assumed to be the same regardless of the number of fish caught per trip and the same for all anglers, regardless of mode, so that the change in CS for a change in the total harvest is measured as:

(1) $dCS = (H^1 - H^0)*v^*$

where H^0 and H^1 measure the total number of fish harvested by the recreational sector with the baseline (status quo) and proposed alternative, respectively, and v^* is the constant CS per fish harvested.[18]

[18] The assumption of a constant CS per trip is common in popular travel cost models such as those based on count data or discrete choice specifications, especially when the assumption of repeated-choice is employed (Hellerstein and Mendelsohn

Producer surplus for a for-hire (charter or headboat) fishing trip is the amount of money the operator earns on the trip over and above the economic cost of providing the trip. In the case of a regulatory change, some trips that formerly targeted a species might now target other species and some trips might be canceled. Assuming the producer surplus per trip is constant regardless of the species targeted, for-hire operators would only lose value from the trips actually canceled. If the regulatory change allows for and induces additional trips, PS is gained by the sector. The change in PS for a change in the number of trips is measured as:

(2) $dPS = (X^1 - X^0)*r$

where X^0 and X^1 measure the total number of for-hire fishing trips taken with the 2006-08 and 2009 baselines) and proposed alternatives, respectively, and r equals the constant producer surplus per trip. Note that the value for X^1, X^0, and r will be different for charter and headboats.

The information necessary to apply the above framework to the proposed action and its alternatives is as follows: 1) an estimate of the CS per fish harvested; 2) the estimated change in the total numbers of fish harvested under each alternative (regardless of mode); 3) an estimate of the PS per angler trip taken for charter and for headboats; and 4) the estimated change in the number of for-hire trips taken under each alternative, by mode.

Measuring Consumer Surplus

Consumer Surplus can be measured as a consumer's willingness to pay (WTP) more than the actual market price for a good or service. In a non-market setting, such as that of a recreational fishing trip, the WTP must be derived using non-market economic research methods, such as stated preference surveys or travel cost models. There are no specific estimates of the value of gag to anglers currently available; however, three potential measures of WTP per grouper are reported in Table 5.2.3.1.[19] All of the estimates in the table are relatively close. For current purposes, the value from Carter and Liese (2010) is used because this estimate is based on a model where the angler has the option to take trips for another species (red snapper, dolphin, or king mackerel) or not to fish at all. The other estimates in Table 5.2.3.1 assume the angler will continue fishing for another species. The WTP estimate of $85 (in 2008 dollars) is for the second fish kept on a trip targeting grouper. To evaluate a closed season (or zero bag limit), an estimate of the angler WTP for the first fish caught and kept would be needed, and it might be higher. However, the value of the first fish kept cannot be estimated from the data available in Carter and Liese (2010). On the other hand, note that trips not targeting gag will also be prevented from keeping gag during the closed season. The WTP per gag for anglers on these trips will likely be less than the $85 estimated for anglers specifically targeting grouper.

1993; Morey 1994). A constant marginal utility of income is also assumed such that there is no difference between compensated or uncompensated measures of CS (Johanssen 1987 pp. 62-66).

[19] For further details see also "Response to the 7/10/09 Data Request for Amendment 17a to the Snapper-Grouper Fishery Management Plan of the South Atlantic, 7/27/2009."

Table 5.2.3.1. Consumer Surplus Estimates: WTP for One Additional Keep of Reef Fish on Targeted Trips in the Southeast U.S.

Study	Study Year	Scope	Modes	Substitute Species	Quality measure	Starting # of fish	WTP (in $2008)
Carter and Liese 2010	2003	Gulf & S. Atlantic	Private & Charter	Red snapper, dolphin, king mackerel, no trip	hypothetical keep	1	$85 (78, 92)
Gentner 2009	2006	Gulf & S. Atlantic	Private & Charter	-none-	predicted keep	constant	$104
Haab et al. 2009	2000	Gulf	Private & Charter	Red snapper, other snappers	5 year average keep	constant	$124 (111, 140)

Notes: Willingness to pay (WTP) $-values updated to June 2008 using the Consumer Price Index - All Urban Consumers (Series Id: CUUR0000SA0). The 95% confidence interval is provided in parentheses when available.

Changes in Gag Landings and Consumer Surplus

The underlying, biological modeling effort supporting this Amendment uses two baseline scenarios against which each alternative is evaluated: a) the years 2006 to 2008 (average) and b) the year 2009. The predicted change in landings between each of the four alternatives and the two baselines were provided by the Gulf of Mexico gag grouper recreational decision model (NMFS 2011). The primary data used by the model is MRFSS effort and catch data. The model generates landings on a gutted weight basis, which are here translated into number of fish in order to apply the WTP per fish estimate. The change in recreational gag landings and the associated change in CS for **Alternative 1 (no action)**, **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to the two baselines are shown in Table 5.2.3.2. Alternatively, Table 5.2.3.3 indicates the change in recreational gag landings and the associated change in CS for **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to **Alternative 1 (no action).** These estimates are calculated according to equation (1) using the anticipated change in landings (converted to numbers of fish) and the constant CS per fish of $85.

Table 5.2.3.2. Estimated Loss of Consumer Surplus in the Gag Recreational Sector Associated with Alternative 1, Alternative 2, Alternative 3, and Alternative 4 Relative to the 2006-08 and 2009 Baselines

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Relative to the 2006 to 2008 Baseline				
Reduction in gag landings (gw lbs)	518,168	2,056,161	1,887,950	1,937,318
Reduction in landings (number of fish)	71,669	284,393	261,127	267,955
Reduction in Consumer Surplus ($)	$6,061,062	$24,051,107	$22,083,532	$22,660,996
Relative to the 2009 Baseline				
Reduction in gag landings (gw lbs)	893	1,451,831	1,214,584	1,288,630
Reduction in landings (number of fish)	123	200,806	167,992	178,234
Reduction in Consumer Surplus ($)	$10,443	$16,982,204	$14,207,103	$15,073,229

Notes: The estimated lost landings in gutted weight pounds are converted to numbers of fish using 7.23, the average pounds per landed gag from 2006 to 2008. The reduction in landings of fish is converted to the reduction in consumer surplus using a value of $85 (in 2008 dollars) per gag (Carter and Liese 2010).

Table 5.2.3.3. Estimated Loss of Consumer Surplus in the Gag Recreational Sector Associated with Alternative 2, Alternative 3, and Alternative 4 Relative to Alternative 1 for the 2006-08 and 2009 Baselines

	Alternative 2	Alternative 3	Alternative 4
Relative to the 2006 to 2008 Baseline			
Reduction in gag landings (gw lbs)	1,537,992	1,369,782	1,419,150
Reduction in landings (number of gag)	212,724	189,458	196,286
Reduction in Consumer Surplus ($)	$17,990,045	$16,022,470	$16,599,934
Relative to the 2009 Baseline			
Reduction in gag landings (gw lbs)	1,450,938	1,213,691	1,287,737
Reduction in landings (number of gag)	200,683	167,869	178,110
Reduction in Consumer Surplus ($)	$16,971,761	$14,196,660	$15,062,787

Notes: The estimated lost landings in gutted weight pounds are converted to numbers of fish using 7.23, the average pounds per landed gag from 2006 to 2008. The reduction in landings of fish is converted to the reduction in consumer surplus using a value of $85 (in 2008 dollars) per gag (Carter and Liese 2010).

Measuring Producer Surplus

Conceptually, producer surplus (PS) is the difference between the price received by the producer for a good or service and the marginal cost of producing it. Empirically, variable costs are used to approximate marginal costs. Because the delineation of variable costs depends critically on the time horizon, the choice of time horizon is also critical to measuring PS. For this analysis, we assume a short-term perspective, where marginal costs are approximated by variable trip costs. As a result, PS can be approximated by the net operating revenue (NOR) or "cash flow" generated by a for-hire fishing trip for the operator. The cash flow is calculated as the difference between the fee paid for the trip and the non-labor variable costs, such as for fuel, ice, and bait.[20]

Table 5.2.3.4 provides two estimates each for short-term NOR for charter and headboat trips. All of these estimates are in 2008 dollars. To account for different number of anglers per trip and to be consistent with MRFSS data, all measures are calculated on an angler trip basis. Given the Gulf of Mexico focus and large sample size of the data in Liese and Carter (2011), the estimate of $148 NOR per angler trip is used to value changes in the number of charter vessel trips. For headboat trips, the estimate of $49 per angler trip by Sutton et al. (1999) is used due to its Gulf focus.

Table 5.2.3.4. Producer Surplus Estimates: Net Operating Revenue (Cash Flow) for For-Hire Fishing Trips in the Southeast U.S.

Study	Study Year	Scope	Mode / Trip Types	Sample Size	Cash Flow (per angler) (in $2008)
Liese and Carter 2011	2002/03	LA through east FL	Representative charter trip (FHS sample)	1,205	$148 (136,158)
Dumas et al. 2009	2007/08	North Carolina	Representative charter trip	1-3 trips from 154 vessels	$130
Sutton et al. 1999	1997	Gulf of Mexico	Representative headboat trip	1-3 trips from 73 vessels	$49
Dumas et al. 2009	2007/08	North Carolina	Representative headboat trip	1-3 trips from 8 vessels	$64

Notes: Cash Flow $-values updated to June 2008 using the Consumer Price Index - All Urban Consumers (Series Id: CUUR0000SA0). The 95% confidence interval is provided in parentheses when available.

[20] For further details see also "Response to the 7/10/09 Data Request for Amendment 17a to the Snapper-Grouper Fishery Management Plan of the South Atlantic, 7/27/2009."

Changes in Gag Trips and Producer Surplus

The primary difficulty with estimating PS lies in correctly estimating the change in the number of trips associated with the regulatory change. Keeping a caught gag is only one element comprising a 'for-hire fishing trip experience.' A for-hire fishing trip is a recreational service provided by the captain/operator which involves, for the angler, experiencing the outdoors, the ocean, a boat, fishing, catching fish, keeping fish, and other factors. Further, for-hire anglers are heterogeneous with respect to the trip characteristics they value, ranging from those who only value keeping as many fish as possible of a specific species to those who value the overall experience independent of any specific trip characteristics. Research regarding if, when, and to what extent incremental changes in single-species regulations induce anglers to stop fishing (as opposed to switching to a different species) is not available. In its absence, assumptions and approximations must be made.

The underlying, biological model separates all recreational trips that catch (keep or release) any gag into two groups: those targeting or catching a lot of gag (target and directed trips for gag) and those where gag is an incidental catch. Presumably, on the latter type of trip, one or more other species were targeted or there was no target species. In either case, gag regulations are unlikely to affect the angler's choice about taking such a trip. On the other hand, anglers who target or catch a relatively large number of gag (gag directed trips) might cancel their fishing trips if faced with regulations that prevent them from keeping gag. The underlying, biological model assumes trips targeting or directed at gag will not be taken during a closed season.

Similarly, in the absence of specific research on how many trips will be canceled when regulation changes, the economic analysis assumes that all of the existing for-hire gag target and directed trips will be canceled. Because some of these trips would probably not be canceled, this assumption, in combination with constant estimates of consumer and producer surplus per trip, is expected to overestimate the reduction in consumer surplus and producer surplus (PS) associated with a shorter season.

The predicted decrease in gag directed and target trips during the closed season between each of the four alternatives and the two baselines were derived from the underlying, biological model (personal communication, Nick Farmer). The model uses MRFSS intercept sample data on species caught per trip linked to MRFSS aggregate effort estimates (at a monthly resolution). The underlying, biological modeling effort also assumes a 150% "effort intensification" during the open season under Alternatives 2, 3, and 4. For simplicity, the model implements this assumption by scaling up removals (landings and discards) of gag by a factor of 1.5 without explicitly modeling a change in trips. From an economic perspective, additional trips during the open season will generate additional PS, which will partially compensate for the trips lost during the closed season.

However, the ad hoc, across-the-board 50% increase in landings (and discards) does not appear reasonable in an explicit trip model for two related reasons. First, consistent with an earlier assumption, the substantial number of trips catching gag incidentally is unlikely to increase due to changes in gag regulations. As a result, the number of target and directed trips for gag must increase proportionally more to account for a 50% landings increase. Second, by design, the relatively short open seasons under Alternatives 2, 3, and 4 are in months when gag landings per trip on target and directed trips for gag is quite low, and hence incidental gag landings are relatively high. As a result, again, the number of target and directed trips for gag must increase non-proportionally as many more trips are necessary to catch and land a given amount of gag during months when gag are not relatively abundant. Implementing the 50% landings increase requires a near doubling of target and directed trips for gag by private boats. Especially

in the for-hire sector, where the operator is dependent on the demand for trips by anglers, the increase in target and directed trips for gag caused by the 50% landings increase assumption is unreasonable, requiring up to 860% more for-hire angler trips in months when gag abundance has historically been low.

The economic analysis could either strictly implement the 50% landings increase by increasing trips to an unreasonable level, or limit the increase in trips to a more number more consistent with the facts raised above. Although the latter approach introduces an inconsistency with respect to the 50% landings increase assumption used in the underlying biological model, this more literal interpretation of the term "effort shift" appears to be more consistent with the intent of the biological model and the Council's understanding of that term. Further, the possible range of this effort shift is believed to lie somewhere between a 0 and 100% increase (i.e., effort would be scaled up by 100% or 200%). The upper limit, which doubles the average number of historically occurring gag target and directed trip, is the maximum number of additional trips allowed to occur during the open season. However, this limit is not binding on the number of private boat trips.

For each alternative and baseline, the number of angler trips lost in the for-hire sector during the closed season are reduced by the number of angler trips gained in the open season due to the 150% effort intensification assumption. The net trip loss is then multiplied by the appropriate per trip PS loss, $148 or $49 for charter or headboat angler trips, respectively. The estimated net change in charter and headboat angler trips and the change in PS associated with **Alternative 1**, **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to the two baselines are shown in Table 5.2.3.5. Alternatively, Table 5.2.3.6 indicates the estimated net change in charter and headboat angler trips and the associated change in PS for **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to **Alternative 1 (no action).**

Table 5.2.3.5. Estimated Loss of Producer Surplus in the Gag For-hire Sector Associated with Alternative 1, Alternative 2, Alternative 3, and Alternative 4 Relative to the 2006-08 and 2009 Baselines

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Relative to the 2006 to 2008 Baseline				
Reduction in charter boat trips (angler-trips)	4,053	11,851	7,032	12,862
Reduction in PS in charter sector	$599,812	$1,753,920	$1,040,780	$1,903,559
Reduction in headboat trips (angler-trips)	687	2,254	1,356	2,244
Reduction in PS in headboat sector	$33,646	$110,470	$66,460	$109,950
Total Reduction in Producer Surplus	$633,458	$1,864,390	$1,107,240	$2,013,509
Relative to the 2009 Baseline				
Reduction in charter boat trips (angler-trips)	2,631	8,972	5,957	10,023
Reduction in PS in charter sector	$389,365	$1,327,858	$881,621	$1,483,398
Reduction in headboat trips (angler-trips)	107	2,337	1,083	2,156
Reduction in PS in headboat sector	$5,249	$114,502	$53,068	$105,624
Total Reduction in Producer Surplus	$394,614	$1,442,360	$934,689	$1,589,022

Notes: The estimated losses in angler-trips are converted to a reduction in producer surplus using $148 or $49 (in 2008 dollars), the average net operating revenue per angler on a charter boat or headboat trip, respectively (Liese and Carter 2011 and Sutton et al. 1999).

Table 5.2.3.6. Estimated Loss of Producer Surplus in the Gag For-hire Sector Associated with Alternative 2, Alternative 3, and Alternative 4 Relative to Alternative 1 for the 2006-08 and 2009 Baselines

	Alternative 2	Alternative 3	Alternative 4
Relative to the 2006 to 2008 Baseline			
Reduction in charter boat trips (angler-trips)	7,798	2,980	8,809
Reduction in PS in the charter sector	$1,154,108	$440,968	$1,303,748
Reduction in headboat trips (angler-trips)	1,568	670	1,557
Reduction in PS in the headboat sector	$76,824	$32,814	$76,304
Total Reduction in Producer Surplus	$1,230,932	$473,782	$1,380,051
Relative to the 2009 Baseline			
Reduction in charter boat trips (angler-trips)	6,341	3,326	7,392
Reduction in PS in the charter sector	$938,494	$492,256	$1,094,033
Reduction in headboat trips (angler-trips)	2,230	976	2,048
Reduction in PS in the headboat sector	$109,253	$47,819	$100,375
Total Reduction in Producer Surplus	$1,047,746	$540,075	$1,194,408

Notes: The estimated losses in angler-trips are converted to a reduction in producer surplus using $148 or $49 (in 2008 dollars), the average net operating revenue per angler on a charter boat or headboat trip, respectively (Liese and Carter 2011 and Sutton et al. 1999).

Summary of Economic Effects for **Action 2** on Gag

The overall estimated change in economic value to the recreational sector for gag associated with **Alternative 1**, **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to the two baselines for gag is shown in Table 5.2.3.7. Alternatively, Table 5.2.3.8 indicates the overall estimated change in economic value to the recreational sector for gag associated with **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to **Alternative 1 (no action).** These estimates probably overstate actual economic effects as private anglers or for-hire operators will likely adjust their behavior to avoid or minimize adverse consequences to their welfare or profits, respectively. Finally, consumer surplus and producer surplus estimates are somewhat different in nature. CS attempts to quantify, in dollar terms, the expected loss of welfare experienced by anglers. These values correspond to no actual flows of dollars in the formal economy, though they clearly motivate economic behavior. In contrast, PS is represented in the formal economy by lower revenue and lower profits in the for-hire sector. However, to the extent consumers will spend their money elsewhere, other producers will gain by potentially similar amounts. In summary, the CS losses represent real welfare losses but are intangible in our formal economy, while PS losses represent a shift of revenue and profits away from the for-hire sector, but are a tangible economic loss for the for-hire sector.

Table 5.2.3.7. Estimated Total Loss of Economic Value in the Gag Recreational Sector Associated with Alternative 1, Alternative 2, Alternative 3, and Alternative 4 Relative to the 2006-08 and 2009 Baselines

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Relative to the 2006 to 2008 Baseline				
Consumer Surplus: Anglers	$6,061,062	$24,051,107	$22,083,532	$22,660,996
Producer Surplus: Charter Boats	$599,812	$1,753,920	$1,040,780	$1,903,559
Producer Surplus: Headboats	$33,646	$110,470	$66,460	$109,950
Total	$6,694,520	$25,915,497	$23,190,772	$24,674,505
Relative to the 2009 Baseline				
Consumer Surplus: All Anglers	$10,443	$16,982,204	$14,207,103	$15,073,229
Producer Surplus: Charter Boats	$389,365	$1,327,858	$881,621	$1,483,398
Producer Surplus: Headboats	$5,249	$114,502	$53,068	$105,624
Total	$405,057	$18,424,564	$15,141,792	$16,662,251

Notes: Estimates are in 2008 dollars.

Table 5.2.3.8: Estimated Total Loss of Economic Value by the Gag Recreational Sector Associated with Alternative 2, Alternative 3, and Alternative 4 Relative to Alternative 1 for the 2006-08 and 2009 Baselines

	Alternative 2	Alternative 3	Alternative 4
Relative to the 2006 to 2008 Baseline			
Consumer Surplus: All Anglers	$17,990,045	$16,022,470	$16,599,934
Producer Surplus: Charter Boats	$1,154,108	$440,968	$1,303,748
Producer Surplus: Headboats	$76,824	$32,814	$76,304
Total	$19,220,977	$16,496,252	$17,979,985
Relative to the 2009 Baseline			
Consumer Surplus: All Anglers	$16,971,761	$14,196,660	$15,062,787
Producer Surplus: Charter Boats	$938,494	$492,256	$1,094,033
Producer Surplus: Headboats	$109,253	$47,819	$100,375
Total	$18,019,508	$14,736,735	$16,257,195

Notes: Estimates are in 2008 dollars.

Changes in Red Grouper Landings and Consumer Surplus

Action 2 also proposes increasing the red grouper bag limit, which is currently two fish per person. However, because of a lack of recent catch data at increased bag limits, estimates of catch levels at different bag limits are not generated by the underlying, biological model. Because current landings are already below the recreational catch target and very few trips catch the bag limit, the additional economic value is likely to be limited. In order to estimate the possible economic consequences of increasing the bag limit for red grouper, an assumption must be made. Specifically, the number of trips in all modes is assumed to remain the same regardless of any change in the red grouper bag limit. Thus, no changes to PS or economic impacts are expected to result from a change in the red grouper bag limit.

Based on landings and trip data averaged across 2009 and 2010, when a 2-fish red grouper bag limit was in effect, less than 1% of trips catching red grouper landed the bag limit. Only these trips, estimated at 6,338 per year on average, are candidates for keeping one or two additional red grouper under **Alternative 2** and **Preferred Alternative 3**, respectively. In Table 5.2.3.8, the additional landings are multiplied by the same $85 per grouper CS estimate used for gag. These estimates likely overstate the actual increase in consumer surplus because: 1) the value of a 3rd or 4th fish on a trip is likely to be less than $85, which is an estimate of the 2nd fish's value, and 2) not all of the candidate trips will actually catch enough additional, legal-size red grouper to keep a 3rd or 4th red grouper.

Table 5.2.3.8. Estimated Gain of Consumer Surplus in the Red Grouper Recreational Sector Associated with Alternative 2 and Alternative 3 Relative to Alternative 1

	Alternative 1	Alternative 2	Alternative 3
Increase in landings (number of fish)	-	6,338	12,676
Increase in Consumer Surplus ($)	-	$536,005	$1,072,009

Notes: The estimated increase in landings of fish is converted to a gain in consumer surplus using a value of $85 (in 2008 dollars) per red grouper (Carter and Liese 2010).

Analysis of Economic Impacts

The procedure for estimating the economic impacts of the various alternatives on the recreational sector involves tracing the changes in regional or state economic activities from angler expenditures to the supporting industries that directly or indirectly conduct business related to recreational fishing. Economic impacts or activities are generally characterized in the form of FTE jobs, income impacts (wages, salaries, and self-employed income), output (sales) impacts (gross business sales), and value added impacts (difference between the value of goods and the cost of materials or supplies). Income and value-added impacts are not equivalent, though similarity in the magnitude of multipliers may result in roughly equivalent values.

The technique used in estimating economic impacts is the so-called input-output analysis. This technique exploits the relations among various sectors/industries, with an industry depending on input from another and supplying its output to another industry. These relations can track the changes ("ripple effects") in all industries due to changes in one or more industries. The input- output model used in this proposed rule was developed for and applied in NMFS (2009 and 2010). This model, however, includes only the

private/shore mode and charter mode, and thus does not account for economic impacts in the headboat sector. The general caveats in using this technique are discussed in GMFMC (2010) and are incorporated herein by reference.

Tables 9-12 and 13-16 present estimates of changes in angler trips and economic impacts on the gag component of the reef fish fishery by state and mode under **Alternative 1 (no action)**, **Alternative 2**, **Alternative 3**, and **Preferred Alternative 4** relative to the two baselines (2006-08 and 2009 respectively). Alternatively, Tables 17-19 and 20-22 present estimates of changes in angler trips and economic impacts on the gag component of the reef fish fishery by state and mode under **Alternative 2, Alternative 3,** and **Preferred Alternative 4** relative to **Alternative 1, (no action)** under the two baselines (2006-08 and 2009 respectively). Because the number of trips in all modes is assumed to remain constant regardless of the red grouper bag limit, a change in the red grouper bag limit is not expected to generate any economic impacts.

Table 5.2.3.9. Reductions in Trips and Economic Impacts of Alternative 1 (no action) relative to the 2006-2008 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	9,361	0	0	9,361
Output Impact	$0	$634,386	$0	$0	$634,386
Value Added Impact	$0	$368,558	$0	$0	$368,558
Jobs	0	7	0	0	7
	Private/Rental Mode				
Target Trips	358	72,875	0	0	73,233
Output Impact	$20,829	$3,308,624	$0	$0	$3,329,453
Value Added Impact	$11,403	$1,967,432	$0	$0	$1,978,835
Jobs	0	33	0	0	33
	Charter Mode				
Target Trips	52	4,001	0	0	4,053
Output Impact	$27,074	$1,256,341	$0	$0	$1,283,414
Value Added Impact	$14,903	$744,881	$0	$0	$759,784
Jobs	0	13	0	0	13
	All Modes				
Target Trips	410	86,237	0	0	86,647
Output Impact	$47,903	$5,199,351	$0	$0	$5,247,254
Value Added Impact	$26,307	$3,080,870	$0	$0	$3,107,177
Jobs	1	53	0	0	53

Table 5.2.3.10. Reductions in Trips and Economic Impacts of Alternative 2 relative to the 2006-2008 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	44,101	0	0	44,101
Output Impact	$0	$2,988,683	$0	$0	$2,988,683
Value Added Impact	$0	$1,736,327	$0	$0	$1,736,327
Jobs	0	32	0	0	32
	Private/Rental Mode				
Target Trips	1,687	343,304	0	0	344,991
Output Impact	$98,152	$15,586,469	$0	$0	$15,684,621
Value Added Impact	$53,736	$9,268,299	$0	$0	$9,322,035
Jobs	1	156	0	0	157
	Charter Mode				
Target Trips	153	11,698	0	0	11,851
Output Impact	$79,660	$3,673,250	$0	$0	$3,752,909
Value Added Impact	$43,850	$2,177,859	$0	$0	$2,221,709
Jobs	1	38	0	0	39
	All Modes				
Target Trips	1,840	399,103	0	0	400,943
Output Impact	$177,812	$22,248,402	$0	$0	$22,426,213
Value Added Impact	$97,586	$13,182,485	$0	$0	$13,280,071
Jobs	2	225	0	0	227

Table 5.2.3.11. Reductions in Trips and Economic Impacts of Alternative 3 relative to the 2006-2008 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	52,806	0	0	52,806
Output Impact	$0	$3,578,613	$0	$0	$3,578,613
Value Added Impact	$0	$2,079,057	$0	$0	$2,079,057
Jobs	0	38	0	0	38
	Private/Rental Mode				
Target Trips	2,020	411,072	0	0	413,092
Output Impact	$117,526	$18,663,228	$0	$0	$18,780,755
Value Added Impact	$64,343	$11,097,856	$0	$0	$11,162,199
Jobs	1	186	0	0	188
	Charter Mode				
Target Trips	91	6,942	0	0	7,033
Output Impact	$47,379	$2,179,834	$0	$0	$2,227,213
Value Added Impact	$26,081	$1,292,417	$0	$0	$1,318,498
Jobs	1	22	0	0	23
	All Modes				
Target Trips	2,111	470,820	0	0	472,931
Output Impact	$164,906	$24,421,675	$0	$0	$24,586,581
Value Added Impact	$90,424	$14,469,330	$0	$0	$14,559,753
Jobs	2	247	0	0	249

Table 5.2.3.12. Reductions in Trips and Economic Impacts of Preferred Alternative 4 relative to the 2006-2008 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	28,112	0	0	28,112
Output Impact	$0	$1,905,124	$0	$0	$1,905,124
Value Added Impact	$0	$1,106,814	$0	$0	$1,106,814
Jobs	0	20	0	0	20
	Private/Rental Mode				
Target Trips	1,075	218,838	0	0	219,913
Output Impact	$62,545	$9,935,543	$0	$0	$9,998,088
Value Added Impact	$34,242	$5,908,047	$0	$0	$5,942,289
Jobs	1	99	0	0	100
	Charter Mode				
Target Trips	166	12,696	0	0	12,862
Output Impact	$86,428	$3,986,628	$0	$0	$4,073,057
Value Added Impact	$47,576	$2,363,660	$0	$0	$2,411,236
Jobs	1	41	0	0	42
	All Modes				
Target Trips	1,241	259,646	0	0	260,887
Output Impact	$148,973	$15,827,295	$0	$0	$15,976,268
Value Added Impact	$81,818	$9,378,521	$0	$0	$9,460,339
Jobs	2	160	0	0	162

Table 5.2.3.13. Reductions in Trips and Economic Impacts of Alternative 1 (no action) relative to the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	5,158	0	0	5,158
Output Impact	$0	$349,553	$0	$0	$349,553
Value Added Impact	$0	$203,079	$0	$0	$203,079
Jobs	0	4	0	0	4
	Private/Rental Mode				
Target Trips	197	40,152	0	0	40,349
Output Impact	$11,462	$1,822,955	$0	$0	$1,834,417
Value Added Impact	$6,275	$1,083,998	$0	$0	$1,090,273
Jobs	0	18	0	0	18
	Charter Mode				
Target Trips	34	2,597	0	0	2,631
Output Impact	$17,702	$815,475	$0	$0	$833,177
Value Added Impact	$9,744	$483,493	$0	$0	$493,237
Jobs	0	8	0	0	9
	All Modes				
Target Trips	231	47,907	0	0	48,138
Output Impact	$29,164	$2,987,984	$0	$0	$3,017,147
Value Added Impact	$16,019	$1,770,569	$0	$0	$1,786,589
Jobs	0	30	0	0	31

Table 5.2.3.14. Reductions in Trips and Economic Impacts of Alternative 2 relative to the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	49,047	0	0	49,047
Output Impact	$0	$3,323,869	$0	$0	$3,323,869
Value Added Impact	$0	$1,931,059	$0	$0	$1,931,059
Jobs	0	35	0	0	35
	Private/Rental Mode				
Target Trips	1,876	381,811	0	0	383,687
Output Impact	$109,148	$17,334,739	$0	$0	$17,443,887
Value Added Impact	$59,756	$10,307,886	$0	$0	$10,367,642
Jobs	1	173	0	0	174
	Charter Mode				
Target Trips	116	8,856	0	0	8,972
Output Impact	$60,396	$2,780,843	$0	$0	$2,841,238
Value Added Impact	$33,246	$1,648,754	$0	$0	$1,681,999
Jobs	1	29	0	0	29
	All Modes				
Target Trips	1,992	439,714	0	0	441,706
Output Impact	$169,544	$23,439,451	$0	$0	$23,608,995
Value Added Impact	$93,002	$13,887,699	$0	$0	$13,980,701
Jobs	2	237	0	0	239

Table 5.2.3.15. Reductions in Trips and Economic Impacts of Alternative 3 relative to the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	53,473	0	0	53,473
Output Impact	$0	$3,623,815	$0	$0	$3,623,815
Value Added Impact	$0	$2,105,318	$0	$0	$2,105,318
Jobs	0	38	0	0	38
	Private/Rental Mode				
Target Trips	2,046	416,264	0	0	418,310
Output Impact	$119,039	$18,898,952	$0	$0	$19,017,991
Value Added Impact	$65,171	$11,238,026	$0	$0	$11,303,197
Jobs	1	189	0	0	190
	Charter Mode				
Target Trips	77	5,880	0	0	5,957
Output Impact	$40,090	$1,846,359	$0	$0	$1,886,449
Value Added Impact	$22,068	$1,094,701	$0	$0	$1,116,769
Jobs	1	19	0	0	20
	All Modes				
Target Trips	2,123	475,617	0	0	477,740
Output Impact	$159,129	$24,369,126	$0	$0	$24,528,255
Value Added Impact	$87,240	$14,438,044	$0	$0	$14,525,284
Jobs	2	246	0	0	248

Table 5.2.3.16. Reductions in Trips and Economic Impacts of Preferred Alternative 4 relative to the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	31,131	0	0	31,131
Output Impact	$0	$2,109,719	$0	$0	$2,109,719
Value Added Impact	$0	$1,225,677	$0	$0	$1,225,677
Jobs	0	22	0	0	22
	Private/Rental Mode				
Target Trips	1,191	242,338	0	0	243,529
Output Impact	$69,294	$11,002,475	$0	$0	$11,071,769
Value Added Impact	$37,937	$6,542,484	$0	$0	$6,580,421
Jobs	1	110	0	0	111
	Charter Mode				
Target Trips	129	9,894	0	0	10,023
Output Impact	$67,164	$3,106,782	$0	$0	$3,173,946
Value Added Impact	$36,972	$1,842,002	$0	$0	$1,878,973
Jobs	1	32	0	0	33
	All Modes				
Target Trips	1,320	283,363	0	0	284,683
Output Impact	$136,458	$16,218,975	$0	$0	$16,355,433
Value Added Impact	$74,908	$9,610,163	$0	$0	$9,685,072
Jobs	2	164	0	0	166

Table 5.2.3.17. Reductions in Trips and Economic Impacts of Alternative 2 relative to Alternative 1 (no action) under the 2006-08 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	34,740	0	0	34,740
Output Impact	$0	$2,354,297	$0	$0	$2,354,297
Value Added Impact	$0	$1,367,769	$0	$0	$1,367,769
Jobs	0	25	0	0	25
	Private/Rental Mode				
Target Trips	1,329	270,429	0	0	271,758
Output Impact	$77,323	$12,277,845	$0	$0	$12,355,168
Value Added Impact	$42,333	$7,300,867	$0	$0	$7,343,200
Jobs	1	123	0	0	123
	Charter Mode				
Target Trips	101	7,697	0	0	7,798
Output Impact	$52,586	$2,416,909	$0	$0	$2,469,495
Value Added Impact	$28,947	$1,432,978	$0	$0	$1,461,925
Jobs	1	25	0	0	26
	All Modes				
Target Trips	1,430	312,866	0	0	314,296
Output Impact	$129,909	$17,049,051	$0	$0	$17,178,960
Value Added Impact	$71,279	$10,101,615	$0	$0	$10,172,894
Jobs	2	172	0	0	174

Table 5.2.3.18. Reductions in Trips and Economic Impacts of Alternative 3 relative to Alternative 1 (no action) under the 2006-08 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	43,445	0	0	43,445
Output Impact	$0	$2,944,227	$0	$0	$2,944,227
Value Added Impact	$0	$1,710,499	$0	$0	$1,710,499
Jobs	0	31	0	0	31
	Private/Rental Mode				
Target Trips	1,662	338,197	0	0	339,859
Output Impact	$96,698	$15,354,604	$0	$0	$15,451,301
Value Added Impact	$52,940	$9,130,424	$0	$0	$9,183,363
Jobs	1	153	0	0	154
	Charter Mode				
Target Trips	39	2,941	0	0	2,980
Output Impact	$20,305	$923,494	$0	$0	$943,799
Value Added Impact	$11,177	$547,537	$0	$0	$558,714
Jobs	0	9	0	0	10
	All Modes				
Target Trips	1,701	384,583	0	0	386,284
Output Impact	$117,003	$19,222,324	$0	$0	$19,339,327
Value Added Impact	$64,117	$11,388,459	$0	$0	$11,452,577
Jobs	1	194	0	0	195

Table 5.2.3.19. Reductions in Trips and Economic Impacts of Preferred Alternative 4 relative to Alternative 1 (no action) under the 2006-08 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	18,751	0	0	18,751
Output Impact	$0	$1,270,738	$0	$0	$1,270,738
Value Added Impact	$0	$738,257	$0	$0	$738,257
Jobs	0	13	0	0	13
	Private/Rental Mode				
Target Trips	717	145,963	0	0	146,680
Output Impact	$41,716	$6,626,919	$0	$0	$6,668,635
Value Added Impact	$22,839	$3,940,615	$0	$0	$3,963,453
Jobs	0	66	0	0	67
	Charter Mode				
Target Trips	114	8,695	0	0	8,809
Output Impact	$59,354	$2,730,288	$0	$0	$2,789,642
Value Added Impact	$32,673	$1,618,780	$0	$0	$1,651,452
Jobs	1	28	0	0	29
	All Modes				
Target Trips	831	173,409	0	0	174,240
Output Impact	$101,070	$10,627,944	$0	$0	$10,729,015
Value Added Impact	$55,511	$6,297,651	$0	$0	$6,353,162
Jobs	1	108	0	0	109

Table 5.2.3.20. Reductions in Trips and Economic Impacts of Alternative 2 relative to Alternative 1 (no action) under the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	43,889	0	0	43,889
Output Impact	$0	$2,974,316	$0	$0	$2,974,316
Value Added Impact	$0	$1,727,980	$0	$0	$1,727,980
Jobs	0	32	0	0	32
	Private/Rental Mode				
Target Trips	1,679	341,659	0	0	343,338
Output Impact	$97,687	$15,511,783	$0	$0	$15,609,470
Value Added Impact	$53,481	$9,223,888	$0	$0	$9,277,370
Jobs	1	155	0	0	156
	Charter Mode				
Target Trips	82	6,259	0	0	6,341
Output Impact	$42,693	$1,965,368	$0	$0	$2,008,061
Value Added Impact	$23,501	$1,165,261	$0	$0	$1,188,762
Jobs	1	20	0	0	21
	All Modes				
Target Trips	1,761	391,807	0	0	393,568
Output Impact	$140,380	$20,451,467	$0	$0	$20,591,847
Value Added Impact	$76,982	$12,117,129	$0	$0	$12,194,112
Jobs	2	207	0	0	208

Table 5.2.3.21. Reductions in Trips and Economic Impacts of Alternative 3 relative to Alternative 1 (no action) under the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	48,315	0	0	48,315
Output Impact	$0	$3,274,262	$0	$0	$3,274,262
Value Added Impact	$0	$1,902,239	$0	$0	$1,902,239
Jobs	0	35	0	0	35
	Private/Rental Mode				
Target Trips	1,849	376,112	0	0	377,961
Output Impact	$107,577	$17,075,997	$0	$0	$17,183,574
Value Added Impact	$58,896	$10,154,028	$0	$0	$10,212,924
Jobs	1	170	0	0	172
	Charter Mode				
Target Trips	43	3,283	0	0	3,326
Output Impact	$22,388	$1,030,884	$0	$0	$1,053,272
Value Added Impact	$12,324	$611,208	$0	$0	$623,532
Jobs	0	11	0	0	11
	All Modes				
Target Trips	1,892	427,710	0	0	429,602
Output Impact	$129,965	$21,381,142	$0	$0	$21,511,108
Value Added Impact	$71,220	$12,667,475	$0	$0	$12,738,695
Jobs	1	216	0	0	217

Table 5.2.3.22. Reductions in Trips and Economic Impacts of Preferred Alternative 4 relative to Alternative 1 (no action) under the 2009 baseline. The dollar values are in 2008 dollars.

	Alabama	WFlorida	Louisiana	Mississippi	Total
	Shore Mode				
Target Trips	0	25,973	0	0	25,973
Output Impact	$0	$1,760,166	$0	$0	$1,760,166
Value Added Impact	$0	$1,022,599	$0	$0	$1,022,599
Jobs	0	19	0	0	19
	Private/Rental Mode				
Target Trips	994	202,186	0	0	203,180
Output Impact	$57,832	$9,179,520	$0	$0	$9,237,352
Value Added Impact	$31,662	$5,458,487	$0	$0	$5,490,149
Jobs	1	92	0	0	92
	Charter Mode				
Target Trips	95	7,297	0	0	7,392
Output Impact	$49,462	$2,291,307	$0	$0	$2,340,768
Value Added Impact	$27,227	$1,358,509	$0	$0	$1,385,736
Jobs	1	24	0	0	24
	All Modes				
Target Trips	1,089	235,456	0	0	236,545
Output Impact	$107,294	$13,230,992	$0	$0	$13,338,286
Value Added Impact	$58,889	$7,839,594	$0	$0	$7,898,483
Jobs	1	134	0	0	135

Direct and Indirect Effects on the Social Environment

Action 2.1 addresses the bag limits, size limits, and closed season for gag, and Action 2.2 addresses the bag limit for red grouper. Thus, this action directly affects recreational fisherman behavior on the water. For Action 2.1, **Alternative 1** is the no action rule, where the regulations for gag would remain those specified in Amendment 30B. The closed season under this alternative, from February 1 through March 31, represents the principal contrast with the remaining alternatives, each of which severely restricts the open season for landing gag. Thus, while this alternative would incur the least negative social impacts by allowing for the longest fishing season and not implementing further regulatory change, it is in conflict with the mandate of the Magnuson Stevens Act to rebuild the gag stock.

The remaining alternatives of Action 2.1 are likely to contribute to negative social impacts as each introduces a much longer closed season than **Alternative 1**. **Alternative 2** would establish a closed season as specified in the Interim Rule currently in place (a 61 day open season from September 16 through November 15). In developing the current Interim Rule, the season outlined by this alternative was selected as it was likely to incur the least negative impacts of the proposed alternatives. **Alternative 3** would establish a split season of the same duration as **Alternative 2**, allowing for the landing of gag the month before and after the closed season for all grouper (January 1 – 31 and April 1 – 30). This alternative is desirable by some anglers who note that gag move inshore in the cooler months, meaning that anglers' fuel expenses are lower when targeting gag during the winter. **Preferred Alternative 4** provides for the longest open season for gag while still operating under the parameters of the rebuilding plan outlined in Action 1. The open season under **Preferred Alternative 4** is twice as many days as **Alternatives 2** and **3**, but at times when there may be less angler effort. The Council selected this alternative as preferred because it provided for the greatest number of fishing days. Although fishermen expressed a preference for the longest fishing season possible, how fishermen's behavior will be impacted by the shortened season, during months typical of lower effort, remains unknown.

Alternatives 1, **2**, **3**, and **Preferred Alternative 4, Option a** specify a 22" minimum size limit for gag, which is in accordance with Amendment 30B. **Alternative 4, Option b** introduces a slot limit permitting landing of gag 22-30" in length, only. Other species currently managed with a slot limit include lesser amberjack and banded rudderfish[21]. For these species, both the commercial and recreational sectors share the same slot limit. A slot limit for gag is not proposed for the commercial sector at this time. It is likely that the implementation of a slot limit on the recreational sector, but not the commercial sector, could contribute to additional complaints by recreational anglers against the commercial sector. Gag is the most popular species of grouper among recreational fishermen and a slot limit is likely to be very unpopular. A slot limit also presents a problem for recreational fishing tournaments, where the goal is to catch the biggest fish. Fishing tournaments are important social events within the recreational community and implementing a slot limit on gag would create a legal problem for these events. After weighing these concerns, the Council removed **Option b** as preferred. The **Preferred Alternative 4, Option a** does not include a slot limit.

All four alternatives of **Action 2.1** specify equivalent bag limits for gag, as implemented in Amendment 30B. Thus no variations in social impacts are expected among the alternatives in relation to differing bag limits.

Action 2.2 consists of options for the red grouper bag limit. **Alternative 1** maintains the status quo of 2 red grouper per person, and would not be expected to incur any social impacts. The remaining two alternatives increase the red grouper bag limit to 3 fish per person (**Alternative 2**) or 4 fish per person (**Preferred Alternative 3**). In theory, the increase in bag limits for red grouper would offset some of the negative social impacts from restricting the harvest of gag during the rebuilding plan. However, red grouper is not as desirable as gag for recreational harvest. It remains unknown how the recreational community will respond to an increase in the red grouper bag limit, given that the total allowable catch has not been met in recent years.

[21] Regulations for recreational fishing of snook and red drum include slot limits but are managed at the state level.

5.2.4 Direct and Indirect Effects on the Administrative Environment

Relative to **Action 2.1**, Under the Magnuson-Stevens Fishery Conservation and Management Act, for a stock that has been declared to be undergoing overfishing, the Council must prepare and submit a plan to end overfishing immediately. In addition, National Standard 1 calls for conservation and management measures to prevent overfishing while achieving, on a continuing basis, optimum yield. All of the alternatives both end overfishing and achieve rebuilding of gag. All of the alternatives will also achieve optimum yield based on the 2009 baseline for measuring percent reduction. Based on the 2006-2008 baseline, optimum yield may not be fully achieved, but the reductions needed for rebuilding will be achieved. Due to the current economic conditions and the increased cost of fuel, fishing effort in the near future is more likely to be similar to the 2009 baseline.

Alternative 1, the no action alternative, would leave the gag recreational season open year round except for the February-march shallow-water grouper closed season. This is far too long to meet the reductions in harvest needed under the rebuilding plan. Under this alternative, the Regional Office would need to exercise its authority to close the fishery on the date when the sector's annual catch limit is projected to be reached. This will require increased administrative effort to calculate the appropriate date, publish closure notices, and inform the public of the closing date.

Alternative 2 would maintain the same fishing season and regulations in 2012 as in 2011. Since the regulations would not change, this would have minimal impacts on the administrative environment. However, since the gag population is expected to be higher in 2012 than in 2011, increased enforcement may be necessary to prevent harvest overages.

Alternative 3 would establish a split season. This could create confusion among the public and require additional administrative efforts to inform the public about the split season and to enforce the open and closed seasons.

Preferred Alternative 4 provides the longest season possible (123 days) while meeting the required harvest reductions. This allows for some stability in the open season, which may benefit both enforcement and voluntary compliance. Thus, effects on the administrative environment are expected to be minimal. **Option a** would leave the size limit at its current 22 inch minimum and would have no change to the administrative environment. **Preferred Option b** would establish a 22" to 30" slot limit for gag. This would require new regulations to be printed, efforts to inform the public both about the new slot limit and about the proper way to measure a fish, and additional enforcement efforts. Thus, this will have some negative effects of the administrative environment.

Red grouper is neither overfished nor undergoing overfishing. An increase in the bag limit under **Action 2.2** is not expected to result in overfishing. Adaptive management protocols and accountability measures will restore the bag limit to previous levels if the annual catch limit is exceeded.

Alternative 1, the no action alternative, leaves the current 2 red grouper bag limit in place. This will result in no needed administrative actions nor any change to the administrative environment.

Alternative 2 would increase the bag limit to 3 fish, with contingent action to reduce the bag limit is the annual catch limit is exceeded. This creates a need to monitor the recreational red grouper harvest for possible post-season actions. However, this is necessary anyway under the accountability measures adopted in Amendment 30B and proposed for revision in this amendment. Therefore, while this may

have a presence in the administrative environment, it will not require any changes that are not already required by other actions.

Preferred Alternative 3 would increase the bag limit to 4 fish, with contingent action to reduce the bag limit is the annual catch limit is exceeded. Administratively, the impacts are no different than under **Alternative 2**, except that monitoring for a possible bag limit reduction may be required over a longer period than under the previous alternative.

5.3 Action 3. Commercial Gag Quota Adjustment to Account for Dead Discards

5.3.1 Direct and Indirect Effects on the Physical Environment

Gag are caught commercial by vertical line and longline gear. Longline gear can interact with the bottom, creating negative impacts if it becomes hung on hard bottom. Vertical lines also impact the bottom, but only at a small point of impact compared to longlines. **Alternative 1** allows the highest commercial gag quota, while **Preferred Alternative 2** allows a smaller quota that's been adjusted to account for dead discards. **Alternative 3** allows the smallest quota. To the extent that a larger quota allows more fishing and more interaction of the gear with the environment, **Alternative 1** would create the most negative impacts on the physical environment, while **Alternative 3** would create the least negative impact, and **Preferred Alternative 2** an intermediate impact. However, the gag quotas, at least in the initial years of the rebuilding plan, are small enough that gag will likely be a bycatch fishery, at least for longline vessels. Since longline vessel fishing times will likely be driven by the larger red grouper quota, the adjustment of commercial gag quota will have little or no direct or indirect changes to existing impacts on the physical environment.

5.3.2 Direct and Indirect Effects on the Biological/Ecological Environment

The catch levels indicated by the stock assessment for rebuilding gag assume that landed catch and dead discards are linked. That is, reductions in the landed catch of gag will be accompanied by reductions in dead discards in the same proportion so that total removals are reduced by the desired amount. This linked scenario is unlikely. Once vessels fill their IFQ shares of gag, they will likely continue to fish for red grouper, with a bycatch and bycatch mortality of gag. The adjustments to the gag and shallow-water grouper quotas are intended compensate for these dead discards. **Alternative 1** does not make any adjustment for dead discards, and will therefore have a negative effect on the biological/ecological environment. **Preferred Alternative 2** will reduce the commercial gag quota by 14%, and will positively benefit the gag resource by increasing the likelihood that rebuilding will occur as intended. **Alternative 3** will reduce the commercial gag quota by 53%, providing the greatest allowance for dead discards, and the highest likelihood of rebuilding successfully occurring. An explanation of how the percent reduction adjustments were derived for **Preferred Alternative 2** and **Alternative 3** is contained in the discussion of the alternative in Section 2.3. One caveat is that, if fishermen choose to target other species and catch gag only as a bycatch, the catch rate of gag may not change as a result of the quota adjustment. All that would change is how much of the catch can be kept and how much must be thrown back. If this occurs, then **Alternative 1** may provide the most positive benefits since it will allow the most efficient retained harvest with the smallest amount of discards. Likewise, **Alternative 3** may provide the most negative impacts since it would require the highest amount of discards, while **Preferred Alternative 2** would be intermediate in its impacts. Given the uncertainty as to which scenario is the more realistic (fishermen targeting gag until their quota is filled vs. catching gag only as bycatch), the intermediate effects of

Preferred Alternative 2 provide the most neutral overall benefits to the biological/ecological environment.

5.3.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

Reductions in the commercial gag quota considered under this action are expected to contribute to overall decreases in total removals, potentially resulting in positive impacts on the gag stock in the future. These anticipated benefits to the gag resource cannot be quantified at this time. However, the adverse economic effects that would result from the precautionary reductions in commercial gag quota can be approximated by the associated decreases in economic value. The evaluation of yearly changes in aggregate lease value, i.e., the changes in the value of annual gag allocations, constitutes the appropriate approach to measure changes in economic value that are expected to result from this management action. This approach assumes that individual fishing quota shares and annual allocations, which are assets that can be freely exchanged, are traded in well-functioning markets. Average gag individual fishing quota allocation prices are currently estimated at approximately $1.0 per pound gutted weight (Andy Strelcheck-NMFS, personal communication). Table 5.3.3.1 provides decreases in commercial gag quota and anticipated losses in economic value measured by changes in annual gag allocations. Present values of losses are computed based on 3% and 7% discount rates and assume that this amendment will be implemented in January 2012. Greater reductions in gag quota would logically be expected to result in greater losses in economic value.

Table 5.3.3.1: Decreases in gag commercial quota (gutted weight) and discounted losses in economic value based on 3% and 7% discount rates.

Year	**Preferred Alternative 2**			**Alternative 3**		
	Pounds (g.w.)	Present Value (3%)	Present Value (7%)	Pounds (g.w.)	Present Value (3%)	Present Value (7%)
2012	92,260	$92,260	$92,260	349,270	$349,270	$349,270
2013	115,220	$111,864	$107,682	436,190	$423,485	$407,654
2014	135,940	$128,136	$118,735	514,630	$485,088	$449,498
2015	152,880	$139,907	$124,796	578,760	$529,647	$472,441
Total	496,300	$472,167	$443,473	1,878,850	$1,787,491	$1,678,863

Alternative 1 would set commercial gag quotas at the full annual catch target, thereby assuming that dead discards would be reduced by the same proportion as landings. If this assumption does not hold, Alternative 1 could result in higher total removals than expected, potentially leading to adverse economic effects in the future due to the added pressure on the gag stock.

Preferred Alternative 2 would reduce commercial gag quotas by 14%. The reduction in commercial quota would account for potential increases in total gag removals that may result from higher proportions of dead discards. Between 2012 and 2015, the present value of losses in economic value expected to result from commercial quota reductions are estimated at $472,167, based on a 3% discount rate. It follows that a greater discount rate would yield a smaller present value. It is expected that potential

economic benefits, stemming from the added protection to the gag stock during rebuilding, would result from precautionary reductions in commercial gag quota under **Preferred Alternative 2**.

Alternative 3 would further reduce commercial gag quota to 53% of the annual catch target. As expected, **Alternative 3** would result in greater losses in economic value. Relative to **Preferred Alternative 2**, **Alternative 3** would potentially grant greater protection to the gag stock during rebuilding. However, the Council decided that the proportion of dead discards assumed under **Preferred Alternative 2** would be more realistic and would lessen adverse economic effects.

Direct and Indirect Effects on the Social Environment

Action 3 addresses the gag and shallow-water grouper quota for the commercial sector which is currently under an individual fishing quota program. The proposal for a reduction in the gag quota is based on the level of dead discards not being reduced to levels sufficient to achieve the annual catch target. Thus, although **Alternative 1** provides the greatest amount of gag quota, and the least amount of social impacts as a result, this alternative would allow too many discards and not achieve the rebuilding of gag.

The remaining two alternatives reduce the annual catch target and will therefore incur negative social impacts on the commercial fleet. In addition to the new grouper individual fishing quota program, commercial longline fishermen have been negatively impacted by the restrictions on their gear type implemented by Amendment 31. Thus, due to multiple new regulatory changes, it is difficult to isolate social impacts from each regulation, and difficult to predict how a lowered gag quota, alone, will affect fishermen. Nevertheless, expected effects on the social environment parallel the effects on the economic environment. That is, the anticipated benefits (long-term) to the gag resource from the proposed reduction in commercial gag quota cannot be quantified at this time. However, the adverse economic effects that would result in the short-term from the precautionary reductions in commercial gag quota can be approximated by the associated decreases in economic value. Thus, negative short-term social impacts can be expected alongside the negative economic impacts from the reduction in gag quota under **Preferred Alternative 2** and **Alternative 3**. The more extreme reduction to the commercial gag quota under **Alternative 3** would entail greater negative social impacts than the lesser reduction outlined in **Preferred Alternative 2**, and it is for this reason that the Council selected **Preferred Alternative 2**. It is also expected that in the long-term, potential social benefits will accompany economic benefits stemming from the added protection to the gag stock during rebuilding under either of these alternatives.

5.3.4 Direct and Indirect Effects on the Administrative Environment

All of the alternatives in this action establish a 4-year stream of increasing commercial quotas. **Alternative 1** implements the full annual catch target yield stream while **Preferred Alternative 2** and **Alternative 3** implement yield streams where each year's quota is reduced from the full annual catch target to account for dead discards. The direct administrative effects of each alternative re the same, since the each involve codifying the commercial quota yield stream and then issuing individual fishing quotas which will change each year as the quota changes. Indirectly, the more restrictive yield streams will result in individual quotas being filled more quickly, and may require increased enforcement to avoid illegal harvests. In addition, the more restrictive yield streams increase the possibility of overages occurring if fishermen inadvertently harvest in excess of their IFQ shares. Overages that exceed the sector annual catch limit would trigger accountability measures resulting in additional administrative impacts to implement the accountability measure actions. From this aspect, **Alternative 3** will have the

greatest negative effects on the administrative environment, **Preferred Alternative 2** will have an intermediate negative effect, and **Alternative 1** will have the least negative effect. However, in the short history of IFQ fisheries in the Gulf of Mexico there have been no overages, so the likelihood of this occurring is small.

5.4 Action 4. Adjustments to Multi-Use Individual Fishing Quota Shares

5.4.1 Direct and Indirect Effects on the Physical Environment

The alternatives in this section affect the administration of the multi-species grouper individual fishing quota system, and have no impact on the physical environment as described in Section 5.1.1.

5.4.2 Direct and Indirect Effects on the Biological/Ecological Environment

Under **Alternative 1**, at the gag quota levels during the early part of the rebuilding program, the amount of red grouper multi-use allocation could exceed the available gag commercial quota. This could reduce regulatory discards of both gag and red grouper due to having insufficient shares. However, this could result in gag harvest exceeding the rebuilding yield, which could delay rebuilding, or possibly completely negate the gag rebuilding program. Under the annual catch limit/annual catch target control rule in the Generic Annual Catch Limits/Accountability Measures Amendment, IFQ fisheries will have little or no buffer. Even after the gag stock is rebuilt, the fixed 4% allowance for red grouper shares to be used as multi-use shares could exceed that buffer and result in the gag annual catch limit being exceeded. The effects from fishing are described in Section 5.1.2.

Alternative 2 would base the amount of red grouper multi-use allocation on the buffer between the gag annual catch limit and the annual catch target. The formula used provides that the amount of red grouper shares that can be used to harvest gag cannot exceed the buffer between the commercial annual catch limit and the commercial annual catch target. However, as discussed above, IFQ fisheries will have little or no buffer. Furthermore, the annual catch limit in this amendment is set at the level where there is only a 50% probability of meeting the target to rebuild the gag stock in 10 years or less. This alternative will have a more limited effect than **Alternative 1** on reducing regulatory discards of gag, but will result in a greater likelihood of success for the gag rebuilding plan. Once the gag stock is rebuilt, this alternative will continue to provide limited benefits to reducing regulatory discards of gag. With respect to red grouper, this alternative could result in a small reduction in the amount of red grouper caught. Red grouper is neither overfished nor undergoing overfishing, so this result, while beneficial, is of limited impact.

Preferred Alternative 3 would set the amount of gag multi-use allocation to zero while red grouper are in a rebuilding plan. Red grouper are currently neither overfished nor undergoing overfishing, so this provision currently has no impact. If red grouper becomes overfished and is placed under a rebuilding plan in the future, this provision will provide positive impacts to the rebuilding plan by preventing any shares other than those specifically allocated under the red grouper annual catch target from being used to harvest red grouper commercially. However, there could be increased regulatory discards of red grouper relative to **Alternative 1**. For the current condition, i.e., red grouper not in a rebuilding plan, this alternative sets the amount gag multi-use allocation on the buffer between the red grouper annual catch limit and the annual catch target. The formula used provides that the amount of gag shares that can be used to harvest red grouper cannot exceed the buffer between the commercial annual catch limit and the

commercial annual catch target. This could reduce regulatory discards of red grouper by allowing a limited amount of red grouper to be retained under gag multi-use shares. For a healthy red grouper stock, occasional harvest at levels up to the annual catch limit will not cause a decline and is neutral in impact. However, it should be noted that continuously fishing above the annual catch target could exceed optimum yield on an ongoing basis. Any reduction in gag harvest as a result of using gag multi-use shares to harvest red grouper would be beneficial to the gag rebuilding program. Given the low levels of gag allocation, at least in the early years of the rebuilding program, this is an unlikely scenario. Even after being fully rebuilt, the gag annual catch limits and annual catch targets are expected to be lower than red grouper, so there is less likelihood of gag multi-use shares being used to harvest red grouper than vice-versa. As with **Alternative 2**, this assumes that there is a buffer, which may not exist in subsequent annual catch limits and annual catch targets after an annual catch limit/annual catch target control rule is adopted in the Generic ACL/AM Amendment. However, while there is a buffer, this could result in fewer gag being harvested, which would benefit the rebuilding plan. This could result in more red grouper being harvested than targeted under the annual catch target. However, red grouper is neither overfished nor going overfishing, and due to the small amount of gag quota available initially, any potential negative impacts on red grouper would be limited.

Preferred Alternative 4 would eliminate red grouper multi-use allocation while the gag rebuilding plan is in effect. With no allowance to retain excess gag caught under a multi-use red grouper share, this could result in increased regulatory discards of gag. This increase in dead discards, while likely under this alternative, is accounted for in Action 3 of this amendment, which adjusts the commercial gag quota downward to explicitly account for these increased discards. Because this alternative would allow the greatest amount of control over gag harvest, it would eliminate much of the management uncertainty and provide the greatest likelihood of the rebuilding plan succeeding. Once the gag stock is rebuilt, this alternative would allow red grouper multi-use shares to harvest gag using the same formula as in **Alternative 2**. Thus, for a rebuild gag stock, the biological impacts would be the same as **Alternative 2**. It will continue to provide limited benefits to reducing regulatory discards of gag. With respect to red grouper, this alternative could result in a small reduction in the amount of red grouper caught. Red grouper is neither overfished nor undergoing overfishing, so this result, while beneficial, is of limited impact.

Overall, **Preferred Alternative 3** and **Preferred Alternative 4** in combination provide the greatest positive impacts to the biological/ecological environment, both during and after the gag rebuilding program. **Alternative 2** provides less beneficial impacts than, **Preferred Alternative 3** and **Preferred Alternative 4**, but more than **Alternative 1**. **Alternative 1** provides the least beneficial impacts, and may hinder the gag rebuilding plan. **Alternative 2** and **Preferred Alternative 4** will result in some increase in regulatory discards of gag, particularly during rebuilding , but this impact is mitigated by Action 3, which reduces the commercial gag quota to account for dead discards.

5.4.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

Alternative 1 would continue to convert 4% of the red grouper allocation into multi-use allocation valid to harvest red grouper or gag. **Alternative 1** would provide flexibility to individual fishing quota participants by allowing them to adjust to geographical and temporal variations in the red to gag grouper ratio, possibly contributing to a reduction in the number of gag discards. However, due to the large decrease in the gag commercial quota expected under this amendment, the percentage of red grouper

allocation that will be converted into multi-use allocation could result in gag harvests that would exceed the gag annual catch limit. In addition to the detrimental effects on the gag stock, this scenario would result in adverse economic effects stemming from the corrective measures that would be implemented to address the over-harvesting of gag,

Alternative 2 would continue to convert a portion of the red grouper allocation into multi-use allocation valid to harvest red grouper or gag. However, the percentage of red grouper allocation to be converted would be based on the difference between the gag annual catch limit and allocation, and the red grouper allocation. Therefore, multi-use percentages would adjust following changes to the gag annual catch limit, allocation, or the red grouper allocation. Although **Alternative 2** would allow fishermen to benefit from the added flexibility multi-use shares may afford, the resulting added pressure on the gag stock could have adverse effects on the rebuilding of the resource, and thus be associated with negative economic effects.

If red grouper is under a rebuilding plan, **Preferred Alternative 3** would set the percentage of gag allocation converted into multi-use allocation valid to harvest gag or red grouper to zero, granting additional protection to red grouper stock while it rebuilds. This additional protection, which is assumed to yield biological benefits, would be anticipated to result in economic benefits in the long term. **Preferred Alternative 3** would, if red grouper is not under a rebuilding plan, continue to convert a portion of the gag allocation into multi-use allocation valid to harvest gag or red grouper. The percentage of gag allocation to be converted into gag multi-use allocation would be based on the relative magnitudes of the red grouper annual catch limit and allocation, and gag allocation. Multi-use percentages would thus adjust following changes to the red grouper annual catch limit and allocation, and gag allocation. Given the limited amount of gag multi-use allocation to be granted following the gag annual catch limit decrease expected under the gag rebuilding plan, it is likely that the totality of the gag allocation, including the portion converted into multi-use allocation, will be used to harvest gag. However, any amount of multi-use gag allocation used to harvest red grouper would lessen pressure on the gag stock, resulting in future economic benefits.

Preferred Alternative 4 would suspend the release of red grouper multi-use allocation until NMFS declares the gag stock rebuilt. It is important to note that the interim rule currently in effect has already suspended the issuance of red grouper multi-use shares. **Preferred Alternative 4,** which constitutes a continuation of the suspension of red grouper multiuse shares currently in effect**,** would limit the pressure on gag stock by preventing any harvest in excess of the specified gag quota. Although it restricts the flexibility that individual fishing quota participants would benefit from under **Alternatives 1, 2,** and **Preferred Alternative 3, Preferred Alternative 4** is expected to yield positive economic effects due to the anticipated beneficial impacts to the rebuilding of the gag stock which is currently overfished and is undergoing overfishing.

Direct and Indirect Effects on the Social Environment

Some social impacts may occur alongside changes in the multi-use provision within the IFQ program, as the multi-use provision provides flexibility to IFQ participants by allowing the retention of species caught incidentally while fishing for other species for which quota is held. Thus, fishermen are able to keep a proportion of gag or red grouper under their allocation of the other species, decreasing the relative discards of fish due to a lack of quota for that species. Fishing behavior may be impacted through an increase in the practice of discarding commercially valuable fish. However, because the grouper IFQ

program has only been in operation since January 2010, adjusting the multi-use provision is not likely to be more than minimally disruptive to fishing practices. Furthermore, any negative social impacts are likely to occur in the short-term only, while gag is under the rebuilding plan.

Under **Alternative 1**, the multi-use provision is maintained; however, the provision could permit the gag harvest to exceed the annual catch target and thus is not in line with the goals of the rebuilding plan.

The two preferred alternatives of this action would operate together to allow IFQ participants to continue landing red grouper under their gag allocation (**Preferred Alternative 3**), and prohibit them from landing gag under their red grouper allocation (**Preferred Alternative 4**). **Preferred Alternative 3** is desirable under the rebuilding plan, as it lessens pressure on the gag stock by prohibiting the landing of gag using red grouper quota. As under other actions within this amendment, it is expected that negative short-term impacts on fishing behavior will be justified in the long-term as the stock rebuilds. However, although this alternative allows IFQ participants to land red grouper with their gag allocation, fishermen are not expected to do so.

Alternative 2 would continue to allow some harvest of gag under an IFQ participant's red grouper allocation. Rather than a fixed percentage of the allocation, however, the red grouper multi-use allocation would be calculated in relation to the annual catch limit. By allowing a more restricted amount of gag to be landed under red grouper allocation than **Alternative 1**, this alternative would help mitigate the impacts that are possible under **Alternative 1**, while continuing to allow some harvest of gag under an IFQ participant's red grouper allocation. However, the Council ultimately decided to eliminate the red grouper multi-use provision entirely during the rebuilding plan (**Preferred Alternative 4**). It may be noted that in public comment, fishermen only offered support for suspending the multi-use provision while the rebuilding plan is in effect.

5.4.4 Direct and Indirect Effects on the Administrative Environment

The administrative environment already accommodates multi-use shares for gag and red grouper. **Alternatives 1, 2, and 3** would maintain the existing multi-use shares, though in different proportions. If the buffer between annual catch target and annual catch limit is reduced or eliminated in a subsequent amendment by application of the annual catch limit/annual catch target control rule, the application of **Alternative 2 or 3**, which are dependent upon the buffer, could become problematic and may require modification through an amendment or framework action. **Preferred Alternative 4** would simplify the administrative environment by eliminating multi-use shares for the duration of the gag rebuilding plan.

5.5 Action 5. Commercial Gag Size Limit

5.5.1 Direct and Indirect Effects on the Physical Environment

Adjustments to the commercial minimum size limit will not change the gear or methods used to fish for gag. However, smaller size limits may allow fishermen to catch their individual quotas faster and spend less time targeting gag. Under this scenario, **Alternative 1** would have the most negative impact on gag habitat since it would result in the longest time needed to catch fish. **Preferred Alternative 2** would shorten the time and provide a less negative impact to gag habitat. **Alternative 3** would provide even less negative impacts to gag habitat, and **Alternative 4**, which eliminates the gag minimum size limit, would have the least negative impacts on gag habitat. Since fishermen would likely switch to red grouper once their gag quota is filled, the relative impacts on red grouper habitat would be the exact opposite. Longline

vessels already catch gag above the current minimum size limit on average, so any change in impacts would mainly come from the vertical line fishery. However, vertical lines have much less impact on the bottom habitat than longlines, so the relative impacts from best to worst would be small.

5.5.2 Direct and Indirect Effects on the Biological/Ecological Environment

Under **Alternative 1**, the current gag minimum size limit is 24-inches total length, which is slightly above the size at 50% female maturity. This will allow a majority of gag to enter the spawning biomass, although some of the undersized released gag will not survive. The release mortality rate for gag was treated in the SEDAR 10 assessment as a function of depth, with 50% release mortality occurring at 150 feet (25 fathoms) (Ortiz 2006). The estimated average release mortality rate for commercially caught gag was 67 percent (GMFMC 2008b).

Lower size limits would decrease the number of discarded grouper and the mortality associated with those discards. Yield-per-recruit (YPR) and spawning potential-per-recruit (SPR) analyses for gag and red grouper indicate lower minimum size limits could increase YPR but decrease SPR (Ortiz 2007; Walter 2007). However, it should be noted YPR-SPR analyses assume the grouper fishery is regulated through a constant fishing mortality policy rather than through a quota. The YPR and SPR results would likely be different under a quota regulated, with SPR reductions less than those estimated by these analyses. To the extent that reductions in dead discards offset the reduction in SPR, a lower minimum size limit may benefit the stock. However, the primary source of regulatory discards during the early years of the rebuilding plan is likely to be lack of individual quota shares rather than the size limit.

Given the high release mortality in the commercial fishery, **Alternative 1** is expected to have the greatest negative impact on the stock and the biological/ecological environment.

Preferred Alternative 2 would reduce the commercial minimum size limit to 22 inches total length, matching the recreational size limit. This is below the average size of female maturity, but given the high release mortality rate, the loss in spawning potential from a reduced size limit would be offset by a gain in yield per recruit as a result of fewer dead discards. Until individual gag quotas are reached, this is projected to reduce the number of discarded gag from the vertical line fishery by 31% while increasing the number of fish needed to meet the individual quota by about 15% (Table 2.5.2). In the longline fishery, the number of discards would be reduced by about 28%. However, because most of the gag caught by longline are already above the 24-inch size limit, a reduction to 22 inches would only increase the number needed to meet the quota by 0.5% (Table 2.5.2). Considering the tradeoff between loss of spawning potential and reduction in dead discards, this alternative will provide net positive benefits to the stock and the biological/ecological environment.

Alternative 3 would reduce the commercial minimum size limit to 20 inches total length, which was the size limit prior to 2000. Until individual gag quotas are reached, this is projected to reduce the number of discarded gag from the vertical line fishery by 62% while increasing the number of fish needed to meet the individual quota by about 30% (Table 2.5.2). In the longline fishery, the number of discards would be reduced by about 47%, while increasing the number needed to meet the quota by 0.9% (Table 2.5.2). At this size, very few gag have reached female maturity (Figure 2.5.1), so this size limit will likely have a greater negative impact on SPR than **Preferred Alternative 2**. Considering the tradeoff between loss of spawning potential and reduction in dead discards, this alternative would provide more net positive benefits to the stock and the biological/ecological environment than either **Alternative 1** or Preferred

Alternative 2. However, anecdotal information provided during Council meetings and at the April Reef Fish Advisory Panel meetings suggests that, at size limits below 22 inches, a differential price by size could develop, with larger fish being more valuable. This being the case, a 20 inch size lint could result in high grading, and resulting discards of smaller, but legal, fish. These are fish that would have to be discarded anyway under **Preferred Alternative 2**. Therefore, based on possible behavior of the fishermen, the impacts of this alternative on the biological/ecological environment would be similar to those from **Preferred Alternative 2**.

Alternative 4 would eliminate the minimum size limit entirely. Prior to the implementation of size limits in 1990, grouper were caught commercially down to about 11 inches, but below 18 inches the frequency of catches dropped significantly. Size limit analyses are only available to 18 inches, but the results of eliminating the size limit is likely to be only slightly different to the 18 inch analyses. At 18 inches, the number of discarded gag from the vertical line fishery until the quota is reached is projected to be reduced by 80% while the number of fish needed to meet the individual quota is projected to increase by about 38% (Table 2.5.2). In the longline fishery, the number of discards would be reduced by about 67%, while increasing the number needed to meet the quota by 1.3% (Table 2.5.2). As with **Alternative 3**, high grading could develop, but the fish that would be discarded are ones that would be required to be discarded under **Preferred Alternative 2**. Therefore, based on possible behavior of the fishermen, the impacts of this alternative on the biological/ecological environment would be similar to those from **Preferred Alternative 2**.

5.5.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

Alternative 1, no action, would maintain the 24-inch commercial gag minimum size limit. As such, economic effects are not expected to result from **Alternative 1**. **Preferred Alternative 2** and **Alternative 3** would reduce the commercial size limit to 22 and 20 inches, respectively. **Alternative 4** would eliminate the commercial gag size limit. The implementation of Preferred **Alternatives 2** or **Alternatives 3** or **4** is expected to benefit the gag stock by allowing commercial fishermen to land a portion, if not the totality, of dead gag discards, thereby having positive impacts on the rebuilding plan. These beneficial impacts to the stock would, in turn, result in future economic benefits. However, potential benefits to the stock and associated economic benefits may be limited or negligible due to fishermen' preference for larger gag. To optimize economic returns derived from their gag allocation, fishermen would rather harvest larger fish because of their increased yield. Lowering or eliminating the commercial gag minimum size limit could therefore be ineffective or counterproductive due to incentives for highgrading.

Direct and Indirect Effects on the Social Environment

The rationale behind the proposed change to decrease the commercial size limit of gag is to allow fishermen to keep smaller fish and avoid discards. This is expected to help the gag stock and ultimately provide long-term social benefits to fishermen. However, regulatory change to decrease the commercial gag size limit may incur effects on fishermen behavior in the short-term, depending on gear type and corresponding fishing depth. Commercial fishermen who fish in deeper waters (usually with longlines) are less likely to catch gag smaller than the current minimum size of 24 inches (**Alternative 1**). Therefore, minimal social impacts in fishing behavior are expected to occur among longliners under any of the alternatives, including eliminating the minimum size limit altogether (**Alternative 4**). On the other hand,

fishermen using vertical line tend to fish shallower than longliners and more often encounter the smaller gag they currently must discard. Thus, the decrease in the minimum size for gag is more likely to affect those fishing with vertical line, as opposed to longliners fishing in deeper waters.

While it may be assumed that allowing fishermen to keep smaller fish would be beneficial for fishing behavior since fishermen often decry the practice of throwing back fish as wasteful, it is likely that under the IFQ program, fishermen prefer to keep larger gag in order to optimize economic returns on their gag allocation. This calls attention to one social consequence of the IFQ program which limits the amount of gag an individual fisherman may land. Prior to the IFQ program, a fisherman harvested from the total allowable catch shared by the entire population of fishermen; under that scenario, a smaller size limit would be beneficial in decreasing discards as the individual fisherman sought to maximize his landings until the total allowable catch (shared by all fishermen) was met. Under the IFQ program, decreasing the minimum size could lead to the practice of highgrading as fishermen prefer to keep larger fish and discard smaller, newly legal fish. The smaller the minimum size (**Preferred Alternative 2** or **Alternative 3**), the more likely highgrading would occur. Eliminating the commercial gag size limit altogether (**Alternative 4**) would require IFQ participants to keep even the smallest gag caught inadvertently, in order to remain legal; this alternative is most likely to lead to non-compliant practices. Ultimately, the proportion of commercial vertical line fishermen who support the change in the size limit for gag is unknown.

Finally, it is worth noting that currently, recreational fishermen are permitted to land smaller gag than are commercial fishermen. The adoption of **Preferred Alternative 2** would bring the commercial size limit in line with the recreational size limit, currently in place. Thus, this alternative would not contribute to tensions between the two sectors. Reducing the commercial size limit below the recreational size limit (**Alternative 3**) or eliminating the size limit altogether (**Alternative 4**), is likely to be perceived by the recreational sector as unfair and may contribute to further hostility toward commercial fishermen.

5.5.4 Direct and Indirect Effects on the Administrative Environment

Currently gag and black grouper both have a commercial 24-inch minimum size limit. The size limit was implemented for black grouper because gag are sometimes referred to locally as black grouper. Having the same size limit for both species was implemented to reduce confusion due to local naming conventions. Setting the gag size limit different from black grouper could reintroduce that confusion and lead to enforcement and voluntary compliance difficulties

Under **Alternative 1**, the gag and black grouper size limits would remain the same, minimizing confusion and optimizing enforceability. Those would provide the most positive benefits to the administrative environment by maintaining enforceability of the size limit and reducing confusion.

Preferred Alternative 2 and **Alternative 3** would both lead to different size limits for gag and black grouper. These differential size limits could introduce confusion and complicate enforcement, resulting in negative benefits to the administrative environment. However, **Alternative 4** would eliminate the gag size limit regulation entirely, simplifying the regulations. While there might still be some confusion from anglers who refer to gag as black grouper, the simplified regulations may offset any confusion from retuning the black grouper size limit.

5.6 Action 6. Time and Area Closures

5.6.1 Direct and Indirect Effects on the Physical Environment

Preferred Alternative 1 would maintain the existing levels of impact on the physical environment as described in Section 5.1.1. The Council selected no action as the preferred alternative because the positive ecological and biological benefits of closing a fishing area were difficult to quantify compared to the negative social and economic impacts. Direct and indirect effects on the physical environment would depend on which **Alternatives 2-4** and (**Options a-d**) are selected in various combinations or in total. Strictly based on the size of an area closure, the alternatives provide protection to the physical environment in the following order from largest to smallest: **Alternative 4-**the Edges (approximately 390 nm^2), **Alternative 5-**Madison-Swanson and Steamboat Lumps (approximately 119 nm^2 total), **Alternative 3-**Extension of the Edges (approximately 244 nm^2), and **Alternative 2-**Extension of Madison-Swanson (approximately 70 nm^2). The size of the closure has a direct effect on the physical environment primarily due to restricting the impacts from bottom fishing gear and anchoring which comes in direct contact with the substrate and can have negative impacts on the physical environment. These impacts are described in detail in Section 5.1.1.

Alternative 2, the extension of Madison-Swanson, is currently the smallest proposed time and area closure compared to the other alternatives. However, if **Alternative 2** were combined with the current Madison-Swanson closed area, effectively becoming one contiguous area, it would total approximately 185 square nautical miles comparable to **Alternative 3**, the extension of the Edges (i.e., approximately 244 square nautical miles). If the Council deemed it necessary to rebuild the gag stock they could select all of the proposed and current area closures, creating one contiguous area totaling 923 nm^2 off the west Florida shelf. This would provide the maximum benefits to the physical environment.

In addition to size of the closed area, the period and type of fishing that is prohibited has direct impacts on the physical environment. Currently, Madison-Swanson and Steamboat Lumps are closed year round to bottom fishing and surface trolling is allowed May 1 through October 31 (**Option a**). This closure would reduce impacts to the physical environment for 8 additional months compared to **Option c**, which prohibits all fishing January 1 through April 30. **Option b** would also close the area for 6 months but potentially provide less benefits to the physical environment the rest of the year when all fishing is allowed (May 1 through October 31). Due to all fishing being allowed May 1 through October 31, there is a potential for other negative impacts to the physical environment, such as anchoring and damage to the substrate (see Section 5.1.1), compared to **Option a**. The cumulative effects of repeated anchoring could damage the hard bottom areas where fishing for reef fish occurs. **Option d** would provide the most benefits to the physical environment because all fishing is prohibited year-round. These impacts are based on studies of the gear in the southeast region.

5.6.2 Direct and Indirect Effects on the Biological/Ecological Environment

Section 5.1.2 describes the effects of fishing on the biological/ecological environment. **Preferred Alternative 1** (no action) would not create additional time and area closures in the Gulf of Mexico. Due to the positive ecological and biological benefits of closing a fishing area being difficult to quantify and the negative social and ecological implications of doing so the Council decided not to close any additional areas to fishing activities. Status quo would maintain the existing benefits to the biological and ecological environment and other actions may need to be taken to reduce gag bycatch and bycatch mortality as described in GMFMC (1999 and 2008a) and incorporated here by reference.

As discussed under the physical environment, positive impacts to the biological environment may be

expected simply based on size of the closed areas and listed in the following order: **Alternatives 4**, **5**, **3**, and **2**. Based on size alone, an area protected from all or some human activity was not effective for a majority of marine species due to their mobility in and out of the closed areas (Shipp 2003).

The direct and indirect impacts on the biological environment of the various alternatives would depend on which series of **Options a-d** were selected. For example, **Option d** would provide the greatest benefits to the biological environment, because all fishing is prohibited year-round; whereas, **Options a-c** provide benefits to the biological environment by limiting fishing during the gag and red grouper spawning season. **Option a** provides a similar level of protection as **Option d** because the area is closed to reef fish fishing for the whole year and only allows trolling the rest of the year. **Option b** would allow reef fish fishing in addition to trolling for that time period. **Option c** is the shortest period of time the areas could be closed to all fishing and therefore would provide the least benefits to the biological environment compared to **Options d**, **a**, and **b**. However, compared to **Preferred Alternative 1**, status quo **Option c** is expected to provide numerous positive impacts to the biological environment, though not quantifiable.

The reproductive biology of gag may make them more susceptible to fishing pressure than most other reef fish species and area closures may mitigate these effects. Gag is a protogynous hermaphrodite, which means females change sex to males as they get older and larger. In addition to changing sex, gag form spawning aggregations similar to other species in the Family Serranidae (Domeier and Colin 1997). Male gag are especially at risk during spawning because they become aggressive feeders, increasing their susceptibility to fishing mortality (Coleman et al. 1996; Koenig et al. 1996). This susceptibility of male gag to fishing pressure during spawning, and potential loss of large dominant males within a spawning aggregation could be detrimental to the rebuilding plan for gag. Coleman et al. (1996) speculated that if either mature large females are not present or are unable to change sex in time to fertilize the other females within the spawning aggregation then the reproductive potential of the aggregation could be limited. Shapiro (1987) suggested that fishes with a protogynous hermaphroditic reproductive strategy may lend themselves to significant population level consequences when subject to high exploitation. Thus, time and area closures during the spawning season may be important to rebuild the gag stock by protecting large dominant males and spawning aggregations.

In addition to protecting spawning aggregations in areas where red grouper and gag coexist and are targeted, area closures may reduce discarding of gag by vessels fishing for red grouper or other reef fish. Therefore, due to the overfished status of gag and the limited release of individual fishing quota allocation to the commercial sector, closed areas, particularly in deeper waters, would provide the greatest positive benefit to the biological environment, thereby reducing bycatch and bycatch mortality of gag while targeting red grouper. Based on commercial landings from January 2008-August 2009, **Alternative 4,** the Edges, had the highest percentage of both gag and red grouper landings attributed to that area 8.9% and 2.4%, respectively (Table 2.6.1). If **Alternative 4** and **Option d** (all fishing prohibited year round) was selected as preferred then the maximum benefits to the biological environment would be expected. Both bycatch and bycatch related mortality of gag while fishers are targeting red grouper would be expected. The current closed areas (Madison-Swanson and Steamboat Lumps, and the Edges) and the two additional alternatives for area closures (**Alternative 2** and **Alternative 3**) are within these statistical zones where both red grouper and gag were caught on a set (all gears) and documented by the Reef Fish Observer Program (A. Strelcheck 2011; Figures 2.7.1 and 2.7.2). However, the percentage of both red grouper and gag caught on a set were lower in the proposed **Alternative 3** compared to the Edges (**Alternative 4)** suggesting that the **Alternative 3** may not achieve as great a reduction in bycatch of gag while targeting red grouper, but would still provide numerous benefits to the biological environment by closing the area during peak spawning (**Option c).** Based on **Alternative 3 Option c** the percent landings for gag and red

grouper attributed to that area and time period are 3.2% and 0.3%, respectively (Table 2.6.1).

5.6.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

Preferred Alternative 1, no action, would not modify existing time and area closures that prohibit fishing for gag and other reef fish species. Therefore, economic effects are not expected to result from **Preferred Alternative 1**. **Alternative 2** and **Alternative 3** would expand existing area closures and close additional areas covering 70 and 244 nautical miles, respectively. **Alternatives 4** and **5** would modify the seasonal closure dates of the Edges and of Madison-Swanson and Steamboat Lumps areas, respectively. The expansion of these closed areas and modifications to seasonal closure times considered are expected to reduce effort, thereby granting additional protection to spawning aggregations of gag and potentially reducing bycatch and bycatch mortality of gag while fishermen are targeting red grouper.

The magnitude of effort reductions that are anticipated to result from **Alternatives 2, 3, 4,** and **5** is not known at this time. Therefore, expected beneficial impacts on the gag stock and future economic benefits that could potentially result from these alternatives are also unknown. The expansion of closed areas and/or modifications to seasonal closure times may adversely impact fishermen who typically harvest gag in those areas by leading them to search for alternative fishing grounds and/or time periods to harvest gag and other reef fish, possibly altering the revenue and cost structures of their fishing trips. Further, additional closed areas may lead some commercial fishermen to increase their effort in fishing grounds closer to shore, potentially increasing competition in those areas. On balance, the economic effects that would potentially result from **Alternatives 2, 3, 4,** and **5** are not known. However, based on the relatively low percentage of landings recorded in each of the area considered for closure, economic effects that are anticipated to result from **Alternatives 2, 3, 4,** and **5** are likely to be negligible. In addition, even if fishermen were not able to harvest a portion of their red grouper or gag allocation due to the proposed closures, they would sell or lease their allocation to fishermen operating in other parts of the Gulf.

Direct and Indirect Effects on the Social Environment

This action proposes expansions to the marine protected areas offshore of west Florida (**Alternatives 2** and **3**) and the modification of seasonal closures for two established marine protected areas, The Edges (**Alternative 4**) and Madison-Swanson (**Alternative 5**). From public comment, fishermen broadly support closed areas for the purpose of protecting spawning aggregations, but are otherwise against closing spatial areas of the marine environment to fishing. Fishermen question the efficacy of marine protected areas as a management tool more than other effort restricting measures such as bag limits, seasons, and minimum sizes. Additionally, area closures displace effort which may lead to unintended consequences if effort concentrates in new areas, or if effort shifts to other species. Such effort shifts could necessitate further management.

The areas under consideration in this action are located far from shore meaning that only those fishermen capable of reaching the areas would be impacted directly. Commercial longliners are likely to be affected; they are currently restricted to fishing deeper than 50 fathoms west of Cape San Blas and deeper than 20 fathoms (35 fathoms from June through August) east of Cape San Blas. The additional closed areas (**Alternatives 2** and **3**) are located west of Cape San Blas and extend to waters deeper than 50 fathoms. Thus, commercial reef fish longliners, whose effort was severely restricted through

implementation of Amendment 31 (GMFMC 2009), would be further displaced from fishing grounds.

Because of the distance from shore, those commercial vertical line fishermen and recreational fishermen with vessels capable of reaching these areas would also be negatively impacted by new or modified closures. It is unknown where fishing effort would be displaced and whether fishermen would switch target species. Unintended consequences are possible. **Alternative 2** would close a smaller area than **Alternative 3** and is slightly closer to shore, yet each borders the Madison-Swanson area closure. Fishermen would most likely be impacted through selection of the alternative closing the area closest to their port of origin; impacts would be geographically differentiated.

The same four options are provided for **Alternatives 2-5** and concern the time and type of fishing closure within the respective area of each alternative (Table 5.6.3.1). Of the options, **option c** would affect fishing effort the least, prohibiting all fishing within each respective area during the gag spawning season only. **Option d** would prohibit all fishing year-round and would incur the greatest impacts of the options for any selected alternative.

Table 5.6.3.1. Comparison of the periods and types of closures that can be selected with each option. An 'X' means all fishing is closed.

Month

Option	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	
a	X	X	X	X	Surface trolling permitted only						X	X	←**Alternative 5** status quo (Madison-Swanson & Steamboat Lumps)
					X (other fishing prohibited) X								
b	X	X	X	X	All fishing permitted						X	X	
c	X	X	X	X	All fishing permitted								←**Alternative 4** status quo (The Edges)
d	X	X	X	X	X	X	X	X	X	X	X	X	
	Gag spawning season												

The impacts from the alternatives and options within this action will vary given other pending actins within this amendment, particularly Action 2.1 which modifies the recreational fishing season. **Preferred Alternative 4** of Action 2.1 has been selected by the Council for final action, setting the recreational gag season at July 1 through October 31. Thus, should either **Alternative 2 or 3** (creating new closures), with **options b** or **c** of Action 6 be adopted, recreational fishing effort toward gag would not be further impacted, thus this action would not incur negative impacts for recreational fishermen targeting gag. However, these alternatives and options would implement a prohibition on surface trolling in these new

areas, thus negatively impacting fishermen who would not be likely to encounter gag when fishing in the area. On the other hand, if **Alternative 4**, **option d** under Action 6 was selected, this would incur additional impacts beyond the shortened season specified in Action 2.1 by further limiting where fishermen may fish during the newly restricted fishing season. These negative impacts would also occur if the split season outlined in **Alternative 3** of Action 2.1 were to be adopted alongside **Alternative 3**, **option c** of Action 6; again, recreational fishermen would be prohibited from harvesting gag in the proposed closed area during the entire open season for gag.

Under the IFQ program for grouper, commercial fishing effort is not restricted by a fishing season but rather, by the amount of quota available. Any of the area closures that are not closed year round would allow commercial fishermen to harvest gag within the area during some time of the year. Thus, negative social impacts are most likely to accrue to the commercial sector if **option d** alongside **Alternatives 2, 3, 4**, or **5** was to be selected.

Ultimately, the Council selected **Preferred Alternative 1**, as the biological and physical benefits of additional closures were difficult to quantify, and commercial and recreational fishermen alike expressed opposition to additional closures before positive results from existing closures could be determined.

5.6.4 Direct and Indirect Effects on the Administrative Environment

Impacts on the administrative environment under **Preferred Alternative 1,** status quo would remain the same as current levels. **Alternatives 2** and **3** may require additional monitoring and law enforcement compared to **Preferred Alternative 1**. Since May 6, 2007, all commercial reef fish vessels are required to have a functioning vessel monitoring systems, which can assist law enforcement with monitoring fishing activities. Charter vessels and headboats are not required to carry a vessel monitoring systems unless they are dual-permitted vessels (have both a charter and commercial reef fish permit). **Alternatives 4** and **5** are currently closed areas and are unlikely to add additional burden to the administrative environment. However, depending on the period and type of fishing closure selected (**Options a-d**) there could be additional direct effects on the administrative environment. **Option a** would prohibit all fishing November 1 through April 30, but allow surface trolling May 1 through October 31. These regulations are identical to Madison-Swanson and Steamboat Lumps regulations and may provide an additional burden to the administrative environment if selected as preferred for **Alternatives 2-4**. Allowing surface trolling in additional closed areas may require law enforcement and monitoring to use tools available such as aerial surveillance and VMS monitoring to ensure other types of fishing are not being prosecuted in the closed areas. Potential noncompliance with area closures was noted for 2005 via aerial surveys in waters within and adjacent to the Madison-Swanson and Steamboat Lumps restricted fishing areas (Smith and Zurcher 2007). Both commercial and recreational vessels were observed inside the marine protected areas when all fishing was prohibited. Observations indicated 1.9% of commercial vessels and 5.3% of the recreational vessels were engaged in fishing activities inside these marine protected areas. When the areas were open to surface trolling, 1.7% of commercial vessels and 3.1% of the recreational vessels were observed engaged in fishing activities (Smith and Zurcher 2007). **Options b-d** would prohibit all fishing at various times of the year requiring monitoring and law enforcement involvement directly impacting the administrative environment.

5.7 Action 7. Gag, Red Grouper, and Shallow-water Grouper Accountability Measures

5.7.1 Direct and Indirect Effects on the Physical Environment

Actions 7.1 and **7.2** have no direct and little indirect effects on the physical environment. The effects of fishing on the physical environment is described in detail in Section 5.1.1. The proposed actions would either bring accountability measures into consistency with current regulations for the commercial sector (**Action 7.1**) or enhance current regulations for the recreational sector (**Action 7.2**). To the extent that accountability measures control commercial effort through individual fishing quota programs (GMFMC 2008b) and shorten recreational fishing seasons, small benefits to the physical environment may result from reduced effort under **Action 7.1**, **Alternative 1** and **Preferred Alternative 2**. It is difficult to discern comparatively whether one alternative or the other would result in a greater decrease or increase in fishing effort.

Under **Action 7.2**, **Alternatives 2-4** would provide further constraints on fishing effort than **Alternative 1**, and so would reduce any adverse effects to the physical environment. Depending on the circumstances of how a fishery is being prosecuted, the limitations on fishing effort under **Alternatives 2** and **3** is different. **Alternative 2** would limit effort and provide limits on fishing if the annual catch limit is projected to be exceeded. **Alternative 3** would only apply to stock in a rebuilding plan that exceeded their annual catch limit. **Preferred Alternative 4**, because it includes the components of both **Alternatives 2** and **3** would likely provide greater limits on fishing effort and thus greater protections to the physical environment from fishing.

5.7.2 Direct and Indirect Effects on the Biological/Ecological Environment

Action 7.1, Preferred Alternative 2 would bring accountability measures into consistency with current management practices for the commercial sector which constrains harvest to the quota via the individual fishing quota program. This provides greater protection to the stock than **Alternative 1** because monitoring of the harvest through the individual fishing quota program is more rigorous than through standard quota monitoring. However, because the individual fishing quota is in effect regardless of whether **Alternative 1** or **Preferred Alternative 2** are selected, any benefits to the stock from **Preferred Alternative 2** would be minimal. Because both **Alternative 1** and **Preferred Alternative 2** are designed to protect gag and red grouper stocks, any benefit to the biological/ecological environment would primarily benefit gag and red grouper, and should have minimal effects on other reef fish species. These effects are described in GMFMC (2008a) and incorporated here by reference.

Action 7.2, **Alternative 1** would leave the current recreational post-season accountability measures in place and unchanged. These post-season accountability measures adjust the season length in the subsequent year if annual catch limits are exceeded in the current year. This provides positive benefits to the biological/environmental environment by creating a process for taking corrective action to restore catches to their appropriate limits. However, it does allow annual catch limits to be exceeded before taking action, which could have short-term negative effects. Furthermore, **Alternative 1** uses a moving average of recent landings to compare against a moving average of annual catch limits to determine if the accountability measures have been triggered. Although this has the benefit of reducing the imposition of accountability measures due to short-term fluctuations, it can also delay implementation of accountability measures in cases where catches rise only slightly above the annual catch limit, but on a persistent basis.

Compared to no action alternative**, Alternative 2** would provide some benefit to reef fish stocks under a rebuilding plan. The overage adjustment would mitigate any damage done to a stock's recovery in an annual catch limit is exceeded by reducing the annual catch limit for the following year by the size of the overage or by some other level depending on what the best available science advises to get a stock back into a condition consistent with the rebuilding plan. However, for stocks that are not in a rebuilding plan,

there would be no additional benefits compared to **Alternative 1**.

Alternative 3 would add an in-season accountability measure to the current gag and red grouper measures. In-season accountability measures are designed to prevent overages from occurring in the first place. For this reason, in-season accountability measures provide greater benefits to the biological/ecological environment of the species being managed under them. However, in-season accountability measures require in-season monitoring of landings, which is not feasible for all fisheries.

Preferred Alternative 4 would combine both the overage adjustment of **Alternative 2** and the in-season accountability measure of **Alternative 3** to the **Alternative 1** accountability measures. Therefore, the gag and red grouper stocks would benefit as described under these alternatives.

5.7.3 Direct and Indirect Effects on the Economic/Social Environment

Direct and Indirect Effects on the Economic Environment

Accountability measures for the commercial sector are considered in **Action 7.1**. **Alternative 1**, no action, would maintain accountability measures implemented by Reef Fish Amendment 30B. These measures would close the shallow-water grouper fishery if commercial landings reach or are projected to reach the red grouper, gag, or other shallow-water grouper quota. **Alternative 1** is not compatible with the current individual fishing quota program. **Preferred Alternative 2** would use the individual fishing quota program in place as the accountability measure for the commercial sector. Under an individual fishing quota program, fishermen cannot legally exceed their annual allocation. Fishermen are allowed a 10% overage on their last trip. However, the overage is deducted from their allocation for the next year. **Preferred Alternative 2,** which would be consistent with the current management of the grouper and tilefish fisheries, is not expected to result in economic effects.

Action 7.2 considers alternatives that would potentially augment the current recreational red grouper and gag accountability measures (AMs). AMs are designed to prevent annual catch limits from being exceeded, and if exceeded, correct or mitigate any overages (50 CFR 600.310(g)). The National Standard 1 guidelines identify two types of AMs: in-season and post-season, the latter of which is invoked when an annual catch limit is exceeded. These two types of AMs are not mutually exclusive and may be used simultaneously when appropriate.

Establishing AMs for the recreational sector is not expected to generate direct, adverse effects on the economic environment in the short-term. Direct, adverse economic effects on fishing participants would only occur in the future if and when the AMs are actually triggered. However, because establishing AMs may result in future management actions, changes to the current AMs would be expected to result in indirect, adverse economic effects on fishing participants. Such actions could rebuild the gag stock from its present level, which would in turn allow the stock to support higher catch levels in the future without being overfished.

Alternative 1, no action, leaves the current AMs for the gag and red grouper recreational sectors in place. The nature of these AMs is discussed in section 5.7.2. Because AMs in the recreational sector would remain unchanged and the economic effects of these AMs were already analyzed in Amendment 30B (GMFMC 2008a), **Alternative 1**, no action, is not expected to result in any indirect economic effects on fishery participants.

Alternative 2 would add an overage adjustment to the current AMs when the gag or red grouper stocks are overfished and under a rebuilding plan. Under this alternative, an overage adjustment could be applied to the gag recreational sector as soon as 2013, depending on whether the recreational sector exceeds its annual catch limit in 2012, because it is overfished and may be under a rebuilding plan if **Preferred Alternative 2**, **Alternative 3**, or **Alternative 4** is selected under **Action 1** in this Amendment. Further, the probability of the gag recreational sector exceeding its annual catch limit is dependent on which if any of those alternatives is selected. That is, the longer the rebuilding time period, the greater the annual catch limit in the early years of the rebuilding plan and thus the less likely an overage would occur and an overage adjustment would need to be applied.

In addition, recreational gag landings were trending upward through 2008, but then dropped precipitously in 2009. Even the reduced level of landings in 2009 are considerably above the recreational sector's annual catch limit for 2011 and 2012, which is the primary motivation for the harvesting restrictions implemented in the two recent interim rules and being considered under **Action 2** in this Amendment. The effectiveness of the measures potentially implemented under **Action 2** in this Amendment will determine whether the recreational sector exceeds its annual catch limit in 2012. With the exception of **Alternative 1**, the other alternatives under **Action 2** are expected to restrain landings in the gag recreational sector well below its 2012 annual catch limit, and in fact are intended and expected to constrain landings below the 2012 recreational annual catch target. Thus, the probability an overage adjustment will be required in 2013 is also minimal. Given current projections of expected recreational gag landings in 2012 under these alternatives, the same logic applies to the probability that an in-season closure of the recreational sector will be necessary in 2012. Thus, the likelihood that **Alternative 2**, **Alternative 3**, or **Preferred Alternative 4** will generate indirect economic effects on recreational fishing participants is minimal. Whether that expectation will continue in future years partly depends on how participants in the gag recreational sector adjust their behavior to the new management measures and any additional changes in those measures in the future (e.g., a change in the recreational fishing season for 2013 and beyond). However, the planned increases in the recreational sector's gag annual catch limit from approximately 1.1 MP GW in 2012 to 1.7 MP GW in 2016 would presumably reduce the likelihood of an overage adjustment or in-season closure even more.

With respect to red grouper, it is not currently overfished or under a rebuilding plan. As such, **Alternative 2** would not apply to the recreational red grouper sector at present and is not expected to apply in the near future. Thus, no indirect economic effects on the recreational red grouper sector are expected under **Alternative 2**.

Further, the recreational annual catch limit for red grouper has not been met in recent years. Recreational red grouper landings averaged less than 1 MP (GW) between 2006 and 2009. With the planned increase in the red grouper total allowable catch, the recreational annual catch limit will be increased from 1.51 MP (GW) to 1.72 MP (GW), which will create a larger difference between the annual catch limit and the expected catch in 2012, even if the bag limit is increased under **Action 2** in this Amendment. Additional increases in the red grouper recreational annual catch limit are planned through 2016. Thus, the probability the recreational sector will exceed its red grouper annual catch limit in the near future is minimal. In turn, the likelihood that **Alternative 3** or **Preferred Alternative 4** will generate indirect economic effects on the recreational red grouper sector is also minimal.

Direct and Indirect Effects on the Social Environment

Action 7.1 addresses accountability measures for the commercial sector. The **Preferred Alternative 2**

establishes accountability measures for the commercial sector to be consistent with the individual fishing quota program currently in place. Thus, no additional social impacts are expected from this action as the commercial sector already operates under the individual fishing quota program.

Action 7.2 addresses accountability measures for the recreational sector. Accountability measures do not directly affect fishing behavior, as they are not modifications of fishing effort. Thus, no direct impacts would be expected from implementing an accountability measure. Furthermore, the adoption of an accountability measure does not mean that it will be applied to the sector. If the total allowable catch of the sector remains below its threshold, the accountability measure is not applied and therefore does not affect fishing in the future. Accountability measures may indirectly affect fishing behavior, should they be employed and close a season early (**Alternative 3**) or reduce the annual catch limit in a subsequent year (**Alternative 2**). The distinction is that this action is not likely to affect recreational fishing practices; individual recreational fishermen are not likely to adjust their fishing behavior because of a particular accountability measure. However, should the collective landings of the entire sector be determined to exceed the annual catch limit, the selected accountability measure would be applied, reducing the total harvest allowed to the sector as a whole. Should this occur, indirect negative impacts would accrue to the recreational sector as a whole by reducing the amount of fish that may be harvested after application of the accountability measure.

This action proposes both in-season (early season closure) and post-season (overage adjustment) procedures for when the gag or red grouper annual catch limit is exceeded or is predicted to be exceeded. This action does not affect fishermen behavior directly and no direct effects on fishing behavior are anticipated. Rather, the action could implement an early season closure (**Alternative 3**), a reduction in the following year's annual catch limit (**Alternative 2**), or both (**Preferred Alternative 4**), should a given season's annual catch limit be exceeded. Currently, when annual catch limits are exceeded a protocol is in place whereby the Assistant Administrator for Fisheries files a notification to maintain the prior year's target catch level and reduce the length of the fishing season for the following year (**Alternative 1**). This is a post-season accountability measure, although it does not mandate an overage adjustment through a reduction in the next year's annual catch limit. Compared with the no action **Alternative 1** where the next season's target catch level is kept constant, **Alternative 2** and **Preferred Alternative 4** would decrease the next fishing season's catch limit by the overage amount in the previous season. This adjustment would incur indirect negative social impacts by prohibiting fishermen from landing the same quantity of gag or red grouper the following year. The in-season, early season closures (**Alternative 3** and **Preferred Alternative 4**) would also incur indirect social impacts by closing the fishing season earlier than planned. These alternatives could result in an additional negative impact on charterboat and headboat operators and their customers who may have to cancel trip bookings due to an early season closure. Because both the in-season and post-season measures are included in **Preferred Alternative 4**, this alternative has the potential to incur the greatest negative social impacts, should the measures be deemed necessary to invoke.

A social issue that arises from these accountability measures, including the no action **Alternative 1**, is evidenced in fishermen's lack of trust in managers' determination that the annual catch limit has been reached. The accountability measures outlined in this action are designed to have positive benefits for the long-term which are expected to mitigate any short-term negative impacts. Nevertheless, ever tightening restrictions may ultimately promote non-compliant fishing behavior, thereby undermining the long-term goals of the rebuilding plan.

5.7.4 Direct and Indirect Effects on the Administrative Environment

Action 7.1 should not have an effect on the administrative environment. Quota monitoring (**Alternative 1**) and the individual fishing quota program (**Alternative 2**) are currently being applied to the commercial shallow-water grouper sector. **Action, 7.2, Alternatives 1** (no action) and **2** would have no immediate direct or indirect affect on the administrative environment. Measures to monitor landings and determine if an annual catch limit has been exceeded are currently in place. **Alternative 2** would just set a different overage adjustment than would be applied under **Alternative 1**. **Alternative 3** and **Preferred Alternative 4** would add to the administrative burden because gag and red grouper recreational landings would need to be monitored in-season. This would put a substantial burden on NMFS 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. Currently, a *Federal Register* notice and Fishery Bulletins are published by the Assistant Administrator to inform anglers of quota closures. Filing accountability measure notifications is expected to increase the burden on the Assistant Administrator and Southeast Regional Office. However, the administrative environment may be negatively affected if harvests are not sufficiently constrained within a year causing additional post-season action to be taken to ensure annual catch limits are not exceeded in subsequent years.

5.8 Cumulative Effects Analysis (CEA)

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

This section uses an approach for assessing cumulative effects that was initially used in Amendment 26 to the Reef Fish FMP and is based upon guidance offered in CEQ (1997). The report outlines 11 items for consideration in drafting a CEA for a proposed action.

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

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

Cumulative effects on the biophysical environment, socio-economic environment, and administrative environments are analyzed below.

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

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

I. The direct and indirect effects of the proposed actions (Section 5.1-5.7);
II. Which resources, ecosystems, and human communities are affected (Sections 3 and 4); and
III. Which effects are important from a cumulative effects perspective (information revealed in this CEA)

2. Establish the geographic scope of the analysis.

The primary affects of the actions in this amendment would affect the physical, biological/ecological, socioeconomic environments of the Gulf of Mexico.

The geographic scope affected by this action is described in detail in Amendment 30B (GMFMC 2008b) and pertains directly to the Gulf of Mexico, particularly the west Florida shelf. Gag and red grouper comprise the bulk of the shallow-water grouper harvest. These species occur along the eastern seaboard from North America and South America and are common to the Gulf of Mexico. Larvae are pelagic and juveniles utilize coastal and nearshore waters. Adults differ in habitat use with red grouper generally occurring over low relief hard bottom and gag occurring over reef and shelf-break habitats.

Reef fish vessels and dealers are primarily found in Gulf states (GMFMC 2008b). Based on mailing addresses or home ports, 98% of historical charter captain reef fish, 96% of for-hire reef fish, 98% of commercial reef fish permitted vessels, and 100% of vessels with reef fish longline endorsements are found in Gulf States. For permitted reef fish dealers, 95 percent are found in Gulf States. With respect to eligible reef fish individual fishing quota shareholders, 96.5% of 1,171 have mailing addresses in Gulf States. For the 850 entities actually holding shares for reef fish species, 97.5% have mailing addresses in Gulf States.

3. Establish the timeframe for the analysis

The timeframe for this analysis is 1984 to 2014. Grouper have been managed in the Gulf of Mexico since the implementation of the Reef Fish Fishery Management Plan in **1984** and the implementation of state regulations for some groupers in 1985. Grouper stocks have been periodically assessed since 1991. Most assessments have focused on gag and red grouper, but other grouper species have been assessed and are described in Section 3.2. The 2006 SEDAR 10 gag and SEDAR 12 red grouper stock assessments were the last benchmark assessments with update assessments occurring in 2009 (SEDAR 2009a, 2009b). These included data for analysis of stock status from 1963-2008 for commercial landings, and 1981-2008 for recreational landings. The catch data for both commercial and recreational fisheries included a conversion of a portion of black grouper landings to gag to reflect mis-identification of gag as black grouper, particularly during the 1980s and in the northern Gulf. In addition, most commercial grouper

landings were not identified to species prior to 1986. Unclassified grouper landings are available from 1963-1985.

The following is a list of reasonably foreseeable future management actions. These are described in more detail in Step 4. Note that the next gag and red grouper assessments are scheduled for 2013. Should new regulations be needed for the management of these stocks, they will likely not be implemented until **2014** at the earliest, or the end of the timeframe discussed in this analysis.

- Next assessments for gag and red grouper through SEDAR are scheduled to occur in 2013. SEDAR assessments for vermilion snapper and gray triggerfish are scheduled for 2011, red snapper for 2012, and greater amberjack and gray snapper for 2013.
- At their June 2011 meeting, the Council asked for a new regulatory amendment to increase the red grouper 2011 total allowable catch because estimates of 2010 landings overestimated the actual harvest. Actions in this regulatory amendment will evaluate increasing the total allowable catch and the recreational bag limit.
- The Council requested an emergency rule at their June 2011 meeting to suspend the September 30 closure date and assign the entire 345,000 pounds of increased TAC to the recreational sector for the 2011 season.
- The Council is developing a generic amendment to address annual catch limits and corresponding AMs. The reauthorized Magnuson-Stevens Act was enacted on January 12, 2007, and requires annual catch limits to be developed in 2010 for stocks subject to overfishing and 2011 for all other stocks.
- On January 1, 2012, red snapper individual fishing quota shares will be available for transfer to all U.S. citizens. Although persons without commercial reef fish permit will not be able to catch and sell fish, they will be able to buy and sell shares and allocation. Potentially persons could buy and hold onto shares without landing fish. This could reduce fishing effort.
- Amendment 28 to the Reef Fish fishery management plan was put on hold but is still under development. This amendment would examine fair and equitable ways to allocate all FMP resources between recreational and commercial fisheries.
- Amendment 33 to the Reef Fish fishery management plan is being developed to evaluate Limited Access Privilege Programs for reef fish species not currently covered under individual fishing programs.
- Amendment 34 to the Reef Fish fishery management plan is being developed to evaluate earned income and crew size requirements in the reef fish fishery.
- Amendment 35 to the Reef fish fishery management plan is being developed to evaluate total allowable catch options relative to the greater amberjack rebuilding plan.

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

a. Past actions affecting grouper fisheries are summarized in Section 1.4. The following list identifies more recent actions (Note actions taken prior to Amendment 30B are described in detail in that amendment (GMFMC 2008b) and incorporated here by reference).

- Amendment 30B was approved by the Secretary in January 2009 and a final rule has published (effective May 18, 2009), except for the "Edges" portion for area closures, which was effective June 24, 2009. The purpose of the amendment is to end overfishing of gag, revise red grouper

management measures as a result changes in the stock condition, establish annual catch limits and AMs for gag and red grouper, manage shallow-water grouper to achieve optimum yield, and improve the effectiveness of federal management measures. In addition, Amendment 30B established management targets and thresholds for gag consistent with the requirements of the SFA, set the gag and red grouper TAC, and established interim allocations for the commercial and recreational gag and red grouper fisheries.

- Because regulations ending overfishing for gag were not expected to be implemented by January 1, 2009, the Council requested NMFS develop an interim rule to put in place such regulations for the 2009 fishing year. This interim rule published December 2, 2008, and was effective January 1, 2009.
- An emergency rule was requested by the Council restricting the bottom longline component of the reef fish fishery in the eastern Gulf to fishing outside of 50 fathoms until the deepwater grouper and tilefish quotas are filled. The quotas were filled in June 2009, at which point, the reef fish bottom longline component of the fishery was closed. The rule was effective May 18, 2009.
- Amendment 29 to the Reef Fish FMP was approved by the Secretary July 2009. This amendment establishes a grouper and tilefish individual fishing quota program for the commercial reef fish sector.
- The Generic Aquaculture Amendment was approved in September 2009. This amendment provides a programmatic approach to evaluating the impacts of aquaculture proposals in the Gulf and a comprehensive framework for regulating such activities.
- An interim rule to implement gag regulations by January 1, 2011, was requested by the Council to reduce gag overfishing. These measures included reducing the gag commercial quota to 100,000 pounds and closing the recreational sector.
- A regulatory amendment, effective January 1, 2011, reduced the red grouper commercial quota from 5.75 million pounds to 4.32 million pounds and revised the definition of buoy gear. Recreational regulations were not addressed in the amendment as recent harvest levels have been sufficiently below catch targets.
- Another interim rule to implement gag regulations by June 1, 2011, was requested by the Council to reduce gag overfishing. Measures were based on a revised assessment update and allowed for a gag commercial quota of 430,000 pounds and a September 16-November 15 recreational fishing season.

b. The following are recent reef fish actions not summarized in Section 1.4 but are important to the reef fish fishery in general (Note actions taken prior to Amendment 30B are described in detail in that amendment (GMFMC 2008b) and incorporated here by reference).

Regulatory amendments increasing the red snapper total allowable catch were approved for 2010 and 2011. Total allowable catches were 6.945 and 7.295 million pounds, respectively.

A 2011 regulatory amendment was approved that closed the recreational sector to harvesting greater amberjack in June and July. This measure was implemented on May 28, 2011, with the purpose of closing the sector in the summer to avoid closures in the fall and winter.

At their November 2007 meeting, the Council recognized the difficulties involved in decisions allocating reef fish total allowable catches between recreational and commercial fisheries. They established an

Allocation Ad Hoc Committee to examine fair and equitable ways to allocate all fishery management plan resources between recreational and commercial fisheries. Once they are completed, the principles for setting allocations should be more transparent and understandable to the various sectors in the fishery. Reef Fish Amendment 28 will likely be the amendment addressing allocation.

The Magnuson-Stevens Reauthorization Act was enacted on January 12, 2007. It added provisions strengthening the requirements to end and prevent overfishing and rebuild U.S. stocks. It requires annual catch limits and corresponding accountability measures to ensure that overfishing does not occur. It also requires conservation and management measures be prepared and implemented within two years of notification that a stock is "overfished" or "subject to overfishing" in order to end overfishing immediately and begin rebuilding stocks. An annual catch limit means a specified amount of a fish stock (e.g., measure of weight or numbers of fish) for a fishing year that is a maximum amount of annual total catch that can be taken, taking into account projected estimates for landings and discard mortality from all user groups and sectors (total annual catch limits can be divided into sector annual catch limits, provided that the sum of all sector limits cannot exceed the total annual catch limit). The Magnuson-Stevens Act states that annual catch limits cannot exceed the recommendations of Council Scientific and Statistical Committees. Measures are required by the Magnuson-Stevens Act to ensure accountability measures, to specify mechanisms for establishing annual catch limits, and to set annual catch limits. These measures need to be developed in 2010 for stocks subject to overfishing and 2011 for all other stocks. Either a plan amendment or a generic amendment would be necessary to establish annual catch limits and accountability measures for stocks in the fishery management plans included in this generic amendment that do not already have annual catch limits. Reef Fish Amendments 30A and 30B addressed catch limits and accountability measures for stocks undergoing overfishing, and a 2010 red snapper regulatory amendment established that the red snapper total allowable catch is functionally equivalent to an annual catch limit. The Gulf Council has taken final action on this generic amendment at their August 2011 meeting to set annual catch limits and accountability measures for many reef fish species currently without these measures.

The Marine Recreational Information Program (MRIP) is modifying the catch estimation method for recreational harvest from 2004-2010 to address improvements identified for estimation algorithms. The modifications will address concerns raised in the National Resource Council (2006) review that estimation methods may not be consistent with the sampling probabilities of individually sampled access sites and could result in biased estimates. Revised estimation procedures have been developed and will be applied to existing data going back to 2004. Correction of estimates prior to 2004 will also be considered in the future.

Due to planned changes in the estimation procedure, MRIP estimates of recreational catch for 2004-2010 are likely to change. Estimates for 2011 and beyond will be based on the new method. Changes in recreational catch estimates for 2004-2009 raise several concerns for developing Council amendments, the generic annual catch limit amendment in particular, since the new MRIP values could result in changes to the values of allowable biological catch, overfishing limit, and sector-based allocations and annual catch limits included in this document. If proposed annual catch limits, allowable biological catch, and overfishing limit values are not updated with the new MRIP estimates, there could be a disjunction between the information used to set targets and limits and the information used to evaluate current conditions to determine if annual catch limits are met and accountability measures are triggered.

While the Council is fully aware of these issues, the Reauthorized Magnuson-Stevens mandate of establishing annual catch limits and accountability measures by 2011 have not been revised to account for

the impending change to recreational data. Hence the Council and NMFS must still meet the 2011 deadline to establish the required limits and targets. The Council will take action as needed via plan amendment or framework amendment to revise the appropriate values as needed in 2012 and beyond.

c. The following are non-FMP actions which can influence the reef fish fishery.

Amendment 30B (GMFMC 2008b) describes in detail non-FMP actions relating liquefied natural gas terminals, hurricanes, fuel prices, imports, and global climate change. These are as follows:

- Some liquefied natural gas terminals use sea water to heat the gas back to its gaseous phase. For open systems, high volumes of sea water are required and are likely to result in large mortalities of marine organism eggs and larvae.
- For hurricanes, direct losses to the fishing industry and businesses supporting fishing activities occur ranging from loss of vessels to destruction of fishery infrastructure (Walker et al. 2006). However, while these effects may be temporary, those fishing related businesses whose profitability is marginal may be put out of business should a hurricane strike.
- Rising fuel costs have negative impacts on communities by increasing business costs and lowering profits.
- Most seafood consumed in the United States is imported and the amount of imports have been steadily increasing. The effects of imports on domestic fisheries can cause fishermen to lose markets through commercial sector closures as dealers and processors use imports to meet demand, and limit the price fishermen can receive for their products through competitive pricing of imports.
- Global climate change can impact 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 CO_2 emissions may impact a wide range of organisms and ecosystems, particularly organism that absorb calcium from surface waters, such as corals and crustaceans (IPCC 2007, and references therein). 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 will occur.

In 2005, a red tide event on the west-Florida shelf may have impacted gag and red grouper populations. It has only been in the last 10 years that mortalities of higher vertebrates have been indisputably demonstrated to be due to acute red tide blooms and their brevetoxins (Landsberg et al. 2009). The extent of this event and possible effects of fish community structure has been described in Gannon et al. (2009).

On April 20, 2010, an explosion occurred on the Deepwater Horizon MC252 oil rig, resulting in the release of an estimated 4.9 million barrels of oil into the Gulf. In addition, 1.84 million gallons of Corexit 9500A dispersant were applied as part of the effort to constrain the spill. At its maximum extent, oil from the Deepwater Horizon MC252 incident has affected more than one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The cumulative effects from the oil spill and response may not be known for several years.

The impacts of the oil spill on the physical environment are expected to be significant and may be long-term. However, the oil remained outside most of the west Florida Shelf area where shallow-water grouper

species are most abundant and where the primary fishery is prosecuted. Oil is dispersed on the surface, and because of the heavy use of dispersants, oil is also documented as being suspended within the water column, some even deeper than the location of the broken well head. Floating and suspended oil washed onto shore in several areas of the Gulf as well as non-floating tar balls. Whereas suspended and floating oil degrades over time, tar balls are more persistent in the environment and can be transported hundreds of miles. Oil on the surface of the water could restrict the normal process of atmospheric oxygen mixing into and replenishing oxygen concentrations in the water column. In addition, microbes in the water that break down oil and dispersant also consume oxygen; this could lead to further oxygen depletion. Zooplankton that feed on algae could also be negatively impacted, thus allowing more of the hypoxia-fueling algae to grow.

Oil present in surface waters could affect the survival of eggs and larvae, affecting future recruitment. Effects on the physical environment, such as low oxygen, could lead to impacts on the ability of larvae and post-larvae to survive, even if they never encounter oil. In addition, effects of oil exposure may create sub-lethal effects on the eggs, larva, and early life stages. The stressors could potentially be additive, and each stressor may increase the susceptibility to the harmful effects of the other. If eggs and larvae are affected, impacts on harvestable-size shallow-water groupers will begin to be seen when the 2010 year class becomes large enough to enter the fishery. For most species, recruitment to the fishery does not occur until ages 4-5; therefore, a year-class failure in 2010 would not be felt by the fishery until 2014-15. The impacts would be felt as reduced fishing success and reduced spawning potential, and would need to be taken into consideration in the next stock assessment. However, as mentioned above, the oil remained outside most of the area where these species are most abundant, and such effects would be expected only for that portion of the population existing in the north-central Gulf of Mexico.

Indirect and inter-related effects on the biological and ecological environment of the shallow-water grouper in concert with the Deepwater Horizon MC252 oil spill are not well understood. Changes in the population size structure could result from shifting fishing effort to specific geographic segments of shallow-water grouper populations, combined with any anthropogenically-induced natural mortality that may occur from the impacts of the oil spill. The impacts on the food web from phytoplankton, to zooplankton, to mollusks, to top predators may be significant in the future. Impacts to shallow-water groupers from the oil spill may similarly impact other species that may be preyed upon by shallow-water groupers, or that might benefit from a reduced stock.

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

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

Reef Fish Fishery

Data used to monitor commercial reef fish effort includes the number of vessels with landings, the number of trips taken, and trip duration. Note that data is not available yet to effectively determine the effects from the individual fishing quota program. Declines in effort may be a signal of stress within the fishery. These trends are described in Sections 3.3, 6.0, 7.0, and briefly summarized here. Although landings in the sector have shown patterns of increases and decreases, the number of boats actively participating in the commercial reef fish sector (except for gag) show a pattern of decline over time. For shallow-water grouper and red grouper, the average number of boats with landings fell from 1,066 and 803, respectively for the time period 1993-98, to 712 and 609, respectively, for the time period 2005-08 (NMFS 2010). This same trend is reflected by the sector as a whole. The number of permitted vessels, which has remained relatively constant, is greater than the number of vessels having landings. This suggests there are permits not actively employed, but could be used in the event noticeable improvements in the sector arise. This reduction in the numbers of vessels participating in the sector also reflects a decline in the number trips taken and days away from port by the sector as a whole. This decline is not reflected for gag where the average number of vessels in the sector was 533 for 1993-98 and 536 for 2005-08.

There are several potential reasons for the decline in effort for reef fish and shallow-water grouper. These may include an increase in fishing costs, increases in harvesting efficiency, more restrictive regulations (particularly for grouper), and even improvements in the stock status of certain species (effort shifting). However, data currently is inadequate to determine which factors contribute the most to declines in fishing effort for reef fish and grouper, and what might be the causes for the apparent increase in fishing effort for gag.

Social and economic characteristics of recreational anglers are collected periodically as an add-on survey to the MRFSS. Data used to monitor recreational reef fish effort in the sector primarily comes from MRFSS and includes the number of trips and number of catch trips. Declines in effort may be a signal of stress within the sector. These trends are described in GMFMC (2010 and NMFS (2010a). The level and pattern of change in recreational effort has remained about flat from 1993 through 1996, fluctuated between 1997 and 1999, and then increased relatively fast because 2000. Private and charter fishing modes accounted for most of target trips, with the charter mode the most common mode for red grouper and private the most common for gag. For both species, Florida accounts for most landings; however, landings in Alabama have been increasing in recent years.

Summary characteristics of the for-hire fleet were analyzed as part of the analyses for the development of the current limited access system (GMFMC 2005c). These analyses indicated for-hire operations were generally profitable. Costs associated with these businesses include bookkeeping services, advertising and promotion, fuel and oil, bait expenses, docking fees, food/drink for customers and crew, ice expenses, insurance expenses, maintenance expenses, permits and licenses, and wage/salary expense. Most vessels

carry per trip about half of the maximum passenger capacity. Therefore, substantial excess capacity exists in the sector. As with the commercial sector, increases in fishing costs, increases in harvesting efficiency, more restrictive regulations (particularly for grouper), and changes in the stock status of certain species may affect effort in this sector.

Gag and Red Grouper

Major stresses to grouper stocks have primarily come from overfishing which has either occurred for red and goliath grouper, or is currently occurring for gag. In addition, in 2005, both stocks appeared to have suffered an episodic mortality event which has been speculated to have been caused by red tide. Trends in landings and the status of grouper stocks are based on NMFS and SEDAR stock assessments (summarized in Section 3.2) and incorporated here by reference.

Ecosystem

With respect to stresses to the ecosystem from actions in this amendment, changes in the gag and red grouper harvest are not likely to create additional stress. Vertical gear and longlines, the primary gear used by the fishery, can damage habitat through snagging or entanglement, however, as described in Section 5.1.1, these impacts are minimal. Changes in the population size structure as a result of shifting grouper fishing selectivities and increases in stock abundance could lead to changes in the abundance of other reef fish species that compete with grouper for shelter and food. Predators of grouper species could increase if grouper abundance is increased, while species competing for similar resources as groupers could potentially decrease in abundance if food and/or shelter are less available. Efforts to model these interactions are still in their development stages, and so predicting possible stresses on the ecosystem in a meaningful way is not possible at this time. As described in Part 4c of this cumulative effects analysis, the Deepwater Horizon MC252 incident has affected more than one-third of the Gulf area from western Louisiana east to the panhandle of Florida and south to the Campeche Bank in Mexico. The impacts of the oil spill on the physical and biological environments are expected to be significant and may be long-term. However, the oil appears to have remained outside most of the west Florida Shelf where gag and red grouper are particularly abundant and contains most of the essential fish habitat (EFH) for these species (GMFMC 2004b).

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

This section examines whether resources, ecosystems, and human communities are approaching conditions where additional stresses could have an important cumulative effect beyond any current plan, regulatory, or sustainability threshold (CEQ 1997). Sustainability thresholds can be identified for some resources, which are levels of impact beyond which the resources cannot be sustained in a stable state. Other thresholds are established through numerical standards, qualitative standards, or management goals. The CEA should address whether thresholds could be exceeded because of the contribution of the proposed action to other cumulative activities affecting resources.

Reef Fish Fishery

As indicated above, both commercial and for-hire fisheries are subject to stress as a result of increases in fishing costs, increases in harvesting efficiency, more restrictive regulations (particularly for grouper), and changes in the stock status of certain species (effort shifting). Reductions in dollars generated by these entities would likely be felt in the fishery infrastructure. For the reef fish fishery, an indicator of stress would be a decline in the number of permitted vessels. For the commercial sector, the number of vessels landing either shallow-water grouper or red grouper has been decreasing (see discussion above

and Section 3.3). However, the number of permitted vessels has remained the same at about 1,000 vessels over the past few years indicating not all permitted vessels are participating in the sector. Whether owners are holding their permits as speculation for selling their permit, or waiting until reef fish prices improve to a point where returning to the sector becomes more profitable is unknown.

For the for-hire sector, analyses conducted on the effects of a limited access program for for-hire vessels indicated operations were generally profitable (GMFMC 2005c). However, testimony from for-hire operators in light of recent red snapper regulations have suggested some for-hire operators may go out of business, particularly in the northeastern Gulf (GMFMC 2007c). Best available survey and modeling results indicate that relatively few trip cancellations were expected to occur as a result of this action. As an example from red snapper fishing, survey respondents indicated that when faced with a reduced or zero red snapper bag limit, they would either continue fishing for red snapper or fish for another species. Fishing for other species may generate distributional effects (i.e., the trips may occur from different ports, modes, or seasons, resulting in one port/entity/season losing business while another gains). These distributional effects, however, cannot be predicted with current data. Further, for at least red snapper trips, preliminary data through August 2007 do not support claims of widespread reductions in charter business as a result of more restrictive red snapper measures. Thus, based on inference from the red snapper for-hire sector, while it is possible some for-hire fishermen may go out of business as a result of actions in Amendment 30B or other reef fish amendments, the sector as a whole is not undergoing widespread harm.

<u>Grouper</u>

No thresholds or benchmarks have been set specifically for most grouper. Amendment 1 to the Reef Fish FMP, implemented in 1990 before the Sustainable Fisheries Act (SFA) was passed, established the minimum spawning stock biomass at 20 percent SPR for all reef fish species. The Generic SFA Amendment proposed SFA definitions for optimum yield, minimum stock size threshold and maximum fishing mortality threshold for three reef fish species and generic definitions for all other reef fish. The definition of maximum fishing mortality threshold for other reef fish which includes grouper species, $F_{30\%SPR}$, was approved and implemented. Definitions for optimum yield and minimum stock size threshold were disapproved because they were not biomass-based.

A benchmark assessment was conducted for gag in 2006 under the SEDAR stock assessment process and was updated in 2009. SEDAR 10 methods, also used in the update assessment, and results are summarized in Sections 1.4 and 3.2. Based on the parameter estimates through 2008, the gag stock was found to be overfished and undergoing overfishing. A brief description of the stock and its status can be found in Section 3.2 and step 5 of this CEA. Measures proposed in this amendment are designed to immediately relieve stress on the gag stock over the next 10 years. Landings will initially be reduced depending on how dead discards are treated.

For red grouper, Sustainable Fisheries Act compliant thresholds and targets were defined in Secretarial Amendment 1. Maximum fishing mortality threshold is defined as the fishing mortality rate at maximum sustainable yield. Minimum stock size threshold is defined as $(1\text{-}M)*B_{MSY}$ with natural mortality (M) equal to 0.14. Maximum sustainable yield is the yield associated with F_{MSY} when the stock is at equilibrium and optimum yield is the yield associated with fishing at 75 percent of F_{MSY} when the stock is at equilibrium.

The most recent benchmark assessment for red grouper was completed in 2007 using an age-structured production model (SEDAR 12 2007). The 2009 update assessment used the same techniques. The results

of the assessments are summarized in Section 1.4 and 3.2. Based on landings data from 1986 to 2008, this assessment indicated the stock had recovered from an overfished state in 1999 and so is no longer considered overfished. The assessment also indicted the stock was no longer undergoing overfishing. However, due to an episodic mortality event in 2005, the population was depressed. Therefore, harvest constraints currently placed on the stock need not be changed to allow the stock to recover, however, as indicated in Item 3 of this CEA, the rerun of the assessment using landings data through 2010 allows a higher harvest.

Other grouper stocks that have been assessed include yellowedge grouper, goliath grouper, and black grouper (see Section 3.2). A review of the Nassau grouper's stock status was conducted by Eklund (1994).

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

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

The first stock assessment of gag was conducted in 1994 and then again in 1997, 2001, 2006, and 2009. An overview of the assessments is provided in Sections 1.4 and 3.2. The most recent assessment occurred in 2009 (finalized in 2011) through the SEDAR process and included data through 2008. The assessment shows trends in biomass, fishing mortality, fish weight, and fish length dating to the earliest periods of data collection. For this assessment, reliable commercial landings data were estimated back to 1963; however, grouper were not identified by species until 1986. Recreational data were available since 1981. Within this timeframe, gag have not been considered overfished until the 2009 update assessment, but some previous assessments indicated gag may have been undergoing overfishing.

The first stock assessment of red grouper was conducted in 1991 and then again in 1993, 1999, 2002, and 2007, with the 2007 assessment being updated in 2009. An overview of the assessments is provided in Sections 1.4 and 3.2. The most recent assessment was the update in 2009 through the SEDAR process. The assessment shows trends in biomass, fishing mortality, fish weight, and fish length dating to the earliest periods of data collection. For this assessment, reliable commercial and recreational landings data were estimated back to 1981. Within this timeframe, the 1999 red grouper assessment, 2000 re-evaluation of the 1999 assessment, and the 2002 assessment have indicated this stock has been undergoing overfishing and was overfished, but the 2007 assessment and subsequent 2009 update assessment indicates the stock has recovered to B_{MSY}.

Information is lacking on the social environment of these fisheries, although some economic data are available. Fishery-wide ex-vessel revenues are available dating to the early 1960s, and individual vessel ex-vessel revenues are available from 1993 when the logbook program was implemented for all commercial vessels.

8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities. Cause-and–effect relationships are presented in Tables 5.8.1 and 5.8.2.

Table 5.8.1. The cause and effect relationship of fishing and regulatory actions for gag within the time period of the CEA.

Time periods	Cause	Observed and/or expected effects
1986 -1989	Growth and recruitment overfishing	Declines in mean size and weight
1990	Minimum size limit of 20-inch; 5 aggregate grouper bag limit; 9.2 MP shallow-water grouper quota	Slight increase in commercial landings; decline in recreational landings
1999	22-inch recreational minimum size limit; 24-inch commercial minimum size limit; and 1 month commercial seasonal closure	Slight increase in both commercial and recreational landings
2005	Commercial trip limit and decrease in recreational aggregate bag limit	Slight decrease in commercial landings as quota filled and shallow-water grouper sector closed; significant declines in recreational landings; overfishing occurring
2009	Gag overfishing and stock declared overfished	End overfishing; reduce harvest; provide harvest limits to achieve sustainability; IFQ to further control commercial sector to prevent overages
2011	Overfishing continues; reduce quota and establish recreational fishing season	Reduce overfishing, prelude to a rebuilding plan

Table 5.8.2. The cause and effect relationship of fishing and regulatory actions for red grouper within the time period of the CEA

Time periods	Cause	Observed and/or expected effects
1986 -1989	Growth and recruitment overfishing	Declines in mean size and weight
1990	Minimum size limit of 20-inch; 5 aggregate grouper bag limit; 9.2 MP shallow-water grouper quota	Slight increase in both commercial and recreational landings
1999	1 month commercial seasonal closure	Increase in commercial and recreational landings
2005	Commercial trip limit; 1-fish red grouper bag limit; recreational seasonal closure	Decrease in commercial landings as quota filled and shallow-water grouper sector closed; significant declines in recreational landings; overfishing ended
2009	Red grouper stock recovery; set quota and bag limit; establish ACLs and AMs; establish TAC and interim allocation	Overfishing ended and stock rebuilt; reduce harvest; provide harvest limits to achieve sustainability
2010	Red grouper individual fishing program; reduce harvest	Further control commercial sector to prevent overages; prevent overfishing

9. Determine the magnitude and significance of cumulative effects.

The primary objectives of this amendment and associated EIS are to end overfishing of gag so that the stock can begin to rebuild and to develop red grouper management measures that will allow the optimum yield of red grouper to continue to be caught as the stock recovers from a 2005 episodic mortality event. Actions 1, 2.2, and 3-7 address the first objective and actions 2.2, 4, 6, and 7 address the second objective. The short- and long-term direct and indirect effects of each these actions are provided in Sections 5.1 through 5.7.

In Amendment 30B (GMFMC 2008b), important valued environmental components (VECs) were identified to examine the magnitude and significance of the cumulative effects. These have not changed for this analysis and so are incorporated by reference. An initial 25 VECs were identified, and the consequences of each alternative proposed in this amendment on each VEC were evaluated. Some of these VECs were combined into a revised VEC because many of the past, current, and reasonably foreseeable future actions (RFFA) were similar. Based on this analysis, seven VECs were determined to be the most important for further consideration. These are shown in Table 5.8.3.

Table 5.8.3. VECs considered, consolidated, or not included for further evaluation.

VECs considered for further evaluation	VECs consolidated for further evaluation	VECs not included for further evaluation
Habitat - hard bottom - EFH		
Managed resources - gag - red grouper - other reef fish species	Gag Red grouper Other shallow water grouper Deepwater grouper Other reef fish Prey species Competitors Predators	Sharks Protected species
Vessel owner, captain and crew - Commercial - For-hire	Crew Fishing Communities	
Dealers		Consumers
Anglers		
Infrastructure	Fishing Communities	
Administration	Federal Rulemaking Federal Permitting Federal Education State Rulemaking/Framework State Education	

Habitat

The past and present effects of different actions on habitat is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. Past management measures have provided protections to reef fish habitat compared to no regulations at all by constraining gear types to those that have lower adverse effects on habitat (e.g., vertical and longline) and outlawing gear types that damage habitat (e.g., roller trawls and fish traps). Current management measures of the reef fish fishery have likely been beneficial to hard bottom areas because they limit effort, thus restricting the amount of gear that interacts with the bottom. Reef fish essential fish habitat, particularly coral reefs and submerged aquatic vegetation, are particularly susceptible to non-fishing activities (GMFMC 2004b) such as dredge-and-fill activities, and oil and gas activities, and changes in freshwater inflows. As described in Part 4c of this cumulative effects analysis, the potential harm to reef fish habitat was highlighted by the Deepwater Horizon MC252 incident. EFH and HAPC designations described in Section 3.2 are intended to promote careful review of proposed activities that may affect these important habitats to assure that the minimum practicable adverse impacts occur on EFH. However, NMFS has no direct control over final decisions on such projects. The cumulative effects of these alternatives depend on decisions made by agencies other than NMFS, as NMFS and the Gulf Council have only a consultative role in non-fishing activities.

Managed Resources

The past and present effects of different actions on managed resources is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. In the past, the lack of management of reef fish has allowed many stocks to undergo both growth and recruitment overfishing. This has allowed some stocks to decline as indicated in numerous stock assessments (Section 3.2). Present management measures work to limit the harvest to sustainable levels; however, these measures may have redirected fishing effort towards other reef fish species. Reasonably foreseeable future actions are expected to benefit managed species as described in steps 3 and 4 of this cumulative effects analysis. These measures are intended to prevent overfishing and allow for sustainable fisheries. Non-fishing activities are likely to adversely affect reef fish stocks. These include loss of larvae by LNG facilities and damage to habitat through the Deepwater Horizon MC252 oil spill. To mitigate the effects of the LNG facilities, closed- rather than open-loop systems are being called for. Efforts to remove oil from areas affected by the Deepwater Horizon MC252 oil spill is ongoing.

Vessel Owner, Captain, and Crew (Commercial and For Hire)

The past and present effects of different actions on the commercial and for hire vessel owners, captains, and crew is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. Adverse or beneficial effects of actions to vessel owners, captains, and crew are tied to the ability for a vessel to make money. The greater the difference between expenses and payment for caught fish or services, the more revenue is generated by the fishing vessel. Relative to this amendment, both sectors have benefited from past actions in the reef fish fishery. By being able to harvest these species unhindered by regulations prior to 1990, many vessels have been able to enter the fishery. However, lack of management led to the depletion of many stocks. Current management measures have had negative, short-term economic impacts and have resulted in limiting fishing effort. Many reasonably foreseeable future actions are likely to continue these short-term negative impacts on the sectors. However, as stocks continue to improve, economic benefits are being realized by the sectors through increased harvest levels for some species. Non-management related reasonably foreseeable

future actions which could affect the sectors include hurricanes and increases in fishing costs (e.g., fuel). Hurricanes are unpredictable and localized in their effects. Increases in fishing costs, unless accompanied by a similar increase in price per pound of fish (commercial) or price per trip (for hire), are likely to decrease the profitability of fishing operations.

Dealers

The past and present effects of different actions on dealers is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. Reef fish vessels and dealers are primarily found in Gulf States. Relative to past actions, dealers have benefitted from actions that have allowed the commercial sector to expand. However, the affect of measures constraining commercial landings both in past, present, and reasonably foreseeable future actions may not have negative effects on dealers due to the availability of reef fish imports. Thus, they have the ability to substitute domestic product with imports and substitute other domestic seafood products for grouper in order to satisfy public demand for seafood. Because of this, the negative effects from management actions for the commercial sector may not necessarily translate into negative effects for dealers. As domestic fish stocks are rebuilt and management programs such as individual fishing quotas are instituted, a more stable supply of domestic reef fish will be available to dealers. This should improve their ability to market these products and improve profits they receive from handling these fish.

Anglers

The past and present effects of different actions on anglers is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. The effects of various past, present, and reasonably foreseeable future actions on anglers are measured through levels of participation in the sector. It is difficult to assess what affects past and present management measures have had on anglers because the amount of effort by the private sector has continually increased where data were available. Therefore, it is difficult to link changes in participation to specific management actions. Likely the effects of how various management measures have affected participation by anglers is similar to the effects on the for-hire industry discussed above. This includes outside factors such as hurricanes and increasing fuel and other costs.

Infrastructure

The past and present effects of different actions on infrastructure is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. The infrastructure that supports fisheries is tied to the commercial and recreational sectors and can be affected by adverse and beneficial economic conditions in those fisheries. Therefore, the effects of past, present, and reasonably foreseeable future actions to the infrastructure should reflect responses by the sectors to these actions as described above.

Administrative Environment

The past and present effects of different actions on the administration of fisheries is described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. Administration of fisheries is conducted through federal (including the Council) and state agencies which develop and enforce regulations, collect data on various fishing entities, and assess the health of various stocks. As more regulations are required to constrain stock exploitation to sustainable

levels, greater administration of the resource is needed. The NMFS 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 quota levels. Further, stock status needs to be periodically assessed to ensure stocks are being maintained at proper levels. Some present actions have assisted the administration of fisheries in the Gulf such individual fishing quota programs and the use of vessel monitoring systems to track vessels. Reasonably foreseeable future actions are designed to improve stock status. This will require increases in the administrative burden to ensure harvest is constrained at a level maintaining stock sustainability.

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

The cumulative effects of the rebuilding plan for gag and constraining red grouper harvests from expanding on the biophysical and socioeconomic environments are positive because they will ultimately restore/maintain the stocks at a level that will allow the maximum benefits in yield and recreational fishing opportunities to be achieved. However, short-term negative impacts on the fisheries' socioeconomic environment may occur due to the need to limit directed harvest and reduce bycatch mortality. These negative impacts can be minimized for the recreational sector by using combinations of bag limits, size limits and closed seasons and for the commercial sector through individual fishing quota programs, size limits, and season-area closures.

11. Monitor the cumulative effects of the selected alternative and modify management as necessary.

The effects of the proposed actions 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, NMFS' Headboat Survey, and the Texas Marine Recreational Fishing Survey. MRFSS is currently being replaced by Marine Recreational Information Program (MRIP), a program designed to improve the monitoring of recreational fishing. Commercial data is collected through trip ticket programs, port samplers, and logbook programs. Currently, SEDAR assessments of Gulf of Mexico gag and red grouper are scheduled for 2013[22].

5.9 Unavoidable Adverse Effects

Unavoidable adverse effects are described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. Catch quotas, minimum size limits, bag limits, and seasonal closures, are generally effective in limiting total fishing mortality, the type of fish targeted, the number of targeted fishing trips, and/or the time spent pursuing a species. However, these management tools have the unavoidable adverse effect of creating regulatory discards. Discard mortality must be accounted for in a stock assessment as part of the allowable biological catch, and thus restricts total allowable catches. Alternatives considered in this amendment that either directly or indirectly could reduce shallow-water grouper bycatch, include higher red grouper bag limits (Action 2.2), including an adjustment for discarded fish in setting the gag quota (Action 3), gag minimum size limits (Action 5), and time and area closures (Action 6). Other alternatives considered in this amendment that may increase grouper bycatch include a gag grouper slot limit (Action 2.1) and longer recreational closed seasons (Action 2.1 and 7.2).

[22] SEDAR Web page http://www.sefsc.noaa.gov/sedar/

Many of the current participants in the reef fish fishery may never recuperate losses incurred from the more restrictive management actions imposed in the short-term to end overfishing of gag. Because gag is but one of the reef fish species managed in the Reef Fish FMP, short-term losses are not expected to be significant, and other species may be substituted to make up for losses to the fishery. With the anticipated recovery of the stock, future participants in the reef fish fishery will benefit. Overall, short-term impacts of actions such as reductions in total allowable harvest for the directed fishery would be offset with much higher allowable catch levels as the stock recovers and is rebuilt.

Actions considered in this amendment should not have adverse effects on public health or safety because these measures should not alter actual fishing practices, just how, when, and where activities can occur. Unique characteristics of the geographic area are highlighted in Section 3. Adverse effects of fishing activities on the physical environment are described in detail in Sections 5.1-5.7. These sections conclude little impact on the physical environment should occur from actions proposed in this document. Uncertainty and risk associated with the measures are described in detail in the same sections as well as assumptions underlying the analyses.

5.10 Relationship between Short-term Uses and Long-term Productivity

The primary objectives of this amendment and associated EIS are to end overfishing of gag so that the stock can begin to rebuild and to develop red grouper management measures that will allow the optimum yield of red grouper to continue to be caught as the stock recovers from a 2005 episodic mortality event. The objective related to gag management would require reducing fishing and bycatch mortality from both directed and incidental harvest sectors. The relationship between short-term economic uses and long-term economic productivity are discussed in the preceding section. However, because gag is but one species in the reef fish complex, these effects may be mitigated through effort shifting to other species and may not be significant.

No alternatives are being considered that would avoid these short-term negative effects because they are a necessary cost associated with rebuilding and protecting these stocks in the reef fish fishery. The range of alternatives has varying degrees of economic costs and administrative burdens. Some alternatives have relatively small short-term economic costs and administrative burdens, but would also provide smaller and more delayed long-term benefits. Other alternatives have greater short-term costs, but provide larger and more immediate long-term benefits.

5.11 Mitigation, Monitoring, and Enforcement Measures

Mitigation, monitoring and enforcement measures are described in detail in the cumulative effects analysis of Amendment 30B (GMFMC 2008b) and is incorporated here by reference. The process of ending overfishing on gag stocks, co-managing red grouper and gag, and expanding prior or creating new marine reserves are expected to have a negative short-term effect on the social and economic environment, and will create a burden on the administrative environment. Given the negative effects describe in Section 5.10, it is difficult to mitigate these measures and managers must balance the costs and benefits when choosing management alternatives for the reef fish fishery.

To ensure overfishing of gag ends and the red grouper harvest does not exceed optimum yield, periodic reviews of stock status are needed. These reviews are designed to incorporate new information and to address unanticipated developments in the respective fisheries and would be used to make appropriate

adjustments in the reef fish regulations should harvest not achieve optimum yield objectives. The details for how assessments are developed, reviewed, and applied are described in Amendment 30B, as are the rule-making options the Council and NMFS have for taking corrective actions (GMFMC 2008b).

Current reef fish regulations are labor intensive for law enforcement officials. NMFS law enforcement officials work cooperatively with other federal and state agencies to keep illegal activity to a minimum. Violators are penalized, and for reef fish commercial and reef fish for-hire operators, permits required to operate in their respective fisheries can be sanctioned.

Reef fish management measures include a number of area-specific regulations where reef fish fishing is restricted or prohibited in order to protect habitat or spawning aggregations of fish, or to reduce fishing pressure in areas that are heavily fished. Additionally, this amendment includes alternative to expand existing or create new marine reserves. To improve enforceability of these areas, the Council has established a vessel monitoring system program for the commercial reef fish sector to improve enforcement. Vessel monitoring systems allows NMFS enforcement personnel to monitor compliance with these area-specific regulations, and track and prosecute violations.

5.12 Irreversible and irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of agency resources proposed herein. The actions to change quotas/allocations, size limits, bag limits, and fishing seasons are readily changeable by the Council in the future. There may be some loss of immediate income (irretrievable in the context of an individual not being able to benefit from compounded value over time) to some sectors from the restricted fishing seasons.

5.13 Any Other Disclosures

CEQ guidance on environmental consequences (40 CFR §1502.16) indicates the following elements should be considered for the scientific and analytic basis for comparisons of alternatives. These are:

a) Direct effects and their significance.
b) Indirect effects and their significance.
c) Possible conflicts between the proposed action and the objectives of federal, regional, state, and local (and in the case of a reservation, Indian tribe) land use plans, policies and controls for the area concerned.
d) The environmental effects of alternatives including the proposed action.
e) Energy requirements and conservation potential of various alternatives and mitigation measures.
f) Natural or depletable resource requirements and conservation potential of various alternatives and mitigation measures.
g) Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures.
h) Means to mitigate adverse environmental impacts.

Items a, b, d, e, f, and h are addressed in Sections 2, 3, 4, and 5.1-5.7. Items a, b, and d are directly discussed in Sections 2 and 5. Item e is discussed in economic analyses. Alternatives that encourage fewer fishing trips would result in energy conservation. Item f is discussed throughout the document as fish stocks are a natural and depletable resource. A goal of this amendment is to make these stocks

sustainable resources for the nation. Mitigations measures are discussed in Section 5.11. Item h is discussed in sections 3 and 5, with particular mention in Section 5.12.

The other elements are not applicable to the actions taken in this document. Because this amendment concerns the management of two marine fish stocks, it is not in conflict with the objectives of federal, regional, state, or local land use plans, policies, and controls (Item c). Urban quality, historic and cultural resources, and the design of the built environment, including the reuse and conservation potential of various alternatives and mitigation measures (Item g) is not a factor in this amendment. The actions taken in this amendment will affect a marine stock and its fishery, and should not affect land-based, urban environments.

With regards to the Endangered Species Act, the most recent biological opinion for the Reef Fish Fishery Management Plan, completed on October 13, 2009, concluded authorization of the Gulf of Mexico reef fish fishery managed under this management plan is not likely to jeopardize the continued existence of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) or smalltooth sawfish. An incidental take statement was issued specifying the amount of anticipated take, along with reasonable and prudent measures and associated terms and conditions deemed necessary and appropriate to minimize the impact of these takes. Other listed species and designated critical habitat in the Gulf of Mexico were determined not likely to be adversely affected.

With regards to the Marine Mammal Protection Act, fishing activities under the Reef Fish Fishery Management Plan should have no adverse impact on marine mammals. The proposed actions are not expected to substantially change the way the fishery is currently prosecuted (e.g., types of methods, gear used, etc.). The reef fish fishery was classified in the 2011 List of Fisheries (75 FR 68468, November 8, 2010) as a Category III fishery because it is prosecuted primarily with longline and hook-and-line gear. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to one percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population.

6 Regulatory Impact Review

6.1 Introduction

The National Marine Fisheries Service requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: 1) provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; 2) 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) 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 some information that may be used in conducting an analysis of impacts on small business entities pursuant to the Regulatory Flexibility Act (RFA). This RIR analyzes the impacts that the proposed management alternatives in this amendment to the Reef Fish FMP would be expected to have on the reef fish fishery.

6.2 Problems and Objectives

The problems and objectives addressed by this amendment are discussed in Section 1.2 of this document and are incorporated herein by reference. In summary, management measures considered in this amendment are intended to decrease or end overfishing of gag, develop red grouper management measures that will allow the optimum yield of red grouper to continue to be caught, adjust multi-use IFQ allocation percentages, and, minimize gag bycatch.

6.3 Description of the Fishery

A description of the fishery is provided in Section 2.3 of this document and is incorporated herein by reference.

6.4 Impacts of Management Measures

6.4.1 Action 1: Rebuilding Plan for Gag

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.1.3 and is incorporated herein by reference. **Preferred Alternative 2** establishes a rebuilding plan that will rebuild the gag stock to a level consistent with producing maximum sustainable yield in 10 years or less. Specifying the rebuilding time to be 10 years or less allows a buffer to account for fluctuations in abundance due to unforeseen events (e.g., red tide) and leeway to take the needs of fishing participants into account when setting catch levels and management measures. **Preferred Alternative 2** would potentially result in more restrictive regulations and thus greater adverse indirect economic effects in the short-term relative to **Alternative 1 (No Action)**.

The rebuilding plan under **Preferred Alternative 2** will lead to different economic costs and benefits relative to **Alternative 1 (No Action)**. The actual costs and benefits associated with **Preferred Alternative 2** depend on the difference between current and target biomass level for gag and the length of the rebuilding period. In terms of productive capacity, a wide gap exists between current and potential

production of the gag stock, and this gap necessitates the introduction of more stringent measures in order to reach full productive capacity. The length of the rebuilding plan will determine how stringent the management measures will be. In general, the shorter the rebuilding period, the more stringent the required management measures will be, and thus the greater the indirect economic costs on fishing participants in the short-term. Because **Preferred Alternative 2** establishes a rebuilding plan while **Alternative 1 (No Action)** does not, the indirect economic costs on fishing participants in the short-term will be greater under **Preferred Alternative 2** than under **Alternative 1 (No Action)**. On the other hand, the indirect economic benefits resulting from larger yields will also accrue sooner and are expected to be greater under **Preferred Alternative 2** than under **Alternative 1 (No Action)**.

The long-term benefits from the fishery depend on, among other factors, the regulatory regime adopted over time. Regulatory regimes that promote economic efficiency generally have a higher likelihood of generating higher economic values while preserving the sustainability of the fish stock. Other regulatory regimes could very well erode the economic benefits over time, even at higher stock levels. For example, if regulations proposed in this amendment are successful in rebuilding the gag stock, higher levels of harvest approaching the chosen optimum yield (OY) would be allowed. However, if overcapacity and other open-access issues in the recreational sector are not addressed, the economic status of the gag component of the reef fish fishery could fall back to its current, or possibly worse, condition. Regardless, without knowledge of the actual management measures that would be implemented under **Preferred Alternative 2** and **Alternative 1 (No Action)**, and the associated estimates of indirect costs and benefits over time, the difference in net benefits between **Preferred Alternative 2** and **Alternative 1 (No Action)** cannot be measured.

However, some additional statements on relative costs and benefits can be made. Specifically, the commercial sector is currently managed under the grouper/tilefish individual fishing quota program. It is assumed the commercial sector for gag will continue to be managed under individual fishing quota program under **Preferred Alternative 2**. Further, the individual fishing quota program is assumed to keep the commercial sector operating within its quota. Economic theory suggests the average allocation price per pound approximates the average net revenue per pound harvested in the commercial sector. In 2010, the first year of the individual fishing quota program, the average price per pound of gag allocation was $1.00. In each year, the expected total net revenue in the commercial sector would be estimated by multiplying its quota by $1.00, assuming a constant average price per pound of gag allocation. The net present value (NPV) of the commercial sector's expected total net revenue would be estimated by discounting it by the appropriate rate, which is currently 3%.

Conversely, the recreational sector is currently managed through the use of a bag limit, size limit, and seasonal closures, which are intended to keep it from harvesting more than its allocation. Because the private and for-hire subsectors are not managed separately (for e.g., via allocations to each subsector), the allocation of landings between the two subsectors cannot be determined. Further, the management measures used to restrain the recreational sector's harvest and landings are subject to change under **Preferred Alternative 2**. As such, net operating revenue (NOR) for the for-hire sector cannot be estimated. However, Carter and Liese (2010) estimated the average consumer surplus (CS) per fish is $85 (2008 dollars). The average weight per fish from 2006-2008 was 7.23 pounds GW. Thus, the average CS per pound of fish landed by the recreational sector is estimated to be $11.76 (2008 dollars). Expected total consumer surplus in the recreational sector can be estimated by multiplying its landings in each year by $11.76. As in the commercial sector, the net present value (NPV) of the recreational sector's expected total consumer surplus would be estimated by discounting it by the appropriate rate, which is currently 3%.

6.4.2 Action 2: Recreational Bag Limits, Size Limits, and Closed Seasons

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.2.3 and is incorporated herein by reference. For the action to establish the recreational fishing season for gag of July 1 through October 31, under the 2006-08 baseline, **Preferred Alternative 4** results in a reduction in CS of approximately $16.6 million and a reduction in PS of approximately $1.38 million relative to **Alternative 1 (no action).** Conversely, **Preferred Alternative 4** results in a reduction in CS of approximately $15.06 million and a reduction in PS of approximately $1.2 million relative to **Alternative 1 (no action)** under the 2009 baseline. Thus, the overall estimated reduction in net economic benefits to the recreational sector associated with **Preferred Alternative 4** ranges from approximately $16.26 million under the 2009 baseline to $17.98 million under the 2006-08 baseline.

With respect to economic impacts, under the 2006-08 baseline, the estimated total reductions in output, value added, and employment are $10.73 million, $6.35 million, and 109 jobs under **Preferred Alternative 4** relative to **Alternative 1 (no action)**. Under the 2009 baseline, the estimated total reductions in output, value added, and employment are $13.34 million, $7.9 million, and 135 jobs under **Preferred Alternative 4** relative to **Alternative 1 (no action)**. No economic effects or impacts are expected to result from the action to maintain the minimum size limit of 22 inches for gag harvested by the recreational sector.

These estimates probably overstate actual economic effects as private anglers or for-hire operators will likely adjust their behavior to avoid or minimize adverse consequences to their welfare or profits, respectively. CS and PS estimates are somewhat different in nature. CS attempts to quantify, in dollar terms, the expected loss of welfare experienced by anglers. These values correspond to no actual flows of dollars in the formal economy, though they clearly motivate economic behavior. In contrast, PS is represented in the formal economy by lower revenue and lower profits in the for-hire sector. However, to the extent consumers will spend their money elsewhere, other producers will gain by potentially similar amounts. In summary, the CS losses represent real welfare losses but are intangible in our formal economy. On the other hand, PS losses represent a shift of revenue and profits away from the for-hire sector, but are a tangible economic loss for the for-hire sector.

Because the number of trips in all modes is assumed to remain the same regardless of any change in the red grouper bag limit, no changes to producer surplus or economic impacts are expected to result under **Preferred Alternative 3** for the action to change the red grouper bag limit. However, the increase in the bag limit from two fish to four fish is expected to increase annual recreational landings of red grouper by 12,676 fish, which is in turn expected to result in an annual increase in consumer surplus of approximately $1.07 million. These estimates apply to 2012 through 2015.

6.4.3 Action 3. Commercial Gag Quota Adjustment to Account for Dead Discards

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.3.3 and is incorporated herein by reference. Reductions in the commercial gag quota considered under this action are expected to contribute to overall decreases in total removals, potentially resulting in positive impacts on the gag stock in the future. These anticipated benefits to the gag resource cannot be quantified at this time. However, the adverse economic effects that would result from the precautionary reductions in commercial gag quota can be approximated by the associated decreases in economic value. Greater reductions in gag quota would logically be expected to result in greater losses in economic value. **Alternative 1** would set commercial gag quotas at the full annual catch target, thereby assuming that dead

discards would be reduced by the same proportion as landings. **Preferred Alternative 2** would reduce commercial gag quotas by 14%. Between 2012 and 2015, the present value of losses in economic value expected to result from commercial quota reductions are estimated at $472,167, based on a 3% discount rate. It follows that a greater discount rate would yield a smaller present value. It is expected that potential economic benefits, stemming from the added protection to the gag stock during rebuilding, would result from precautionary reductions in commercial gag quota under **Preferred Alternative 2**. **Alternative 3** would further reduce commercial gag quota to 53% of the annual catch target. As expected, **Alternative 3** would result in greater losses in economic value. Relative to **Preferred Alternative 2**, **Alternative 3** would potentially grant greater protection to the gag stock during rebuilding. However, the Council decided that the proportion of dead discards assumed under **Preferred Alternative 2** would be more realistic and would lessen adverse economic effects.

6.4.4 Action 4. Adjustments to Multi-Use Individual Fishing Quota Shares

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.4.3 and is incorporated herein by reference. Due to the large decrease in the gag commercial quota expected under this amendment, the percentage of red grouper allocation that will be converted into multi-use allocation under **Alternative 1** could result in gag harvests that would exceed the gag ACL. In addition to the detrimental effects on the gag stock, this scenario would result in adverse economic effects stemming from the corrective measures that would be implemented to address the over-harvesting of gag.

Alternative 2 would adjust red grouper multi-use percentages following changes to the gag annual catch limit, allocation, or the red grouper allocation. Although **Alternative 2** would allow fishermen to benefit from the added flexibility multi-use shares may afford, the resulting added pressure on the gag stock could have adverse effects on the rebuilding of the resource, and thus be associated with negative economic effects. If red grouper is under a rebuilding plan, **Preferred Alternative 3** would set the percentage of gag allocation converted into multi-use allocation valid to harvest gag or red grouper to zero, granting additional protection to red grouper stock while it rebuilds. This additional protection, which is assumed to yield biological benefits, would be anticipated to result in long economic benefits in the long term. **Preferred Alternative 3** would, if red grouper is not under a rebuilding plan, continue to convert a portion of the gag allocation into multi-use allocation valid to harvest gag or red grouper. Multi-use allocation percentages would adjust following changes to the red grouper annual catch limit and allocation, and gag allocation. Any amount of multi-use gag allocation used to harvest red grouper would lessen pressure on the gag stock, resulting in future economic benefits.

Preferred Alternative 4 would suspend the release of red grouper multi-use allocation until NMFS declares the gag stock rebuilt. **Preferred Alternative 4** would limit the pressure on gag stock by preventing any harvest in excess of the specified gag quota. **Preferred Alternative 4** is expected to yield positive economic effects due to the anticipated beneficial impacts to the rebuilding of the gag stock which is currently overfished and is undergoing overfishing.

6.4.5 Action 5. Commercial Gag Size Limit

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.5.3 and is incorporated herein by reference. **Alternative 1**, which would maintain the 24-inch commercial gag minimum size limit, is not anticipated to result in economic effects. **Preferred Alternative 2** and **Alternative 3** would reduce the commercial size limit to 22 and 20 inches, respectively. **Alternative 4** would eliminate the commercial gag size limit. The implementation of **Preferred Alternative 2** or

Alternatives 3 or **4** is expected to benefit the gag stock by allowing commercial fishermen to land a portion, if not the totality, of dead gag discards, thereby having positive impacts on the rebuilding plan. These beneficial impacts to the stock would, in turn, result in future economic benefits. However, potential benefits to the stock and associated economic benefits may be limited or negligible due to fishermen' preference for larger gag. To optimize economic returns derived from their gag allocation, fishermen would rather harvest larger fish because of their increased yield. Lowering or eliminating the commercial gag minimum size limit could therefore be ineffective or counterproductive due to incentives for highgrading.

6.4.6 Action 6. Time and Area Closures

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.6.3 and is incorporated herein by reference. **Preferred Alternative 1** would not modify existing time and area closures that prohibit fishing for gag and other reef fish species. Therefore, economic effects are not expected to result from **Preferred Alternative 1**. **Alternatives 2** and **3** would expand existing area closures and close additional areas covering 70 and 244 nautical miles, respectively. **Alternatives 4** and **5** would modify the seasonal closure dates of the Edges and of Madison-Swanson and Steamboat Lumps areas, respectively. The expansion of these closed areas and modifications to seasonal closure times considered are expected to reduce effort, thereby granting additional protection to spawning aggregations of gag and potentially reducing bycatch and bycatch mortality of gag while fishermen are targeting red grouper. The economic effects that would potentially result from **Alternatives 2, 3, 4,** and **5** are not known. However, based on the relatively low percentage of landings recorded in each of the area considered for closure, economic effects that are anticipated to result from **Alternatives 2, 3, 4,** and **5** are likely to be negligible. In addition, even if fishermen were not able to harvest a portion of their red grouper or gag allocation due to the proposed closures, they would sell or lease their allocation to fishermen operating in other parts of the Gulf.

6.4.7 Gag, Red Grouper, and Shallow-water Grouper Accountability Measures

Action 7.1 **Commercial** Accountability Measures

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.7.3 and is incorporated herein by reference. **Alternative 1**, no action, would maintain accountability measures implemented by Reef Fish Amendment 30B. These measures would close the shallow-water grouper fishery if commercial landings reach or are projected to reach the red grouper, gag, or other shallow-water grouper quota. **Alternative 1** is not compatible with the current individual fishing quota program. **Preferred Alternative 2** would use the individual fishing quota program in place as the accountability measure for the commercial sector. Under an individual fishing quota program, fishermen cannot legally exceed their annual allocation. Fishermen are allowed a 10% overage on their last trip. However, the overage is deducted from their allocation for the next year. **Preferred Alternative 2,** which would be consistent with the current management of the grouper and tilefish fisheries, is not expected to result in economic effects.

Action 7.2: Recreational Accountability Measures

A detailed analysis of the economic effects expected to result from this action is provided in Section 5.7.3 and is incorporated herein by reference. **Alternative 2** would add an overage adjustment to the current AMs for the recreational sector when the gag or red grouper stocks are overfished and under a rebuilding

plan. An overage adjustment could be applied to the gag recreational sector as soon as 2013, depending on whether the recreational sector exceeds its annual catch limit in 2012, because it is overfished and will be under a rebuilding plan (**Preferred Alternative 2** under **Action 1**). In general, the longer the rebuilding time period, the greater the annual catch limit in the early years of the rebuilding plan and thus the less likely an overage would occur and an overage adjustment would need to be applied. Thus, the probability of the gag recreational sector exceeding its annual catch limit is being reduced by the selection of **Preferred Alternative 2** under **Action 1**.

Recreational gag landings were trending upward through 2008, but then dropped precipitously in 2009. Even the reduced landings in 2009 are considerably above the recreational sector's annual catch limit for 2011 and 2012. The effectiveness of the measures potentially implemented under **Action 2** will determine whether the recreational sector exceeds its annual catch limit in 2012. **Preferred Alternative 4** for the action to establish the recreational fishing season for gag under **Action 2** is expected to restrain landings in the gag recreational sector well below its 2012 annual catch limit, and in fact is intended and expected to constrain landings below the 2012 recreational annual catch target. Thus, the probability an overage adjustment will be required in 2013 is also minimal. Given the current projection of expected recreational gag landings in 2012 under **Preferred Alternative 4** for the action to establish the recreational fishing season for gag under **Action 2**, the same logic applies to the probability that an in-season closure of the recreational sector will be necessary in 2012. Thus, the likelihood that **Preferred Alternative 4** under **Action 7.2**, which would add an overage adjustment and an in-season closure, will generate indirect economic effects on recreational fishing participants is minimal. Whether that expectation will continue in future years partly depends on how participants in the gag recreational sector adjust their behavior to the new management measures and any additional changes in those measures in the future (e.g., a change in the recreational fishing season for 2013 and beyond). However, the likelihood of an overage adjustment or in-season closure will be reduced further due to the planned increases in the recreational sector's gag annual catch limit from approximately 1.1 MP GW in 2012 to 1.7 MP GW in 2016.

With respect to red grouper, it is not currently overfished or under a rebuilding plan. As such, **Preferred Alternative 4** would not apply to the recreational red grouper sector at present and is not expected to apply in the near future. Thus, no indirect economic effects on the recreational red grouper sector are expected under **Preferred Alternative 4**. In addition, the recreational annual catch limit for red grouper has not been met in recent years. Recreational red grouper landings averaged less than 1 MP (GW) between 2006 and 2009. With the planned increase in the red grouper total allowable catch, the recreational annual catch limit will be increased from 1.51 MP (GW) to 1.72 MP (GW), which will create a larger difference between the annual catch limit and the expected catch in 2012, even if the bag limit is increased under **Action 2**. Additional increases in the red grouper recreational annual catch limit are planned through 2016. Thus, the probability the recreational sector will exceed its red grouper annual catch limit in the near future is minimal. In turn, the likelihood that **Preferred Alternative 4** will generate indirect economic effects on the recreational red grouper sector is also minimal.

6.5 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 that can be expressed as costs associated with the regulations. Costs associated with this specific action would include:

Council costs of document preparation,
meetings, public hearings, and information
dissemination……....$160,000

NMFS administrative costs of document
preparation, meetings, and review …….$70,000

TOTAL……..……...$230,000

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 amendment. To the extent that there are no quota closures proposed in this amendment or other regulatory measures, no additional enforcement activity is anticipated. In addition, under a fixed budget, any additional enforcement activity due to the adoption of this amendment would mean a redirection of resources to enforce the new measures.

6.6 Determination of Significant Regulatory Action

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

7 Regulatory Flexibility Act Analysis

7.1 Introduction

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

With certain exceptions, the RFA requires agencies to conduct an initial regulatory flexibility analysis (IRFA) for each proposed rule. The IRFA is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An IRFA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." In addition to analyses conducted for the RIR, the IRFA provides: 1) A description of the reasons why action by the agency is being considered; 2) a succinct statement of the objectives of, and legal basis for, the proposed 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; and, 5) an identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule.

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

A discussion of the reasons why action by the agency is being considered is provided in Section 1.2 of this document. In summary, the purposes of this proposed rule are to decrease or end overfishing of gag so that the stock can begin to rebuild, develop red grouper management measures that will allow the optimum yield of red grouper to continue to be caught as the stock recovers from a 2005 episodic mortality event, and minimize gag bycatch consistent with the goals and objectives of the Council's red grouper rebuilding plan and achieving the mandates of the Magnuson-Stevens Act. The objective of this amendment is to prevent overfishing of the gag resource in the Gulf of Mexico and allow harvest of gag and red grouper at optimum yield. The Magnuson-Stevens Act provides the statutory basis for this proposed rule.

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

This proposed rule is expected to directly affect commercial fishing vessels whose owners possess gag or red grouper fishing quota shares and for-hire fishing vessels that harvest gag. As of October 1, 2009, 970 entities owned a valid commercial Gulf reef fish permit and thus were eligible for initial shares and allocation in the grouper/tilefish IFQ program. Of these 970 entities, 908 entities initially received shares

and allocation of grouper or tilefish. More importantly, 875 entities specifically received gag shares and an initial allocation of the commercial sector's gag quota in 2010. These 875 entities are expected to be directly affected by the proposed actions to reduce the gag commercial quota to 86% of the ACT to account for dead discards, modify the percentages of red grouper and gag allocation that can be converted into multi-use allocation, and reduce the commercial size limit for gag. Of these 875 entities, 815 also received red grouper shares and an initial allocation of the commercial sector's red grouper quota in 2010.

Of these 875 entities, 215 were not commercially fishing in 2008 or 2009 and thus have no commercial fishing revenue during these years. On average, these 215 entities received an initial allocation of 874 pounds of gag in 2010. Eight of these entities also received a bottom longline endorsement in 2010. These eight entities received a higher initial allocation of gag in 2010, with an average of nearly 3,139 pounds. The other 660 entities that received gag shares and initial allocations in 2010 were active in commercial fisheries in 2008 or 2009.

Of the 660 commercial fishing vessels with commercial landings in 2008 or 2009, 139 vessels did not have any gag landings in 2008 or 2009. Their average annual gross revenue in these two years was approximately $50,800 (2008 dollars). Their average allocation of gag in 2010 was approximately 540 pounds. The vast majority (85%) of these vessels' commercial fishing revenue is from landings of snapper, mackerel, dolphin, and wahoo.

The other 521 commercial fishing vessels did have landings of gag in 2008 or 2009. Their average annual gross revenue from commercial fishing was approximately $71,000 (2008 dollars) between the two years. On average, these vessels had 2,375 pounds and 1,300 pounds of gag landings in 2008 and 2009 respectively, or 1,835 pounds between the two years. Gag landings accounted for approximately 8% of these vessels' annual average gross revenue, and thus they are somewhat though not significantly dependent on revenue from gag landings. These vessels' average initial gag allocation in 2010 was 2,121 pounds. Therefore, on average, their 2008 gag landings were very near but their 2009 gag landings were considerably less than their 2010 gag allocation. Fifty-two of these vessels also received a bottom longline endorsement in 2010. These particular vessels' average annual revenue was approximately $156,000 (2008 dollars) in 2008 and 2009. Revenue from gag landings fell from approximately $15,900 to $8,400 in 2009 and thus they became relatively less dependent on gag landings. These vessels are highly dependent on revenue from red grouper landings, which accounted for 54% and 47% of their gross revenue in 2008 and 2009 respectively. Revenue from DWG landings decreased only slightly, from approximately $36K in 2008 to $31K in 2009, and thus these vessels became relatively more dependent on revenue from DWG landings. Their average initial 2010 allocation of gag was approximately 5,507 pounds while their average gag landings were 3,933 and 2,204 pounds in 2008 and 2009 respectively. Thus, they have been harvesting well within that allocation in recent years, particularly in 2009.

The for-hire fleet is comprised of charter vessels, which charge a fee on a vessel basis, and headboats, which charge a fee on an individual angler (head) basis. The harvest of gag in the EEZ by for-hire vessels requires a charter vessel/headboat (for-hire) for Gulf reef fish permit. On March 23, 2010, there were 1,376 valid or renewable for-hire Gulf reef fish permits. A valid permit is a non-expired permit. Expired reef fish for-hire permits may not be actively fished, but are renewable for up to one year after expiration. Because of the extended renewal period, numerous permits may be expired but renewable at any given time of the year. The majority (823, or approximately 60%) of the 1,376 valid or renewable permits were registered with Florida addresses. The registration address for the federal permit does not restrict operation to federal waters off that state; however, vessels would be subject to state permitting requirements, should such exist. Although the permit does not distinguish between headboats and charter

vessels, it is estimated that 79 headboats operate in the Gulf. The majority of these vessels (43, or approximately 54%) operate from Florida ports. Given that nearly 99% of target effort for gag and 97% of the economic impacts from the recreational sector for gag are in west Florida, it is assumed that the 823 for-hire vessels (780 charter vessels and 43 headboats) in Florida are expected to be directly affected by the proposed action to establish a recreational gag fishing season of July 1-October 31.

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. For for-hire vessels, the other qualifiers apply and the receipts threshold is $7.0 million (NAICS code 713990, recreational industries).

In 2008 and 2009, the maximum annual commercial fishing revenue by an individual commercial fishing vessel with gag fishing quota shares was approximately $606,000 (2008 dollars). The average charter vessel is estimated to earn approximately $88,000 (2008 dollars) in annual revenue, while the average headboat is estimated to earn approximately $461,000 (2008 dollars). Based on these values, all commercial and for-hire fishing vessels expected to be directly affected by this proposed rule are determined for the purpose of this analysis to be small business entities.

7.4 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.

7.5 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.

7.6 Significance of economic impacts on small entities

<u>Substantial number criterion</u>

This proposed rule, if implemented, would be expected to directly affect 875 commercial fishing entities and 823 for-hire fishing entities. All affected entities have been determined, for the purpose of this analysis, to be small entities. Therefore, it is determined that the proposed rule will affect a substantial number of small entities.

<u>Significant economic impacts</u>

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 rule 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?

Establishing a rebuilding plan for gag is an administrative action and is therefore not expected to generate direct, adverse economic effects on commercial or for-hire entities. Thus, the proposed action to establish a rebuilding plan for gag that would rebuild the gag stock to a level consistent with producing maximum sustainable yield in 10 years or less is not expected to reduce profits for commercial or for-hire entities.

Net operating revenues (NOR) are assumed to be representative of profits for for-hire vessels. It is assumed that 823 for-hire vessels, 780 charter vessels and 43 headboats, participate in the recreational harvest of gag. Estimates of NOR from recreational fisheries other than gag and thus across all fisheries in which these charter vessels and headboats participate are not currently available. However, on average, NOR for charter trips targeting gag are estimated to be approximately $1.56 million per year while NOR for headboat trips targeting gag are estimated to be $91,300 per year. Thus, NOR for all trips targeting gag are estimated to be approximately $1.65 million per year. The average annual NOR from trips targeting gag is estimated to be $2,000 per charter vessel and $2,124 per headboat.

When the length of the gag season is reduced and the daily bag limit for gag is set at zero, some trips that formerly targeted gag will instead target other species while other trips that formerly targeted gag will be cancelled. Assuming the NOR per trip is constant regardless of the species targeted, for-hire operators will only lose NOR from trips cancelled as a result of the shortened season length. Information regarding the number of trips cancelled as a result of the shortened season is not currently available. Thus, this analysis assumes that all of the current for-hire trips targeting gag will be cancelled when the recreational sector is closed. Because some of these trips would probably not be cancelled, this assumption is expected to overestimate the actual reduction in NOR associated with a shorter season. Thus, the following estimates of losses in NOR and profit for charter vessels and headboats should be considered maximum values.

Under the proposed action to establish a recreational gag fishing season of July 1 through October 31, the losses in NOR for charter vessels and headboats are estimated to be approximately $1,304,000 and $76,000, respectively. Thus, losses in NOR for all trips targeting gag is estimated to be approximately $1,380,000. The average annual losses in NOR for trips targeting gag are estimated to be $1,672 and $767 per charter vessel and headboat, respectively. These losses in NOR represent a loss in profits of approximately 84% and 36% per charter vessel and headboat, respectively.

The estimated losses in NOR represent a loss in profit for all charter vessel and headboat trips targeting gag. The proposed action is not expected to affect profit from trips not targeting gag for charter vessels and headboats. For-hire vessel dependence on fishing for individual species cannot be determined with available data. Although some for-hire vessels are likely more dependent on trips that target gag than other for-hire vessels, overall, about three percent of for-hire anglers are estimated to target gag. As a result, while the proposed action would be expected to substantially affect the NOR derived from gag

trips, overall, gag trips do not comprise a substantial portion of total for-hire trips nor would they, by extension, be expected to account for a substantial portion of total for-hire NOR.

Under the proposed action to increase the recreational bag limit for red grouper from 2 fish to 4 fish, the number of trips in all recreational fishing modes is assumed to remain the same regardless of any change in the red grouper bag limit. As such, no changes to producer surplus in the for-hire sector are expected. Thus, the proposed action is not expected to reduce profits for for-hire entities.

Of the 875 entities that received gag shares and an initial allocation of the commercial gag quota in 2010, 215 entities did not participate in commercial fishing in 2008 or 2009. Thus, they have no commercial fishing revenue and did not earn profits from commercial fishing in those two years. On average, these vessels received an initial allocation of 874 pounds of gag quota in 2010. Under the proposed action to reduce the commercial gag quota to 86% of the ACT to account for dead discards, their average allocation of gag in 2012 would be reduced from 421 pounds to 362 pounds, or by approximately 59 pounds. Using the average 2008 price of $3.52 per pound, this loss in allocation could potentially represent a loss of nearly $208 (2008 dollars) in gross revenue per entity. Using the 2010 average price of $1.00 per pound of gag allocation, this loss in allocation could potentially represent a loss of $59 (2008 dollars) in net revenue per entity. For eight of these 215 entities that also possess longline endorsements, their average allocation of gag in 2012 would be reduced from 1,512 pounds to 1,300 pounds, or by 212 pounds. Thus, their potential losses in gross revenue and net revenue, estimated to be $746 and $212 (2008 dollars) respectively, are expected to be somewhat higher.

However, in general, these potential losses in gross revenue and net revenue would only be realized if these 215 entities not only become active in commercial fishing but also specifically intend to harvest gag in 2012 and at a level above their reduced allocation. That is, a reduction in allocation can only lead to a reduction in landings, and thus gross revenue, if these entities intend to harvest at levels above their reduced allocation. Alternatively, losses in gross and net revenue could be due to these entities' inability to sell the allocations they are losing under the proposed action, though this possibility presumes that a demand for these allocations exists. Regardless, the significance of these potential losses in gross revenue and net revenue to these 215 entities cannot be evaluated given the lack of information on potential gross revenue, net revenue, and profits from commercial fishing in general and specifically for gag.

Similarly, for the 139 entities with gag shares that commercially harvested other than gag, they earned approximately $50,800 in annual gross revenue on average in 2008 and 2009. Profit estimates for these vessels are not currently available. However, because they did not have any gag landings, none of their gross revenue and thus none of their potential profits were the result of gag harvests. Under the proposed action to reduce the commercial gag quota to 86% of the ACT to account for dead discards, their average allocation of gag in 2012 would be reduced from 260 pounds to 224 pounds, or by 36 pounds. Using the average 2008 price of $3.52 per pound, this loss in allocation could potentially represent a loss of $127 (2008 dollars) in gross revenue per entity. Using the 2010 average price of $1.00 per pound of gag allocation, this loss in allocation could potentially represent a loss of approximately $36 (2008 dollars) in net revenue per entity.

However, these potential losses in gross and net revenue could only lead to a loss in profits if these entities intend to become active in the reef fish fishery harvesting gag in 2011 and at a level above their reduced allocation. That is, a reduction in allocation can only lead to a reduction in landings and thus gross revenue if these entities intend to harvest at levels above their reduced allocation. Thus, for example, if these vessels intended to harvest gag in 2012 at a level equivalent to their 2012 allocation, and

this harvest was in addition to rather than in place of their recent commercial fishing activities, the reduction in allocation could lead to a maximum loss of approximately .3% in gross revenue, which could in turn reduce net revenue and profits. Alternatively, losses in gross and net revenue could be due to these entities' inability to sell the allocations being lost under the proposed action, though this possibility presumes that a demand for these allocations exists.

For the 521 entities with gag shares that participated in the commercial harvest of gag in 2008 or 2009, they earned approximately $71,000 (2008 dollars) in annual gross revenue on average in 2008 and 2009. Profit estimates for these vessels are not currently available. However, gag landings accounted for approximately 8% of these vessels' annual average gross revenue, and thus they are somewhat but not significantly dependent on revenue from gag landings. Under the proposed action to reduce the commercial gag quota to account for dead discards, these vessels' 2012 gag allocations would be reduced from 1,022 pounds to 879 pounds, or 143 pounds on average. As these vessels have been harvesting at levels near their 2010 allocation in recent years on average, this reduction in gag allocation is likely to lead to an equivalent reduction in gag landings and therefore gross revenue. Using the average 2008 price of $3.52 per pound, it is estimated that these vessels could lose nearly $503 (2008 dollars), or approximately .7%, in annual gross revenue on average. Using the 2010 average price of $1.00 per pound of gag allocation, this loss in allocation would represent a loss of $503 (2008 dollars) in net revenue per entity. Since net revenue is assumed to be representative of profits for commercial vessels, these vessels are expected to experience a reduction in profits.

However, 52 of these 521 vessels also received a bottom longline endorsement in 2010. These particular vessels' average annual gross revenue was approximately $156,000 (2008 dollars) in 2008 and 2009, with gag landings accounting for approximately 8% of that gross revenue. These vessels are highly dependent on revenue from red grouper rather than gag landings. Under the proposed action to reduce the commercial gag quota, their allocation of gag in 2012 would decrease from 2,749 pounds to 2,364 pounds, or by 385 pounds. As these vessels have been harvesting at levels near their 2010 allocation in recent years on average, this reduction in gag allocation is likely to lead to an equivalent reduction in gag landings and therefore gross revenue. Using the average 2008 price of $3.52 per pound, it is estimated that these vessels could lose $1,355 (2008 dollars), or approximately .9%, in annual gross revenue on average. Using the 2010 average price of $1.00 per pound of gag allocation, this loss in allocation would represent a loss of approximately $1,355 (2008 dollars) in net revenue per entity. Since net revenue is assumed to be representative of profits for commercial vessels, these vessels are expected to experience a reduction in profits.

No additional economic effects would be expected to result from the revised SWG quota because the updated SWG quota simply reflects the reduction in the commercial gag quota, the effects of which have already been discussed.

Given the proposed action to establish a rebuilding plan for gag, the conversion of red grouper allocation into multi-use allocation valid toward the harvest of red grouper or gag would be suspended under the proposed action to modify the percentages of red grouper and gag allocation that can be converted into multi-use allocation. Because red grouper is not under a rebuilding plan at this time, gag shareholders would be allowed to convert 8% of their gag allocation into multi-use allocation and thus no adverse economic effects are expected. However, minimal adverse economic effects are expected as a result of commercial fishing entities not being allowed to convert 4% of their red grouper allocation into multi-use allocation. Multi-use allocation that has been converted from red grouper allocation can only be used to possess, land, or sell gag after an entity's gag and gag multi-use allocation has been landed, sold, or

transferred. Given the proposed reduction in the commercial gag quota due to dead discards, it is possible these entities will exhaust their gag and gag multi-use allocations. Gross revenue from gag landings is greater than gross revenue from an equivalent amount of red grouper landings because gag commands a relatively higher market price. Thus, gross revenue from commercial fishing and therefore profits per vessel and could be slightly lower than if the conversion were allowed to continue.

Under the proposed action to reduce the commercial size limit for gag from 24 inches to 22 inches total length, commercial fishing entities would be allowed to retain more and discard less of the gag they catch and thus are expected to economically better off relative to the status quo. However, if commercial fishermen prefer to harvest larger gag due to a higher market demand for larger fish, then additional high-grading may be possible because the commercial sector is managed under the IFQ program. As such, few additional gag may be retained and thus the potential increases in gross revenue, net revenue, and profits per vessel are likely minimal.

Establishing AMs is not expected to generate direct, adverse economic effects on commercial or for-hire entities. Direct, adverse economic effects would only occur if and when the AMs are actually triggered. This action would replace current AMs for the commercial sector established under Amendment 30B with the current IFQ program because an IFQ functions as an AM. This action would also add an overage adjustment and an in-season closure to the current AMs for the recreational sector when the gag or red grouper stocks are overfished and under a rebuilding plan. Because red grouper is not overfished or under a rebuilding plan, this action does not currently apply to the red grouper component of the reef fish fishery. The action to establish a recreational fishing season of July 1 through October 31 for gag is expected to restrain landings in the gag recreational sector well below its 2012 annual catch limit, and in fact is intended and expected to constrain landings below the 2012 recreational annual catch target. In turn, the probability an overage adjustment or in-season closure will be required in 2013 is also minimal. Thus, the proposed action to establish new AMs for the commercial and recreational sectors of the gag, red grouper, and shallow-water grouper component of the reef fish fishery is not expected to reduce profits for commercial or for-hire entities.

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

Three alternatives, including the status quo, were considered for the action to establish a rebuilding plan for gag that would rebuild the gag stock to a level consistent with producing maximum sustainable yield in 10 years or less. In the absence of all fishing mortality, including bycatch mortality, the shortest possible time in which the gag stock can rebuild is 5 years. Under the National Standard 1 guidelines, the maximum time allowed for rebuilding the gag stock is 10 years. In the Generic ACL/AM Amendment, the proposed ACLs are based on yields that are projected to rebuild the stock in 10 years, while the proposed ACTs are based on yields that are projected to rebuild the stock in 7 years.

The first alternative, the status quo, would not have established a rebuilding plan for gag. The fishing mortality rate for gag has shown an increasing trend over time and fishing mortality rates in recent years are not consistent with rebuilding or maintaining the gag stock at its maximum sustainable yield level. Moreover, because the gag stock has been determined to be overfished and undergoing overfishing, this alternative does not comply with Magnuson-Stevens Act requirements regarding rebuilding plans.

The second alternative would have established a rebuilding plan that would rebuild the gag stock to a level consistent with producing maximum sustainable yield in 7 years or less. Seven years is the

estimated time to rebuild if the stock is managed at a fishing rate corresponding to optimum yield (F_{OY}) rather than the rate corresponding to a 10-year rebuilding plan ($F_{rebuilding}$). Although the yields under a 7-year rebuilding plan would eventually catch up to those for a 10-year plan, the initial catch targets in the early years would be smaller under a 7-year rebuilding plan relative to a 10-year rebuilding plan. Thus, this alternative would potentially imply more restrictive regulations and thus more adverse indirect economic effects in the short-term relative to the proposed action.

The third alternative would have established a rebuilding plan that would rebuild the gag stock to a level consistent with producing maximum sustainable yield in 5 years. If this alternative were adopted, strong measures to reduce bycatch of gag in other fisheries would also need to be considered. Because a total elimination of discard mortality is unlikely to be achieved, this alternative would likely result in the stock being slightly under the rebuilding target at the end of five years. Most importantly, this alternative would require a complete closure of the gag component of the reef fish fishery for at least 5 years. Therefore, this alternative would eliminate all net revenue from the commercial sector and all consumer and producer surplus from the recreational sector for at least 5 years and, as such, would lead to the most restrictive regulations and thus considerably greater adverse indirect economic effects in the short-term relative to the proposed action.

Four alternatives, including the status quo, were considered for the action to establish a recreational gag fishing season of July 1 through October 31. The first alternative, the status quo, would maintain a year-round gag recreational fishing season, with the exception of the current February 1 through March 31 closed season for shallow-water grouper. This alternative would be expected to result in a 14% reduction in gag removals relative to the 2006-08 baseline and a 1% increase in gag removals relative to the 2009 baseline. As such, this alternative does not achieve the necessary reduction in removals to rebuild the gag stock, contrary to the Council's goals and objectives and Magnuson-Stevens Act requirements.

The second alternative, which would establish a gag recreational season of September 16 through November 15, would reduce gag removals by 60% relative to the 2009 baseline, which exceeds the annual catch target reduction of 47%. Relative to the 2006-08 baseline, this alternative also reduces removals by 60%. Therefore, this alternative does not fully meet the annual catch target of 61% relative to the 2006-08 baseline, but does exceed the annual catch limit and rebuilding yield reduction level of 53%. This alternative is more conservative biologically than the proposed action, but only allows a 61-day fishing season as opposed to the 123-day fishing season allowed under the proposed action.

The third alternative, which would establish a gag recreational season of January and April, would reduce removals by 52%, which exceeds the annual catch target reduction target of 47%. Relative to the 2006-08 baseline, this alternative reduces removals by 56%. This alternative does not fully meet the annual catch target of 61% relative to the 2006-08 baseline, but it does exceed the annual catch limit and rebuilding yield reduction level of 53%. This alternative is similar to the second alterative in that it allows 61 days of fishing, and thus is shorter than the 123-day fishing season allowed under the proposed action, but it splits the season into two segments to provide more fishing opportunities. Biologically, this alternative is as conservative as the proposed action.

The fourth alternative would establish the same gag recreational season of July 1 through October 31 as the proposed action. However, rather than maintain the current 22 inch recreational minimum size limit, it would implement a 22-30 inch slot limit. Although this alternative would achieve a larger reduction in removals relative to the proposed action, a larger percentage of those removals would consist of dead discards. Further, a portion of those additional dead discards would consist of larger fish above the slot

limit. These larger fish produce more eggs in spawning season. Thus, this alternative could negatively impact the spawning potential ratio and in turn the rate of rebuilding.

Two alternatives, including the status quo, were considered for the action to increase the recreational bag limit for red grouper from 2 fish to 4 fish. The first alternative, the status quo, would retain the current recreational bag limit for red grouper of 2 fish. The recreational annual catch limit for red grouper has not been met in recent years. Recreational red grouper landings averaged less than 1 MP (GW) between 2006 and 2009. With the planned increase in the red grouper total allowable catch, the recreational annual catch limit will be increased from 1.51 MP (GW) to 1.72 MP (GW), which will create a larger difference between the annual catch limit and the expected catch in 2012, and additional increases in the red grouper recreational annual catch limit are planned through 2016. This alternative would not allow for-hire entities to increase their landings per trip even though the recreational sector's harvest has been and is expected to be well below its allocation. As such, opportunities to increase the economic value of red grouper harvests in the recreational sector would be unnecessarily foregone.

The second alternative would increase the recreational bag limit for red grouper from 2 fish to 3 fish. This alternative would allow for-hire entities to increase their landings per trip, but would not enhance their opportunities to increase the economic value of red grouper harvests to the same extent as the proposed action. Such opportunities should be enhanced as much as possible given the large difference between the recreational sector's annual catch limit and the expected catch under the current bag limit. Like the proposed action, this alternative includes an adaptive feedback mechanism that would adjust the bag limit if the recreational sector exceeds its annual catch limit, though it would not be a two stage process as under the proposed action.

Two alternatives, including the status quo, were considered for the action to reduce the gag commercial quota to 86% of the ACT to account for dead discards. The first alternative, the status quo, would not adjust the gag commercial quota to account for dead discards. This alternative would set the gag commercial quota at the current ACT. The ACT assumes dead discards in the commercial sector will be reduced by the same proportion as landings. If this assumption is not valid, then total removals of gag will exceed the harvest levels projected in the assessment. The ACT provides a buffer against reaching the ACL, but this buffer may not be sufficient to offset increased removals due to dead discards.

The second alternative would reduce the gag commercial quota to 47% of the ACT to account for dead discards. This alternative represents the worst case scenario, under which dead discards are assumed to remain at their 2006-08 level. Analyses associated with the 2011 gag interim rule indicated that, if dead discards remain at their 2006-2008 levels, the gag commercial quota would need to be reduced to 47 percent of the ACT in order to compensate for the increased removals. Although this alternative would provide the greatest allowance for dead discards and thus the highest likelihood of rebuilding the gag stock successfully, it is based on the unlikely assumption that dead discards will remain at their 2006-08 levels. Longline vessels have historically landed about 34 percent of the commercial gag harvest. As a result of the longline endorsement requirements implemented in 2010, the number of reef fish longline vessels has decreased substantially. Of the 908 initial grouper/tilefish shareholders in 2010, 293 vessels used bottom longline or trap gear for commercial reef fish harvesting purposes between 1999 and 2007. However, only 62 of these vessels qualified for the bottom longline endorsement. Given the substantial reduction in the number of longline vessels, dead discards are expected to be considerably less now and in the future compared to their 2006-08 levels. As such, reducing the gag commercial quota to 47% of the ACT would unnecessarily impose more significant economic and social impacts on commercial harvesters and associated communities relative to the proposed action.

Two alternatives, including the status quo, were considered for the action to modify the percentage of red grouper allocation that can be converted into multi-use allocation if a rebuilding plan for gag is in effect. The first alternative, the status quo, would allow 4% of the red grouper allocation to be converted into multi-use allocation at the beginning of each year. Under this alternative, the amount of red grouper multi-use allocation could exceed the available gag commercial quota, thereby leading to harvests that exceed the ACL. Such a result is contrary to the purposes of the action to establish a rebuilding plan for gag that would rebuild the gag stock to a level consistent with producing maximum sustainable yield in 10 years or less and is therefore inconsistent with Magnuson-Stevens Act requirements and National Standard 1 guidance.

The second alternative would base the amount of red grouper multi-use allocation on the buffer between the gag ACL and ACT. Subsequent ACLs and ACTs may be set by the ACL/ACT control rule adopted in the Generic ACL/AM Amendment. Although a control rule has not been adopted yet, the alternatives currently under consideration would have little or no buffer for individual fishing quota fisheries, which would render this alternative unusable. Furthermore, the gag ACL is set at the level where there is only a 50% probability of meeting the target to rebuild the gag stock in 10 years or less. Thus, this alternative will reduce the probability of the rebuilding plan being successful.

One alternative, the status quo, was considered for the action to modify the percentage of gag allocation that can be converted into multi-use allocation if a rebuilding plan for red grouper is in effect. Under this alternative, 8% of the gag allocation would be converted into multi-use allocation. If a rebuilding plan for red grouper was necessary in the future, this alternative could result in red grouper harvests that would exceed the commercial ACL in the future, which would in turn trigger AMs and reduce the ability of the red grouper stock to rebuild.

Three alternatives, including the status quo, were considered for the action to reduce the commercial gag minimum size limit from 24 to 22 inches total length. The first alternative, the status quo, would maintain the commercial gag minimum size limit at 24 inches total length. The size at 50% female maturity is approximately 24 inches total length. Under this alternative, regulatory discards due to the minimum size limit would continue at the current rate, which is contrary to the Council's goal of reducing gag discards.

The second alternative would reduce the commercial gag minimum size limit from 24 inches to 20 inches total length. Until a commercial fisherman's individual fishing quota allocation is reached, this alternative is expected to reduce total gag discards by 62% for the vertical line component of the commercial sector and by 47.2% for the longline component. At the same time, the number of gag needed to fill an individual fishing quota allocation is expected to increase by 29.7% for the vertical line component and by 0.9% for the longline component. This alternative has a greater likelihood of creating a price differential by size, which would in turn likely result in additional high-grading as fishermen attempt to maximize the economic return on their individual fishing quota shares. Additional high-grading would lead to higher rather than lower levels of gag discards, which is contrary to the Council's goals.

The third alternative would eliminate the minimum size limit and thus would effectively require all commercially caught gag be retained regardless of size. As a result, this alternative also effectively requires that each commercial fisherman possess sufficient gag allocation to cover all harvest of gag. Grouper sizes in the commercial sector have been recorded as small as 11 inches prior to the implementation of size limits, but the numbers landed are few below 18 inches. At a minimum size limit

of 18 inches, the expected reduction in total gag discards is 79.9% for the vertical line component and 66.7% for the longline component. At the same time, the increase in number of gag needed to fill an individual's allocation of gag is expected to be 38.2% for the vertical line component and 1.3% for the longline component. At minimum size limits less than 18 inches, these values will change little because both gears become less selective for gag at smaller sizes. To the extent a market demand for larger fish exists, this alternative is likely to create a price differential for larger size fish. Given the limited amount of gag allocation expected to be distributed under the proposed gag commercial quota, this alternative could encourage high-grading by commercial fishermen, which would lead to higher rather than lower levels of gag discards, contrary to the Council's goals.

Four alternatives, including the status quo, were considered for the action to expand the current time and area closures off the west coast of Florida. The first alternative would expand the current closed areas of Madison-Swanson and the Edges by approximately 70 square miles. Four options were considered under this alternative. The first option would prohibit all fishing from November 1 through April 30, but allow surface trolling from May 1 through October 31. The second option would prohibit all fishing from November 1 through April 30, but allow all fishing from May 1 through October 31. The third option would prohibit all fishing from January 1 through April 30, but allow all fishing from May 1 through December 31. The fourth option would prohibit all fishing year-round. The percentage of gag and red grouper commercial landings coming from this area ranges from .55% for gag and .06% of red grouper under the third option to 1.25% and. .39% for gag and red grouper respectively under fourth option. These numbers indicate it is unlikely that gag and particularly red grouper are being targeted in this area. Thus, the expected reduction in gag bycatch is relatively small and thus so are the biological benefits.

The second alternative would expand the current closed areas of Madison-Swanson and the Edges by approximately 244 square miles. Four options were considered under this alternative. The first option would prohibit all fishing from November 1 through April 30, but allow surface trolling from May 1 through October 31. The second option would prohibit all fishing from November 1 through April 30, but allow all fishing from May 1 through October 31. The third option would prohibit all fishing from January 1 through April 30, but allow all fishing from May 1 through December 31. The fourth option would prohibit all fishing year-round. Gag bycatch is expected to increase as a result of the proposed action to reduce the gag commercial quota and the resulting reduction in the gag to red grouper quota ratio. The percentage of gag and red grouper commercial landings coming from this area ranges from 3.23% for gag and .26% of red grouper under the third option to 5.92% and .93% for gag and red grouper respectively under fourth option. If this alternative was selected, by limiting where recreational fishermen may fish, the adverse economic and social effects incurred as a result of the proposed recreational fishing season for gag would be amplified, particularly under the fourth option. Furthermore, the Council determined that these additional adverse economic and social effects on the recreational sector outweighed the biological benefits to the gag stock.

The third alternative would modify the seasonal closure dates of The Edges 40 fathom contour area, which is approximately 390 square miles in size and currently prohibits all fishing from January 1 through April 30 and allows all fishing from May 1 through December 31. Four options were also considered under this alternative. The first option would prohibit all fishing from November 1 through April 30, but allow surface trolling from May 1 through October 31. The second option would prohibit all fishing from November 1 through April 30, but allow all fishing from May 1 through October 31. The third option would prohibit all fishing from January 1 through April 30, but allow all fishing from May 1 through December 31. The fourth option would prohibit all fishing year-round. This alternative would close a larger area than the other alternatives that would expand the existing closures. Because The Edges 40

fathom contour area is relatively large, the percentage of gag and red grouper commercial landings coming from it is greater than under the other alternatives that would expand the existing closures, ranging from 4.13% for gag and .57% of red grouper under the third option to 8.92% and 2.41% for gag and red grouper respectively under fourth option. Thus, the expected reduction in gag bycatch is greater than under the other alternatives that would expand the existing time area closures. If this alternative was selected, by limiting where recreational fishermen may fish, the adverse economic and social effects incurred as a result of the proposed recreational fishing season for gag would be amplified, particularly under the fourth option. Furthermore, the Council determined that these additional adverse economic and social effects on the recreational sector outweighed the biological benefits to the gag stock.

The fourth alternative would modify the seasonal closure dates for the Madison Swanson and Steamboat Lumps closed areas, which cover approximately 219 square miles. At present, these closures prohibit all fishing from November 1 through April 30 but allow surface trolling for species other than reef fish from May 1 through October 31. The first option would prohibit all fishing from November 1 through April 30, but allow surface trolling from May 1 through October 31. The second option would prohibit all fishing from November 1 through April 30, but allow all fishing from May 1 through October 31. The third option would prohibit all fishing from January 1 through April 30, but allow all fishing from May 1 through December 31. The fourth option would prohibit all fishing year-round. Because Madison Swanson and Steamboat Lumps have been closed to reef fish fishing for an extended time period, no data is available to determine how much harvesting activity may occur in these areas. As such, it is not possible to determine the potential effects from closing them for a longer time period and thus considerably uncertainty exists regarding those potential effects. However, it is highly likely the biological benefits to the gag stock would be minimal at best.

One alternative, the status quo, was considered for the action to replace the current AMs for the commercial sector of gag, red grouper, and shallow-water component of the reef fish fishery with the IFQ program. By retaining the current AMs, this alternative would close the commercial shallow-water grouper fishery if commercial landings of red grouper, gag, or shallow-water grouper reach or are projected to reach their respective quotas. As such, these measures are inconsistent with the Council's management goals and objectives for the commercial sector of the reef fish fishery, as reflected by the IFQ program. Furthermore, concerns regarding the need for additional AMs appear to be unfounded given that, to this point, commercial landings have been less than the quotas for all individual species and species complexes managed under the IFQ program.
Three alternatives, including the status quo, were considered for the action to establish additional AMs for the recreational harvest of gag and red grouper. The first alternative, the status quo, would retain the existing accountability measures for the recreational harvest of gag and red grouper. The current accountability measures do not include in-season management measures or an overage adjustment if either the gag or red grouper stocks are determined to be overfished. The gag stock is currently overfished. Thus, this alternative would allow the recreational ACLs to be exceeded before taking action, which could have short-term negative effects on the red grouper stock and particularly the gag stock. These additional AMs are recommended by the National Standard 1 guidance and are currently being considered by the Council for the management of other reef fish species in the Generic ACL amendment.

The second alternative would add an overage adjustment to the existing accountability measures if gag or red grouper are determined to be overfished. This alternative would provide some benefit to the gag and red grouper stocks if they are under a rebuilding plan. The Council is proposing an action to establish a rebuilding plan for gag, and thus this alternative would be expected to apply immediately to the gag recreational sector. If the recreational ACL is exceeded, the overage adjustment would mitigate any

damage done to a stock's recovery by reducing the ACL for the following year by the size of the overage or by some other level depending on what the best available science indicates will place the stock back on its rebuilding path. However, relative to the proposed action, this alternative would not allow in-season closures as a result of projections indicating the recreational sector will exceed its red grouper or gag ACL. Thus, this alternative would allow the recreational ACLs to be exceeded before taking action, which could have short-term negative effects on the red grouper stock and particularly the gag stock.

The third alternative would add in-season accountability measures to the existing accountability measures that would allow the gag or red grouper recreational fishing seasons to close early if necessary. This alternative would provide some benefit to the gag and red grouper stocks. However, this alternative does not add an overage adjustment as per National Standard 1 guidance. Moreover, by not requiring an overage adjustment, this alternative would allow overages to occur from one year to the next if the in-season closures are implemented after the ACL has been exceeded. If these overages consistently occur over time, the cumulative effect could be sufficient to preclude rebuilding if a stock is under a rebuilding plan. As such, this alternative is not as beneficial to the red grouper and gag stocks as the proposed action.

8 Other Applicable Law

The MSFCMA (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 APA, 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 APA 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 CZMA Section 307(c)(1), when taking an action that affects any land or water use or natural resource of a state's coastal zone, NMFS is required to provide a consistency determination to the relevant state agency at least 90 days before taking final action.

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

Data Quality Act

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

Specifically, the Act directs the Office of Management and Budget to issue government wide guidelines that "provide policy and procedural guidance to federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by federal agencies." Such guidelines have been issued, directing all federal agencies to create and disseminate agency-specific standards to: (1)

ensure information quality and develop a pre-dissemination review process; (2) establish administrative mechanisms allowing affected persons to seek and obtain correction of information; and (3) report periodically to Office of Management and Budget on the number and nature of complaints received.

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

Endangered Species Act

The Endangered Species Act (ESA) 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 ESA requires NMFS, 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 3.2.2. NOAA Fisheries Service, as part of the Secretarial review process, will make a determination regarding the potential impacts of the proposed actions.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) 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 MMPA, 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 MMPA 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 MMPA, 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 MMPA, NMFS must publish, at least annually, a List of Fisheries (LOF) 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 LOF determines whether participants in that fishery may be required to comply with certain provisions of the MMPA, 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 3.2.2.

Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (PRA) (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 PRA requires NMFS to obtain approval from the Office of Management and Budget before requesting most types of fishery information from the public. Alternatives that might have PRA consequences include Action 6.1, Alternatives 2 and 3; Action 6.2, Alternative 2; and all alternatives in Action 7 with the exception of Alternative 1, no action.

Executive Orders

E.O. 12630: Takings

The Executive Order 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. 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 a) 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; b) creates a serious inconsistency or otherwise interferes with an action taken or planned by another agency; c) materially alters the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or d) 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 3.3.3.3.

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 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 Council 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 ESA.

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 EFH, which established additional HAPCs and gear restrictions to protect corals throughout the Gulf. There are no implications to coral reefs by the actions proposed in this amendment. The alternatives in Action 8 (Time and Area Closures) will reduce impacts in the areas of proposed time/area closures, but although those areas contain hard bottom habitat, they are not areas of living coral reefs.

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 12612 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 MPAs, HAPCs, and gear-restricted areas in the eastern and northwestern Gulf. Actions 8 does contain alternatives regarding the establishment of additional time/area closures. The existing and proposed areas in these actions are entirely within federal waters of the Gulf of Mexico. They do not affect any areas reserved by federal, state, territorial, tribal or local jurisdictions.

Essential Fish Habitat

The amended MSFCMA 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 EIS (GMFMC 2004b) to address the new EFH requirements contained within the MSFCMA. 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.

9 LIST OF PREPARERS (INTERDISCIPLINARY PLANNING TEAM)

Name	Expertise	Responsibility	Agency
Steven Atran	Biologist	Co-Team Lead – Amendment development, Introduction, Purpose and need, Gag rebuilding plan, Commercial gag quota adjustment	GMFMC
Peter Hood	Biologist	Co-Team Lead – Amendment development, Accountability measures, Summary, Bycatch practicability analysis, Cumulative effects analysis	SERO
Carrie Simmons	Biologist	Recreational management scenarios, Time and area closures	GMFMC
Assane Diagne	Economist	Economic analyses, Adjustments to multi-use IFQ shares	GMFMC
Ava Lasseter	Anthropologist	Social analyses	GMFMC
Steve Bortone	Biologist	Reviewer	GMFMC
Rick Leard	Biologist	Reviewer	GMFMC
David Dale	Biologist	EFH review	SERO
Jennifer Lee	Protected Resources	Protected species review	SERO
Mike Travis	Economist	Economic analyses	SERO
Rich Malinowski	Biologist	Reviewer	SERO
Shepherd Grimes	Attorney	Legal Compliance	SERO
Andrew Strelcheck	Biologist	Scientific analyses	SERO
Cynthia Meyer	Biologist	Reviewer, GIS	SERO
Noah Silverman	Natural Resource Management Specialist	NEPA compliance	SERO
Anik Clemons	Regulations Writer	Reviewer	SERO
Scott Sandorf	Regulations Writer	Reviewer	SERO
Brian Linton	Assessment Analyst	Stock Assessment	SEFSC
Brent Stoffle	Social Scientist	Social analyses	SEFSC
Larry Perruso	Economist	Economic analyses	SEFSC
Christopher Liese	Economist	Economic Analyses	SEFSC

10 List of agencies, organizations, and persons to whom copies of the amendment / DEIS are sent

List of Agencies:

Federal Agencies

Gulf of Mexico Fishery Management Council's
- Scientific and Statistical Committee
- Socioeconomic Assessment 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

List of Organizations:
- Coastal Conservation Association
- Environmental Defense
- Fishermen's Advocacy Organization
- Fishing Rights Alliance
- Gulf Fishermen's Association
- Ocean Conservancy
- Pew Environment Group
- Recreational Fishing Alliance
- Southeast Fisheries Association
- Southern Offshore Fishing Association

Responsible Agencies:
Gulf of Mexico Fishery Management Council (Lead Agency for FMP)
2203 North Lois Avenue, Suite 1100
Tampa, Florida 33607
813-348-1630

NOAA Fisheries Service (Lead Agency for Environmental Impact Statement)
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701
727-824-5305

11 Public Hearing Locations and Dates

Public hearings were held at the following locations:

Tuesday May 3, 2011
Hilton St. Petersburg Carillon Parkway
950 Lake Carillon Drive
St. Petersburg, FL

Clarion Hotel
12635 South Cleveland Ave
Fort Myers, FL 33907

Wednesday May 4, 2011
Banana Bay Resort
4590 Overseas Hwy
Marathon, FL

Monday May 9, 2011
Amendment 32 and ACLs/AMs Amendment
Renaissance Riverview Plaza
64 South Water Street
Mobile, AL

Tuesday May 10, 2011
Amendment 32 and ACLs/AMs Amendment
Hilton
5400 Seawall Blvd
Galveston, TX

Tuesday May 10, 2011
Amendment 32 and ACLs/AMs Amendment
Four Points Sheraton
940 Beach Blvd.
Biloxi, MS

Boardwalk - Royal American Beach Getaways
9400 S. Thomas Drive
Panama City Beach, FL

Wednesday, May 11, 2011
Harte Research Institute
Conference Room
6300 Ocean Drive
Corpus Christi, TX

Amendment 32 and ACLs/AMs Amendment
Crowne Plaza NOLA Airport
2829 Williams Blvd.
Kenner, LA

Additional public hearings will be held at the following locations:

Monday, August 1, 2011
Hyatt Place Ft. Myers
2600 Champion Ring Road
Fort Myers, FL 33905

Tuesday, August 2, 2011
Hilton St. Petersburg
Carillon Park
950 Lake Carillon Drive
St. Petersburg, FL 33716

Wednesday August 3, 2011
Boardwalk Beach Resort
9400 S. Thomas Drive
Panama City Beach, FL 32408

Final Testimony was heard on:
August 18, 2011
Crowne Plaza
6121 North IH-35
Austin, TX 78752

12 Alternatives Considered but Rejected

12.1 Bycatch Issues

The following bycatch issues were considered, but were determined to be either unfeasible, or would take too long to implement through this amendment, whose primary objective is to implement a rebuilding plan for gag as soon as possible. One alternative under commercial bycatch, to reduce the commercial minimum size limit of gag (which had been Alternative 5 in the commercial bycatch section), was retained and remains in the amendment as a separate action.

12.1.1 Commercial Bycatch

Alternative 1: No action. Do not implement any of the commercial bycatch reduction alternatives in this section.

Alternative 2: Establish a commercial gag bycatch quota. Analyses and projection of the bycatch observer data will be made at a time during the current year to provide sufficient time to adjust the commercial quota in the following year. If the gag bycatch quota is projected to be exceeded in the current year, the Assistant Administrator for Fisheries will file a notification that will reduce the red grouper commercial quota in the following year by the amount necessary to ensure that the gag bycatch quota is not exceeded for that fishing year. The bycatch quota (in numbers of fish) will be:

- **a. 4,000 fish per year (18% reduction from the 2000-2008 average of 4,871 fish)**
- **b. 3,000 fish per year (38% reduction from the 2000-2008 average of 4,871 fish)**
- **c. 2,000 fish per year (59% reduction from the 2000-2008 average of 4,871 fish)**

Alternative 3: Establish an electronic or video monitoring system for commercial reef fish vessels in the eastern Gulf of Mexico.

Option a: Request that the National Marine Fisheries Service develop a protocol for using video monitoring in combination with VMS to identify areas with high gag bycatch. The Assistant Administrator for Fisheries would then be authorized through notice action, to close areas with gag bycatch levels that exceed a threshold (to be determined) to bottom fishing for a period of up to 90 days.

Alternative 4: Set aside a portion of the commercial gag quota to account for bycatch.

Alternative 6: Reduce the commercial red grouper quota to reduce commercial dead discard of gag. With respect to dead discards, optimum yield in the red grouper fishery is defined as a catch level that produces dead discards of gag reduced from the 2000-2008 average of 4,871 fish to no more than:

- **d. 4,000 fish per year (18% reduction)**
- **e. 3,000 fish per year (38% reduction)**
- **f. 2,000 fish per year (59% reduction)**

12.1.2 Recreational Bycatch

Alternative 1: No Action. Do not implement any of the recreational bycatch reduction alternatives in this section.

Alternative 2: Prohibit recreational fishing for

a. gag
b. all grouper
c. all bottom fishing

within an area east and south of the Mobile Bay (or other region defined by the Council) encompassing a depth range of

d. deeper than 15 fathoms (26% release mortality rate or higher)
e. deeper than 25 fathoms (50% release mortality rate or higher)
f. deeper than 35 fathoms (75% release mortality rate or higher)

With the closed area to be in effect during

g. January through April (gag spawning season)
h. Whenever the recreational fishing season for gag is closed
i. Whenever the recreational fishing season for gag is open
j. Year-round

Alternative 3: Reduce the recreational minimum size limit for gag from 22 inches total length to

a. 20 inches total length
b. 18 inches total length
c. no minimum size limit

Alternative 4: Establish a recreational slot limit for gag, with the minimum and maximum sizes defined as

a. 19 - 27 inches total length
b. 20 – 29 inches total length

12.2 Recreational Data Collection and Monitoring Programs

This action was considered to be beyond the scope of this amendment. It was removed from Amendment 32 with the intent that it be placed in a more appropriate amendment.

Alternative 1. No Action. Do not implement new data collection and monitoring programs for the recreational grouper fishery**.**

Alternative 2. Collaborate with the states to establish a recreational fish tag program. Reporting of MRIP-consistent data will be required for each tagged fish. The program will be implemented no later than 2012:

a. gag
b. gag and red grouper
c. all shallow-water grouper
d. all grouper

with the number of tags issued to be:

e. no limit, issue tags for monitoring and data collection purposes only
f. the number of fish estimated to fill the annual catch target

Alternative 3: By 2012, Require that permitted reef fish for hire vessels operating in the U.S. Exclusive Economic Zone participate in an electronic logbook program that includes catch and bycatch reporting consistent with the recommendations of MRIP*. Vessel permits will not be renewed for vessels that fail or refuse to participate in the program. The electronic logbook program will apply to:

a. All permitted reef fish for hire vessels
b. A sub-sample of all permitted reef fish for hire vessels.

*Note this requirement would not be effective until NMFS develops and certifies an electronic logbook system which meets the needs of MRIP.

Alternative 4: Collaborate with the states to establish a telephone or web-based system to report MRIP-consistent data. The program will be implemented no later than 2012. Reporting will be:

a. Voluntary
b. Required

The reporting program will be for:

c. the private recreational reef fish fishery
d. the for-hire reef fish fishery
e. both the private and for-hire reef fish fisheries

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