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FINAL

REEF FISH AMENDMENT 30B:

GAG – END OVERFISHING AND SET MANAGEMENT THRESHOLDS AND TARGETS,

RED GROUPER – SET OPTIMUM YIELD TAC AND MANAGEMENT MEASURES,

TIME/AREA CLOSURES,

AND FEDERAL REGULATORY COMPLIANCE

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

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Gulf of Mexico Fishery Management Council
2203 North Lois Avenue, Suite 1100
Tampa, Florida 33607
813-348-1630
813-348-1711 (fax)
888-833-1844 Toll Free
gulfcouncil@gulfcouncil.org
http://www.gulfcouncil.org

National Oceanic & Atmospheric Administration
National Marine Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701
727-824-5308
727-824-5305 (fax)
http://sero.nmfs.noaa.gov

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Table of Contents

ABBREVIATIONS USED IN THIS DOCUMENT **IV**

EXECUTIVE SUMMARY **VII**

FISHERY IMPACT STATEMENT - SOCIAL IMPACT ASSESSMENT **XXII**

INTRODUCTION XXII
PROBLEMS AND METHODS XXII
SOCIAL IMPACT ASSESSMENT DATA NEEDS XXIII

FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS) COVER SHEET **XXVI**

1 INTRODUCTION **1**

1.1 BACKGROUND 1
1.2 STATUS OF THE RED GROUPER AND GAG STOCKS IN THE GULF OF MEXICO 3
1.2.1 Gag Stock Assessment (SEDAR 10) With Subsequent Reanalysis 3
1.2.2 Red Grouper Stock Assessment (SEDAR 12) 11
1.3 PURPOSE AND NEED FOR ACTION 15
1.4 HISTORY OF MANAGEMENT 17

2 MANAGEMENT ALTERNATIVES **25**

2.1 ACTION 1. SET GAG THRESHOLDS AND BENCHMARKS 25
2.2 ACTION 2. RED GROUPER MINIMUM STOCK SIZE THRESHOLD (MOVED TO CONSIDERED BUT REJECTED) 30
2.3 ACTION 3. SET GAG TAC 30
2.4 ACTION 4. SET RED GROUPER TAC 36
2.5 ACTION 5. RED GROUPER AND GAG ALLOCATIONS 41
2.6 ACTION 6. SHALLOW-WATER GROUPER ANNUAL CATCH LIMITS AND ACCOUNTABILITY MEASURES 47
2.7 ACTION 7. SHALLOW-WATER GROUPER, RED GROUPER AND GAG COMMERCIAL QUOTAS 55
2.8 ACTION 8. APPLICATION OF QUOTA CLOSURES 59
2.9 ACTION 9. RECREATIONAL HARVEST OF GAG AND RED GROUPER 67
2.10 ACTION 10. ALTERNATIVES TO REDUCE DISCARD MORTALITY OF GROUPER 89
2.11 ACTION 11. CREATION OF TIME/AREA CLOSURES 93
2.12 ACTION 12. DURATION OF TIME/AREA CLOSURES 105
2.13 ACTION 13. FEDERAL REGULATORY COMPLIANCE 112

3 DESCRIPTION OF THE FISHERY AND AFFECTED ENVIRONMENT **116**

3.1 DESCRIPTION OF GEAR TYPES USED IN THE COMMERCIAL AND RECREATIONAL FISHERIES 116
3.2 DESCRIPTION OF AFFECTED PHYSICAL ENVIRONMENT 118
3.3 DESCRIPTION OF AFFECTED BIOLOGICAL ENVIRONMENT 122
3.4 DESCRIPTION OF THE ECONOMIC AND SOCIAL ENVIRONMENT 130
3.4.1 Commercial Sector 130
3.4.2 Recreational Sector 148

3.4.3 Affected Environment, Social 171
3.4.4 Madeira Beach, Florida (incorporated, pop. 4,511) 174
3.4.5 Panama City, Florida (incorporated, pop. 36,417) 178
3.4.6 St. Petersburg, Florida (incorporated, pop. 248,232) 182
3.5 ADMINISTRATIVE ENVIRONMENT 186

4 BYCATCH PRACTICABILITY ANALYSES 187

5 ENVIRONMENTAL CONSEQUENCES 203

5.1 ACTION 1. SET GAG THRESHOLDS AND BENCHMARKS 203
5.2 ACTION 2. RED GROUPER MINIMUM STOCK SIZE THRESHOLD 209
5.3 ACTION 3. SET GAG TAC 209
5.4 ACTION 4. SET RED GROUPER TAC 221
5.5 ACTION 5. RED GROUPER AND GAG ALLOCATIONS 227
5.6 ACTION 6. SHALLOW-WATER GROUPER ANNUAL CATCH LIMITS AND ACCOUNTABILITY MEASURES 239
5.7 ACTION 7. SHALLOW-WATER GROUPER, RED GROUPER, AND GAG COMMERCIAL QUOTAS 243
5.8 ACTION 8. APPLICATION OF QUOTA CLOSURES 252
5.9 ACTION 9. RECREATIONAL HARVEST OF GAG AND RED GROUPER 266
5.10 ACTION 10. ALTERNATIVES TO REDUCE DISCARD MORTALITY OF GROUPER 281
5.11 ACTION 11. CREATION OF TIME/AREA CLOSURES 293
5.12 ACTION 12. DURATION OF TIME/AREA CLOSURES 308
5.13 ACTION 13. FEDERAL REGULATORY COMPLIANCE 313
5.14 CUMULATIVE EFFECTS ANALYSES (CEA) 319
5.15 UNAVOIDABLE ADVERSE EFFECTS 345
5.16 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY 346
5.17 MITIGATION, MONITORING AND ENFORCEMENT MEASURES 347
5.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES 348
5.19 ANY OTHER DISCLOSURES 349

6. REGULATORY IMPACT REVIEW 350

6.1 INTRODUCTION 350
6.2 PROBLEMS AND ISSUES IN THE FISHERIES 351
6.3 OBJECTIVES 351
6.4 DESCRIPTION OF THE FISHERIES 351
6.5 IMPACTS OF MANAGEMENT ALTERNATIVES 351
6.5.1 Action 1: Set Gag Thresholds and Benchmarks 351
6.5.2 Action 2: Action Moved to the Considered but Rejected Section 352
6.5.3 Action 3: Set Gag TAC 352
6.5.4 Action 4: Set Red Grouper TAC 352
6.5.5 Action 5: Gag and Red Grouper Allocations 353
6.5.6 Action 6: Shallow-water grouper Interim Annual Catch Limits and Accountability Measures 353
6.5.7 Action 7: Shallow Water, Gag and Red Grouper Commercial Quotas 353
6.5.8 Action 8: Application of Quota Closures 354
6.5.9 Action 9: Recreational Harvest of Gag and Red Grouper 354

6.5.10 Action 10: Grouper Discard Mortality Reduction *355*
6.5.11 Action 11: Creation of Time/Area Closures *355*
6.5.12 Action 12: Duration of Time/Area Closures *356*
6.5.13 Action 13: Federal Regulatory Compliance *356*
6.6 PRIVATE AND PUBLIC COSTS 356
6.7 DETERMINATION OF SIGNIFICANT REGULATORY ACTION 357
7 REGULATORY FLEXIBILITY ACT ANALYSIS 357
8 OTHER APPLICABLE LAW 370
9 LIST OF PREPARERS 377
10 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE AMENDMENT/EIS ARE SENT 377
11 PUBLIC HEARING LOCATIONS AND DATES 378
12 SCOPING HEARING SUMMARIES 378
13 ALTERNATIVES CONSIDERED BUT REJECTED 401
ACTION 2. RED GROUPER MINIMUM STOCK SIZE THRESHOLD 401
ACTION 8. APPLICATION OF QUOTA CLOSURES 402
ACTION 9. RECREATIONAL HARVEST OF GAG AND RED GROUPER 408
ACTION 10. ALTERNATIVES TO REDUCE DISCARD MORTALITY OF GROUPER 410
14 REFERENCES 413
15 INDEX 424
16 RESPONSE TO COMMENTS ON DEIS 428

ABBREVIATIONS USED IN THIS DOCUMENT

AA	Assistant Administrator for Fisheries
ABC	Allowable Biological Catch
ACL	Annual Catch Limit
ALS	Accumulated Landings System (commercial fishing statistics)
AM	Accountability Measures
APA	Administrative Procedures Act
ASPIC	A Stock Production Model Incorporating Covariates
B	Biomass
BiOp	Biological Opinion
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality
CFLP	Coastal Fisheries Logbook Program
CFR	Code of Federal Regulations
CMP	Coastal Migratory Pelagic
COI	Certificate of Inspection
Council	Gulf of Mexico Fishery Management Council
CPI	Consumer Price Index
CPUE	Catch Per Unit Effort
CZMA	Coastal Zone Management Act
DQA	Data Qualtiy Act
DEIS	Draft EIS
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ELMR	Estuarine Living Marine Resources
E.O.	Executive Order
ESA	Endangered Species Act
F	Instantaneous Fishing Mortality Rate
FAO	Food and Agriculture Organization
FEIS	Final EIS
FL	Fork Length
FLS	Fisheries Logbook System
FMP	Fishery Management Plan
FR	Federal Register
GAJ	Greater Amberjack
GMFMC	Gulf of Mexico Fishery Management Council
GOM	Gulf of Mexico
GOMFF	Gulf of Mexico Finfish
GOMRF	Gulf of Mexico Reef Fish
GTF	Gray Triggerfish
GULFFIN	Gulf Fisheries Information Network
HAPC	Habitat Area of Particular Concern

IFQ	Individual Fishing Quota
IRFA	Initial Regulatory Flexibility Analysis
M	Natural Mortality Rate
MFMT	Maximum fishing mortality threshold (overfishing threshold)
MMPA	Marine Mammal Protection Act
mp	million pounds
MRFSS	Marine Recreational Fisheries Statistics Survey
MSFCMA	Magnuson-Stevens Fisheries Conservation and Management Act
MSRA	Magnuson-Stevens Reauthorization Act
MSST	Minimum stock size threshold (overfished threshold)
MSY	Maximum sustainable yield
NMFS	National Marine Fisheries Service (NOAA Fisheries)
NEPA	National Environmental Policy Act
NOAA	National Oceanic & Atmospheric Administration
NOS	National Ocean Service
OMB	Office of Management and Budget
OY	Optimum yield
PRA	Paperwork Reduction Act
RA	Regional Administrator, SERO
RFA	Regulatory Flexibility Act
RFFA	Reasonalbly Foreseeable Future Action
RFSAP	Reef Fish Stock Assessment Panel
RIR	Regulatory Impact Review
SAV	Submerged Aquatic Vegetation
SAFMC	South Atlantic Fishery Management Council
SEIS	Supplemental EIS
SEAMAP	Southeast Area Monitoring and Assessment Program
SEFSC	Southeast Fisheries Science Center
SEDAR	Southeast Data, Assessment and Review
SERO	Southeast Regional Office (NMFS)
SFA	Sustainable Fisheries Act of 1996
SIA	Social Impact Assessment
SL	Standard Length
SMZ	Special Management Zone
SPR	Spawning Potential Ratio
SSB	Spawning Stock Biomass
SSBR	Spawning Stock Biomass per Recruit
SSC	Scientific and Statistical Committee
TAC	Total allowable catch
TIP	Trip Interview Program
TL	Total length
TPWD	Texas Parks and Wildlife Department
USGC	U. S. Coast Guard
VEC	Valued Environmental Component
VPA	Virtual Population Analyses
wF	West Florida

VMS	Vessel Monitoring System
YPR	Yield per Recruit

EXECUTIVE SUMMARY

Stock assessments were conducted in 2006 under the Southeast Data, Assessment and Review (SEDAR) process for gag (SEDAR 10) and red grouper (SEDAR 12), with additional analyses conducted in 2007. Both assessments were subsequently re-evaluated, resulting in corrections to some of the gag data inputs. While red grouper was found to have fully recovered from its previous condition of overfished and undergoing overfishing, gag were found to be undergoing overfishing as of 2004. The overfished status for gag is undetermined since gag do not have a Sustainable Fisheries Act (SFA) compliant definition for minimum stock size threshold (MSST). However, under any MSST definition considered in this amendment, gag was not overfished in 2004.

Red grouper were placed under a rebuilding plan in 2004. The stock had been found to be overfished and undergoing overfishing in both a 1999 stock assessment and a subsequent 2002 assessment. 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. The red grouper quota was reached, and the commercial shallow-water grouper fishery closed, on November 15, 2004. In order to extend the 2005 season, stepped commercial grouper trip limits (10,000, 7,500, and 5,500 pounds) were adopted. For 2006 and later, a fixed 6,000 pound grouper trip limit was adopted.

For the recreational sector, landings data indicated that the recreational red grouper allocation was being exceeded despite the red grouper bag limit. Consequently, in 2005 an interim rule intended to reduce the red grouper bag limit from two to one fish per person per day, reduce the aggregate grouper bag limit from five to three grouper per day, and implement a one-time closure of the recreational fishery, from November - December 2005, for all grouper species. The rule was challenged by organizations representing recreational fishing interests, and 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 grouper other than red 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 were allowed to proceed. The one red grouper bag limit was made permanent in a 2006 regulatory amendment, which also prohibited for-hire vessel captains and crews from retaining bag limits of any grouper while under charter, and 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.

The most recent SEDAR 12 stock assessment for red grouper was completed in early February 2007. Although this assessment confirmed the findings of the previous two assessments that the red grouper stock was overfished in the 1990s, it estimated that the red grouper estimated spawning stock exceeded SS_{MSY} starting in 1999, and that the current (2005) stock status was close to its OY biomass level. Consequently, the red grouper rebuilding plan could be replaced with a management policy to maintain the stock at its OY level.

The objectives of this amendment and associated EIS are fourfold. The first objective is to define MSST and OY, and to possibly redefine MFMT, and to set a TAC and management measures that will end overfishing of gag. Because the red grouper stock has recovered from an overfished state, the second objective is to increase red grouper TAC consistent with a level that would achieve OY. Two other objectives of this amendment are to co-manage gag and red grouper by implementing concurrent management measures, and to consider the expansion of the existing restricted fishing areas or to create new time/area closures to better protect gag stocks. Amendment 30B and its accompanying EIS analyze 12 actions not including Action 2 (Set Red Grouper MSST) which was considered, but rejected. In these 12 actions, 42 alternatives are considered, many of which have suboptions. These actions and management alternatives considered by the Council are listed in Table 1 and are summarized as follows:

Action 1 – Set Gag Thresholds and Benchmarks sets the SFA thresholds (MFMT and MSST) and target (OY) for gag. Aside from the no action alternative, the alternatives provide a choice of thresholds based on either maximum yield per recruit or 30% spawning potential ratio (SPR) The stock would be considered to be undergoing overfishing as of 2004 under all alternatives for defining MFMT (Table 2.1.2), but is not overfished under any of the overfished (MSST) thresholds under consideration. The **Preferred Alternative 2**, based on recommendation of the SEDAR assessment workgroup and their predecessor Reef Fish Stock Assessment Panel that for protogynous hermaphroditic fish yield per recruit is a better indicator of overall health of the stock than SPR, is Alternative 2(a)(e): base thresholds and benchmarks on maximum yield per recruit, with the minimum stock size threshold (MSST) set equal to (1-M)*SSB_{MAX}, and optimum yield (OY) set equal to the yield at 75 percent of F_{MAX}.

Action 2 originally contained alternatives to redefine the red grouper MSST to be compatible with the gag MSST. However, during development of the amendment the Council determined that such action would not be necessary. The alternatives were moved to the Considered but Rejected section (Section 13), but the section number and heading were retained for consistency with earlier versions of the amendment.

Action 3 – Set Gag TAC contains alternatives to set the gag total allowable catch (TAC). There are four alternatives in addition to the no action alternative. **Preferred Alternative 2** and Alternative 3 base TAC on fishing at the OY level, which is the ultimate management goal under National Standard 1. Alternatives 4 and 5 base TAC on the less restrictive MSY level, using maximum yield per recruit as a proxy for MSY (or 30% SPR if that proxy is adopted for setting thresholds in Action 1). This is sufficient to meet the statutory requirement to end overfishing immediately, but will not achieve the long-term OY target without further reductions. For each pair of alternatives (OY or MSY based TAC) there are two ways to implement the TAC. The even numbered alternatives (**Preferred Alternative 2** and Alternative 4) allow TAC to increase every year for the first three years (2009-2011) in accordance with the projected rebuilding of the stock. After 2011, TAC would not be increased until a future regulatory amendment is implemented. It is assumed that catch rates will increase proportionately with the increase in stock biomass. Consequently, no adjustments to management measures are expected other than increases in the commercial quota and recreational allocation. The odd-numbered alternatives (3 and 5) take into account uncertainty by being slightly more conservative. These alternatives keep TAC at the first year level for a three-year period, 2009-2011. Any future increase in TAC would require an amendment. The disadvantage of this approach is that, as catch rates increase in response to a rebuilding stock, commercial quotas will be filled earlier and earlier during each three year period, and the recreational sector is increasingly likely to exceed its allocation and trigger accountability measures (Action 6). A new stock assessment is expected in 2009, but if there is a delay in the stock assessment, the TAC will remain at the year 3 level until an assessment can be conducted.

Action 4 – Set Red Grouper TAC contains alternatives to adjust the red grouper TAC. There are two alternatives in addition to the no action alternative. **Preferred Alternative 2** raises TAC to the equilibrium OY level, while Alternative 3 raises TAC to the higher equilibrium MSY level. This TAC will be used as the annual catch target (ACT) in Action 6, while the highest ABC recommended by the SSC (7.72 mp) will become the annual catch limit (ACL). Since the stock is fully rebuilt and is expected to stay in equilibrium except for random or cyclic annual variations, no subsequent changes in TAC should be needed unless there is a change in the status of the stock. After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs at the equilibrium OY or MSY level or the yield at F_{OY} or F_{MSY}, whichever is less.

Action 5 – Red Grouper and Gag Allocations sets the commercial and recreational allocations for the gag and red grouper stocks. Amendment 1 set an allocation of 65:35 (commercial:recreational) for groupers in aggregate, but it did not set allocations for individual grouper species. Grouper landing data by species does not exist for most of the 1979-1987 base period for setting allocations. The TAC framework procedure allows alternate criteria to be used, provided the criteria are adopted in a plan amendment. Alternative 1 uses the default base period to the extent possible. Only 1986-1987 landings data are available, so those years are used to set the allocations. Alternative 2 uses the recent five-year landings average (2001-2005), which reflects current usage of the resource, and thus would cause the least disruption in the fishery. **Preferred Alternative 3** uses the full landings time series that is available (1986-2005), which provides a robust allocation that reduces the influence of short-term shifts, but may not reflect recent changes in use of the resource. The variation in allocations between the three alternatives is a maximum of six percent for gag, and one percent for red grouper.

Action 6 – Shallow-water grouper annual catch limits and accountability measures, contains four alternatives to establish accountability measures (AMs) and annual catch limits (ACLs) and catch targets (ACTs) for red grouper and gag for the years 2009-2001 in accordance with new requirements under the Magnuson-Stevens Reauthorization Act of 2007. Alternative 1 would not establish ACLs and AMs for grouper. The Council would be required in a subsequent amendment to develop grouper ACLs and AMs. Alternatives 2 and 4 would set gag and red grouper ACLs by recreational and commercial allocation at the yields associated with F_{OY}. Alternative 3 and **Preferred Alternative 5** would set gag and red grouper ACLs at the yields associated with F_{MAX} (gag) and equilibrium MSY (red grouper), and would set ACTs at the yields associated with F_{OY} (gag) and equilibrium OY (red grouper). No ACL would be established for the entire recreational shallow-water grouper (SWG) complex, since SWG other than red grouper and gag represent a small percentage of the overall recreational SWG catch and landings data for SWG species (other than gag, black grouper, and red grouper) is less precisely estimated through existing surveys. For the commercial SWG fishery, the ACL would be set equal to the sum of gag and red grouper yields associated with either F_{OY} or $F_{MAX/MSY}$ (gag) plus equilibrium OY or MSY (red grouper) plus 0.68 million pounds for other SWG. Under Alternatives 2 and 4, the ACLs would equal the commercial quota or recreational target catch level. These alternatives would provide no buffer between quotas/target catch levels and the ACL, and therefore would be more conservative than Alternative 3 and **Preferred Alternative 5**. Alternative 3 and **Preferred Alternative 5** would provide a buffer between the quota/target catch level and ACL. This would provide greater flexibility in the event overages occur, but may also increase the likelihood of overfishing occurring. Alternative 4 and **Preferred Alternative 5** differ from Alternatives 2 and 3 in that multiyear averages would be used to monitor compliance with ACLs and implement AMs. Under all four alternatives, the Assistant Administrator (AA) would close the commercial or recreational SWG fishery if the ACL for gag, red grouper, or SWG (commercial only) is exceeded. Additionally, if the ACL is exceeded, the AA would file a notice maintaining the prior year red grouper, gag, or SWG quota/target catch level in the following fishing year. The AA may also shorten the length of the recreational fishing season in the following year to ensure recreational landings do not exceed the specified target catch level for that year. Proposed NMFS guidelines for implementing AMs and ACLs have recently been published and will be finalized later in 2008. At this time, the AMs and ACLs adopted in this amendment are consistent with the proposed guidelines. After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs at the equilibrium OY or MSY level or the yield at F_{OY} or F_{MSY}, whichever is less. They will also ensure the ACLs and AMs are consistent with the NMFS final guidelines.

Action 7 – Shallow-water Grouper, Red Grouper, and Gag Commercial Quotas contains alternatives to adjust the commercial aggregate shallow-water grouper quota and the red grouper and gag species quotas. The no action alternative leaves the aggregate and red grouper quotas at their current levels, and leaves the gag quota undefined. For Alternative 2 and **Preferred Alternative 3**, the red grouper and gag species quota levels are determined from their respective TACs (Actions 3 and 4) and allocations (Action 5). The aggregate quota is then the sum of the gag and red grouper quotas plus an additional amount to account for other shallow-water grouper species. Alternative 2 and **Preferred Alternative 3** differ only in the amount of allowance for the other groupers. Alternative 2 uses a baseline of 1999-2001 (0.32 mp) for consistency with Secretarial Amendment 1, while **Preferred Alternative 3** uses a more recent baseline of 2001-2004 (0.41 mp). Depending upon the red grouper and gag TACs and allocations, the other shallow-water grouper species component accounts for 7 to 9 percent of the aggregate quota under Alternative 2, and 1 to 8 percent under **Preferred Alternative 3**.

Action 8 – Application of Quota Closures contains alternatives regarding the type of closure or partial closure that will occur when one or more of the commercial quotas in Action 7 are reached. The no action alternative leaves in place a closure of the commercial shallow-water grouper fishery when either the shallow-water grouper quota or the red grouper quota is reached (whichever comes first). No action would be taken when the gag quota is reached. In this situation, the gag quota would become simply a target catch level; however, Action 6 would give the AA authority to close the SWG fishery if the gag quota is reached. Under this alternative, accountability measures would be needed in a subsequent amendment to respond to gag overharvest. Alternative 2 extends the existing closure method to include the gag quota, i.e., the commercial shallow-water grouper fishery closed when any of the shallow-water grouper quota, red grouper quota, or gag quota is reached (whichever comes first). One concern for this method is that it leaves one or more of the grouper quotas unfilled. **Preferred Alternative 3** addresses this concern while also attempting to avoid unnecessary discard mortality by establishing a gag or red grouper incidental harvest trip limit once 80 percent of the species quota is reached. The preferred incidental harvest trip limit of 200 pounds for the species at 80 percent of quota would allow the shallow-water grouper fishery to continue, but would only allow fishermen to retain gag or red grouper as a small amount/percentage of their grouper catch for each trip. Alternative 4 would make gag a bycatch only fishery in the commercial sector by limiting commercial gag harvest at all times to a incidental harvest trip limit of 300 to 1,000 pounds or to 15 to 20 percent of the grouper catch on a trip.

Action 9 – Recreational Harvest of Gag and Red Grouper contains alternatives for managing the recreational grouper fishery. The alternatives in this section attempt to achieve target harvest levels for both red grouper and gag through a combination of bag limits, size limits and closed seasons. Priority is given to achieving the needed reduction in gag harvest since that stock is undergoing overfishing, and to maximizing the number of open days in the fishing season for a given gag harvest target. This section presents the no action alternative plus five alternatives to achieve reductions in gag harvest. During development of this amendment, the Council decided that the alternatives should not include aggregate bag limits higher than three fish, nor should they include any increase in size limits due to the likelihood of increased discard mortality. The alternatives under consideration in this amendment comply with these parameters; however, other scenarios, including some with larger size limits or bag limits, are shown for comparison in Tables 2.9.10 and 2.9.11. Alternative 1 is the no action alternative, and would neither reduce gag nor increase red grouper harvest. Alternatives 2 through 6 are all intended to reduce gag harvest by better than the 41 percent reduction needed from the 2004-2006 baseline average annual catch needed to achieve F_{OY} in 2009. Alternatives 2, 3 and 6 would allow recreational red grouper harvest to increase, while Alternatives 4 and 5 would result in a decrease in recreational red grouper harvest. During public hearings, the Council received testimony that a portion of the 41 percent reduction has already been achieved through reductions in recreational effort due to high fuel prices or other factors, but a reliable value to assign to this reduction could not be determined. **Preferred Alternative 7** is intended to achieve an estimated 26 percent reduction in recreational gag harvest, which is greater than the minimum reduction needed to end overfishing. Additional reductions from reduced effort will further reduce fishing mortality and will help to achieve the ultimate target of F_{OY}. **Preferred Alternative 7** proposes a gag bag limit of 2 fish per person per day within the aggregate bag limit, a red grouper bag limit of 2 fish per person per day within the aggregate bag limit, an aggregate bag limit of 4 grouper total per person per day, and a recreational shallow-water grouper closed season of February 1-March 31 (306 day season, reduces gag 26 percent, increases red grouper 17 percent).

Action 10 – Alternatives to Reduce Discard Mortality of Grouper contains alternatives to reduce discard mortality of grouper. Alternative 1 does not propose new measures, but notes that NMFS implemented on June 1, 2008 an action from Amendment 27 that requires non-stainless steel circle hooks, venting tools and dehooking devices on board all vessels fishing for reef fish in the Gulf EEZ. Alternative 2 is an educational approach, requiring pamphlets or prominently displayed placards that provide instructions on venting and proper handling and release methods on board reef fish vessels. **Preferred Alternative 3** reduces regulatory discards on commercial grouper vessels by reducing the minimum size limit on one or more shallow-water grouper species that have a size limit. The preferred options are to reduce the red grouper commercial size limit to 18 inches total length, and to apply the new size limit to the entire commercial grouper fishery. No other grouper size limits would be changed. Since implementation of the 22 inch recreational and 24 inch commercial gag minimum size limits in 2000, dead discards have accounted for about 1.3 percent of total commercial gag removals, and 23 percent of the total recreational gag removals by weight (SEDAR 2007a, b). For red grouper during the same period, dead discards have accounted for about 12 percent of total commercial removals, and 14 percent of total recreational removals by weight (Table 1, SEDAR 10 2006).

Action 11 – Creation of Time/Area Closures contains alternatives to create a new time/area closure during the gag spawning season, or expand the existing Madison-Swanson and/or Steamboat Lumps restricted fishing areas. The Madison-Swanson and Steamboat Lumps restricted fishing areas were created in 2000 primarily to protect a portion of the spawning aggregations of gag and to protect a portion of the male gag population, which tends to remain offshore year-round. They were also created to evaluate the effectiveness of time/area closures as a fishery management tool. Since the 1970s, male gag have decreased from about 17 percent of the gag population to as little as 2 percent. Researchers have suggested that the existing Madison-Swanson and Steamboat Lumps restricted fishing areas are too small to be an effective tool for regulation of fishing impacts, and that much larger MPAs would be needed to protect a range of species from fishing suffered during life-cycle offshore movement (GMFMC 2007a). **Preferred Alternative 2** in this action contains options to create a new seasonal time/area closure located between the existing Madison-Swanson and Steamboat Lumps restricted fishing areas in either of two ways; either as a rectangular area over Snyder Ridge (127 nautical square miles, approximately the same size as the existing restricted fishing areas), or (**Preferred**) as an elongated parallelogram shaped area that spans 37 nautical miles along the 40-fathom contour and covers 390 nautical square miles. Options allow seasonal fishing restrictions within the new area to be either the same as in the existing restricted fishing areas (no fishing November-April, surface trolling only allowed May-October), or as an area-specific seasonal closure in which all fishing would be prohibited during part of the year encompassing all or most of the gag spawning season (December-April or (**Preferred**) January-April, or March-April) and all fishing would be allowed the remainder of the year (May-October or (**Preferred**) May-December, or May-February. It is the Council's intent that, if a seasonal area closure is implemented to protect gag spawning aggregations, the commercial February 15 to March 15 closed season on gag, black grouper and red grouper will be repealed. Alternative 3 would expand the current Madison-Swanson restricted fishing area to encompass an additional 70 nautical square miles of habitat to the north and west of the existing boundary. Alternative 4 would create cross-shelf restricted fishing areas as recommended by the Council's Ecosystem SSC (GMFMC 2007a) by extending the Madison-Swanson restricted fishing area northward to the federal-state boundary, and the Steamboat Lumps restricted fishing area eastward to the federal-state boundary.

Action 12 – Duration of Marine Time/Area Closures accompanies Action 11 by presenting alternatives for the duration of the time/area closures. The Madison-Swanson and Steamboat Lumps restricted fishing areas were initially created in 2000 for a four year period and then extended for six additional years. They will expire June 16, 2010 unless action is taken in a plan amendment to further extend their existence. Alternatives in this section include options to extend the duration of the Madison-Swanson and Steamboat Lumps restricted fishing areas as well as to set the duration for any new time/area closures created in Action 11. The alternatives range from allowing all restricted fishing areas including newly created one to expire on June16, 2010, to setting a sunset date for 10 years from implementation, to allowing the areas to remain in effect indefinitely, until repealed in a subsequent amendment. All of the alternatives require that the restricted fishing areas be monitored for effectiveness. There are two preferred alternatives for this action. **Preferred Alternative 1** continues the duration of the new time/area closure from Action 11 indefinitely unless terminated in a subsequent amendment and Preferred **Alternative 4b** continues the Madison-Swanson and Steamboat Lumps restricted fishing areas indefinitely unless terminated in a subsequent amendment.

Action 13 – Federal Regulatory Compliance contains an alternative to improve compliance with federal management regulations by federally permitted commercial and recreational for-hire reef fish vessels. While NMFS and state fishery management agencies usually attempt to work cooperatively to implement consistent regulations, both for enforceability and effectiveness of management, there are occasionally situations in which federal and some state regulations differ. When there are less restrictive regulations in state waters, the effectiveness of the federal regulations is diminished. In order to stay within rebuilding requirements or prevent overfishing, the regulations for federal waters and in the remaining states may need to be tightened as a result. This creates an unfair burden for the remaining states, and may be in conflict with National Standard 4, which requires that conservation and management measures not discriminate among residents of different states. In order to improve effectiveness of federal management measures, **Preferred Alternative 2** of this action requires that all 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. This alternative only affects federally permitted vessels fishing for reef fish. It does not affect vessels fishing for non-reef fish species, nor does it affect commercial and for-hire vessels without federal reef fish permits that fish exclusively in state waters, nor does it affect private recreational fishing vessels for which there is no federal permit requirement.

Table 1. Actions and alternatives considered by the Council in Amendment 30B.

Action 1. Set Gag Thresholds and Benchmarks	**Alternative 1: No Action - MSST = $SSB_{20\%SPR}$, MFMT = $F_{30\%SPR}$, and OY = the yield at $F_{20\%SPR}$.**
	***Preferred* Alternative 2: Set MFMT equal to F_{MAX}, set MSST equal to:** ***Preferred* Option a. (1-M)*SSB_{MAX} (M = 0.15)** **Option b. 0.75*SSB_{MAX}** **Option c. 0.50*SSB_{MAX}** **and set OY equal to:**

	Option d. the yield at 60 percent of F_{MAX} ***Preferred* Option e. the yield at 75 percent of F_{MAX}** **Option f. the yield at 90 percent of F_{MAX}**
	Alternative 3: Maintain MFMT at $F_{30\%SPR}$, set MSST equal to: **Option a. (1-M)*$SSB_{30\%SPR}$ (M = 0.15)** **Option b. 0.75*$SSB_{30\%SPR}$** **Option c. 0.50* $SSB_{30\%SPR}$** **and set OY equal to:** **Option d. the yield at 60 percent of $F_{30\%SPR}$** **Option e. the yield at 75 percent of $F_{30\%SPR}$** **Option f. the yield at 90 percent of $F_{30\%SPR}$**
Action 2. Red Grouper Minimum Stock Size Threshold	**(moved to Considered but Rejected)**
Action 3. Set Gag TAC	**Alternative 1. No action. Do not set a gag TAC. Gag TAC remains undefined.**
	***Preferred* Alternative 2. Set TAC for 2008-2012 at constant F_{OY} yield. TAC in 2009 would be 3.38 mp, TAC in 2009 would be 3.62 mp, and TAC in 2010 would be 3.82 mp. TACs for subsequent years would be set in a subsequent amendment, and would remain at the 2011 level until such an amendment is implemented.**
	Alternative 3. Set TAC for 2008-2012 on a three year stepped basis using the first year of each interval as defined by the constant F_{OY} projection. During the first three-year interval, 2009 through 2011, TAC would be 3.38 mp. TAC for subsequent three-year intervals would be set through a subsequent amendment, and would remain at the previous level until such an amendment is implemented.
	Alternative 4. Set TAC for 2008-2012 at constant F_{MAX} yield. TAC in 2009 would be 4.25 mp, TAC in 2010 would be 4.39 mp, and TAC in 2011 would be 4.50 mp. TACs for subsequent years would be set in a subsequent amendment, and would remain at the 2011 level until such an amendment is implemented.
	Alternative 5. Set TAC for 2008-2012 on a three year stepped basis using the first year of each interval as defined by the constant F_{MAX} projection. During the first three-year interval, 2009 through 2011, TAC would be 4.25 mp. TAC for subsequent three-year intervals would be set through a subsequent amendment, and would remain at the previous level until such an amendment is implemented.
Action 4. Set Red Grouper TAC	**Alternative 1. No action. Do not change the red grouper TAC. Remain at 6.56 mp gutted weight**

	Preferred Alternative 2. Set red grouper TAC at the constant catch level corresponding to fishing at equilibrium F_{OY}. TAC would be 7.57 mp gutted weight.
	Alternative 3. Set red grouper TAC at the constant catch level corresponding to fishing at equilibrium F_{MSY}. TAC would be 7.72 mp gutted weight.
Action 5. Red and Gag Grouper Allocations	**Alternative 1. No Action. Use 1986-1987 landings. Maintain recreational:commercial proportions for gag at 65:35, red grouper at 23:77.**
	Alternative 2. No Action. Functional Status Quo (most recent years). The recreational:commercial proportions based on 2001-2005 average landings for gag at 59:41, red grouper at 24:76.
	Alternative 3. Interim allocation. The recreational:commercial proportions based on 1986-2005 average for gag at 61:39, red grouper at 24:76.
Action 6. Shallow-water grouper Annual Catch Limits and Accountability Measure	**Alternative 1. No action. Do not establish annual catch limits or accountability measures for shallow-water grouper (SWG).**
	Alternative 2. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the AA for Fisheries will file a notification closing the entire commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits specified in Table 6.1, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If recreational landings, as estimated by the SEFSC, reach or are projected to reach the red grouper or gag target catch level specified in Table 6.1, then the AA would file a notification closing the entire recreational SWG fishery for the remainder of the fishing year. In addition, if despite such a closure, recreational red grouper or gag landings exceed the respective annual catch limits specified in Table 6.1, then the AA would file a notification maintaining the prior year red grouper or gag target catch level and reduce the length of the recreational SWG season by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target allowable catches for that following fishing year. Landings will be evaluated relative to the applicable ACLs on an annual basis for the years 2009-2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.
	Alternative 3. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the AA for Fisheries will file a notification closing the commercial SWG fishery in accordance with the

	application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits specified in Table 6.2, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If recreational landings, as estimated by the SEFSC, reach or are projected to reach the red grouper or gag target catch level specified in Table 6.2, then the AA would file a notification closing the entire recreational SWG fishery for the remainder of the fishing year. In addition, if despite such a closure, recreational red grouper or gag landings exceed the respective annual catch limits specified in Table 6.2, then the AA would file a notification maintaining the prior year red grouper or gag target catch level and reduce the length of the recreational SWG season by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target allowable catches for that following fishing year. Landings will be evaluated relative to the applicable ACLs on an annual basis for the years 2009-2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.
	Alternative 4. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the Assistant Administrator (AA) for Fisheries will file a notification closing the commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits (ACL) specified in Table 6.3, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If annual recreational landings, as estimated by the SEFSC following the conclusion of the fishing year, exceed the red grouper or gag ACLs specified in Table 6.3, the AA would file a notification maintaining the prior year red grouper or gag target catch level. In addition, the notification would reduce the length of the recreational SWG 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. Recreational landings will be evaluated relative to the applicable ACLs as follows: For 2009, only 2009 red grouper and gag landings will be compared to the ACLs specified for 2009; in 2010, the average of 2009 and 2010 red grouper and gag landings will be compared to ACLs specified for 2010; and in 2011, the average of 2009-2011 red grouper and gag landings will be compared to ACLs specified for 2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.

	Preferred **Alternative 5. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the Assistant Administrator (AA) for Fisheries will file a notification closing the commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits (ACL) specified in Table 6.4, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If recreational landings, as estimated by the SEFSC following the conclusion of the fishing year, exceed the red grouper or gag ACLs specified in Table 6.4, the AA would file a notification maintaining the prior year red grouper or gag target catch level. In addition, the notification would reduce the length of the recreational SWG 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. Recreational landings will be evaluated relative to the applicable ACLs as follows: For 2009, only 2009 red grouper and gag landings will be compared to the ACLs specified for 2009; in 2010, the average of 2009 and 2010 red grouper and gag landings will be compared to ACLs specified for 2010; in 2011, the average of 2009-2011 red grouper and gag landings will be compared to ACLs specified for 2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.**
Action 7. Shallow-Water Grouper, Red Grouper and Gag Commercial Quotas	**Alternative 1. No action. Do not adjust the red grouper or shallow-water grouper quotas and do not specify a quota for gag. SWG would remain 8.80 mp and red grouper at 5.31 mp.**
	Alternative 2. Set the commercial gag and red grouper quotas by multiplying the TAC for each year by each species' commercial allocation. The allowance for the commercial other shallow water grouper will be 0.32 mp and the aggregate commercial shallow-water grouper quota is the sum of the gag and red grouper quotas, and other shallow-water grouper allowance.
	Preferred **Alternative 3. Set the commercial gag and red grouper quotas by multiplying the TAC for each year by each species' commercial allocation. The allowance for the commercial other shallow water grouper will be 0.41 mp and the aggregate commercial shallow-water grouper quota for each year is the sum of the gag and red grouper quotas, and other shallow-water grouper allowance.**

Action 8. Application of Quota Closures	**Alternative 1. No action. The commercial shallow-water grouper fishery closes when either the red grouper quota or the shallow-water grouper quota is reached, whichever comes first.**
	Alternative 2. The commercial shallow-water grouper fishery closes when either the red grouper quota, gag quota, or shallow-water grouper quota is reached, whichever comes first.
	***Preferred* Alternative 3: When 80 percent of the gag or red grouper quota is reached or projected to be reached, the directed fishery for the applicable species would be closed; however, an incidental harvest trip limit would be allowed until either the gag, red grouper, or shallow-water grouper quota is reached or projected to be reached, upon which the shallow-water grouper fishery would close. The incidental harvest trip limit provision would not be implemented unless the quota for the applicable species is projected to be harvested prior to the end of the fishing year. If implemented, the incidental harvest trip limit would be:** **Option a: 100 pounds.** ***Preferred* Option b: 200 pounds.** **Option c: 500 pounds.**
	Alternative 4. The commercial shallow-water grouper fishery closes when either the red grouper quota, gag quota, or shallow-water grouper quota is reached, whichever comes first. For gag, a trip limit would apply to extend the grouper fishing year. The gag trip limit would be: **Option a: 300 pounds or** **Suboption i: 15 percent of the grouper caught on a trip, whichever is greater.** **Suboption ii: 20 percent of the grouper caught on a trip, whichever is greater.** **Option b: 300 pounds.** **Option c: 500 pounds.** **Option d: 1,000 pounds**
Action 9. Recreational harvest of gag and red grouper	**Alternative 1. No action. Maintain the red grouper minimum size limit at 20 inches TL and the gag minimum size limit at 22 inches TL, maintain the February 15 to March 15 recreational closure for gag, red grouper, and black grouper, maintain the recreational bag limit for red grouper at 1 fish per person per day within the 5-grouper aggregate bag limit. (336 day season)**
	Alternative 2. Establish **- a gag bag limit of 1 fish per person per day within the aggregate bag limit** **- no red grouper bag limit (catch up to the aggregate)** **- aggregate grouper bag limit of 3 fish per person** **- a January 15 through April 15 closed season on shallow-water grouper**

	Alternative 3. Establish **- a gag bag limit of 1 fish per person per day within the aggregate bag limit** **- two red grouper bag limit** **- aggregate grouper bag limit of 3 fish per person,** **- February 1 through April 30 closed season on shallow-water grouper**
	Alternative 4. Establish **- a gag bag limit of 2 fish per person per day within the aggregate bag limit** **- no red grouper bag limit (catch up to the aggregate)** **- aggregate grouper bag limit of 3 fish per person** **- a Jan 1 through May 15 closed season on shallow-water grouper**
	Alternative 5. Establish **- aggregate grouper bag limit of 3 fish per person** **- no species-specific grouper bag limit** **- gag rec size limit remains 22-inch TL** **- red grouper rec size limit remains 20-inch TL** **- January 1 through May 21 closed season**
	Alternative 6. Establish: **- aggregate grouper bag limit of 3 fish per person** **- gag bag limit of 1 fish within the aggregate bag limit** **- no red grouper bag limit (catch up to the aggregate)** **- gag size limit is reduced to 20-inch TL** **- red grouper size limit remains 20-inch TL** **- December 1 through April 30 closed season on shallow water grouper**
	***Preferred* Alternative 7. Establish a gag bag limit of 2 fish per person per day within the aggregate bag limit, a red grouper bag limit of 2 fish per person per day within the aggregate bag limit, an aggregate grouper bag limit of four fish per person per day, and a shallow-water grouper closed season from:** **Option a. February 15-March 31 (320 day season, reduces gag 23%, increases red 19%)** **Option b. June 1-July 31 (304 day season, reduces gag 26%, reduces red 6%)** **Option c. September 15-November 25 (303 day season, reduces gag 25%, increases red 14%)** **Option d. November 1-December 31 (304 day season, reduces gag 26%, increases red 19%)** ***Preferred* Option e. February 1-March 31 closure (306 day season, reduces gag 26%, increases red 17%)**

Action 10. Alternatives to Reduce Discard Mortality of Grouper	**Alternative 1: No action. Do not require any new equipment or implement any new regulations to reduce bycatch.**
	Alternative 2: Require pamphlets or prominently displayed placards on board reef fish fishing vessels.
	***Preferred* Alternative 3: Reduce the minimum size limit for commercial SWG to:** **Option a: 18-inches TL for black, gag, red and yellowfin grouper (scamp remains** **Option b: 16-inches TL for black, gag, red, yellowfin and scamp** **Option c: 14-inches TL for black, gag, red, yellowfin and scamp** **Option d: no minimum size limit on any grouper species** ***Preferred* Option e: 18-inches TL for red grouper only** **This lower minimum size limit would apply to the:** ***Preferred* Suboption i: The commercial longline shallow-water grouper fishery.** **Suboption ii: The entire commercial shallow-water grouper fishery**
Action 11. Creation of Time/Area Closures	**Alternative 1. No Action. Do not create any additional time/area closures.**
	Alternative 2. Establish a new time/area closure within the gag spawning area: **Option a. Snyder Ridge** **Option b. The Edges 40 fathom contour area** **Option i. All fishing prohibited November through April, surface trolling allowed May through October.** **Option ii. all fishing prohibited November through April, all fishing allowed May through October.** ***Preferred* Option iii. all fishing prohibited January through April, all fishing allowed May through December.** **Option iv. all fishing prohibited March through April, all fishing allowed May through February.**
	Alternative 3. Expand the Madison-Swanson Marine restricted fishing area to the north and west

	Alternative 4. Expand Madison-Swanson and Steamboat Lumps restricted fishing areas into a network of cross-shelf restricted fishing areas.
Action 12. Duration of Time/Area Closures	***Preferred* Alternative 1. No action. Time/area closures created under Action 11 will be monitored for effectiveness, and will remain in effect unless terminated in a subsequent amendment.**
	Alternative 2. Time/aArea closures created under Action 11 will be monitored for effectiveness, and will expire after June 16, 2010 (to coincide with existing restricted fishing areas), unless reauthorized in a subsequent amendment.
	Alternative 3. Area closures created under Action 11 will be monitored for effectiveness, and will expire 10 years after implementation (approximately 2019), unless reauthorized in a subsequent amendment.
	***Preferred* Alternative 4. The Madison-Swanson and Steamboat Lumps restricted fishing areas will remain in effect:** **a. No action – until the existing expiration date of June 16, 2010.** **b. *Preferred* Indefinitely, unless terminated in a subsequent amendment.** **c. For an additional 10 years after implementation (approximately 2019), unless reauthorized in a subsequent amendment.**
Action 13. Federal Regulatory Compliance	**Alternative 1. No action. All vessels with federal commercial or charter reef fish permits are subject to applicable federal reef fish regulations when fishing in the EEZ, and are subject to applicable state reef fish regulations when fishing in state waters.**
	Alternative 2. All vessels with federal commercial or charter reef fish permits must comply with the more restrictive of state or federal regulations when fishing in state waters.

Fishery Impact Statement - Social Impact Assessment

INTRODUCTION

Mandates to conduct Social Impact Assessments (SIA) come from both the National Environmental Policy Act (NEPA) and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). NEPA requires Federal agencies to consider the interactions of natural and human environments by using a "...systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" [NEPA section 102 (2) (a)]. Under the Council on Environmental Quality's (CEQ, 1986) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, a clarification of the terms "human environment" expanded the interpretation to include the relationship of people with their natural and physical environment (40 CFR 1508.14). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects which may be direct, indirect or cumulative (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994).

Under the Magnuson-Stevens Act, fishery management plans (FMPs) must "...achieve and maintain, on a continuing basis, the optimum yield from each fishery" [Magnuson-Stevens Act section 2 (b) (4)]. When considering "…a system for limiting access to the fishery in order to achieve optimum yield…" the Secretary of Commerce and Regional Fishery Management Councils are to consider both the social and economic impacts of the system [Magnuson-Stevens Act section 303 (b) (6)]. Recent amendments to the Magnuson-Stevens Act require that FMPs address the impacts of any management measures on the participants in the affected fishery and those participants in other fisheries that may be affected directly or indirectly through the inclusion of a fishery impact statement [Magnuson-Stevens Act section 303 (a) (9)]. National Standard 8, requires that FMPs must consider the impacts upon fishing communities to assure their sustained participation and minimize adverse economic impacts upon those communities [Magnuson-Stevens Act section 301 (a) (8)].

PROBLEMS AND METHODS

Social impacts are generally the consequences to human populations that follow from some type of public or private action. Those consequences may include alterations to "...the ways in which people live, work or play, relate to one another, organize to meet their needs and generally cope as members of a society..." (Interorganizational Committee on Guidelines and Principles for Social Impact Assessment, 1994:1). Social impact analyses can be used to determine possible consequences management actions may have on fishing dependent communities. In order to do a full social impact analysis it is necessary to identify community participants who depend upon the fisheries in that area and to identify the amount of dependency they have upon a given fishery. Further it is necessary to understand the other opportunities for employment that exist within the community should fishery management measures become so restrictive that participants must switch their focus to other fisheries or other jobs outside of the fishing industry.

Public hearings and scoping meetings may provide input from those concerned with a particular action, but they do not constitute a full overview of the fishery.

In attempting to assess the social impacts of the proposed amendment it must be noted that there is not enough data at the community level for these analyses to do a comprehensive overview of the fishery; therefore, analyses cannot predict all social impacts. Although research in communities is ongoing, at this time it is still not complete enough to fully describe possible consequences this amendment may have on individual fishing communities.

Today, more fisheries are managed by quotas and/or have restrictions on the number of participants. This limits the other opportunities fishermen who fish for gag or red grouper may have had in the past and may make it impossible to rely on other fisheries in order to supplement their income derived from participation in these fisheries.

Information that is available for analysis pertains primarily to the commercial harvesting sector for the gag and red grouper fisheries. These data are records of landings based on the dealers' landings in the Gulf of Mexico region, and permits data that can be used as a starting point for analyses of possible impacts of this amendment. There is not enough data on communities that may be dependent on these fisheries to fully describe the impacts of any change in fishing regulations on any one community. However, demographic information based on census data of the communities with the highest number of pounds landed attributed to the dealers in the given community is included to give some insight into the structure of these communities that land gag and red grouper. The social impacts on recreational fishermen, the processing sector, the consumer, fishing communities, and society as a whole are not fully addressed due to data limitations. Data to define or determine impacts upon fishing communities are still very limited.

SOCIAL IMPACT ASSESSMENT DATA NEEDS

Based on an analysis of landings and permit data, there are not any communities in the Gulf of Mexico region that are completely dependent on the gag or red grouper fisheries. There has never been a systematic survey done of fishermen who target these species or their communities in this region. Changes due to development and the increase of tourism infrastructure have been occurring rapidly in coastal communities of the Gulf of Mexico making community descriptions more problematic. Recognizing that defining and understanding the social and economic characteristics of a fishery is critical to good management of the fishery. Therefore, more comprehensive work needs to be done on all of the fisheries in the region.

For all of the fisheries in the Gulf of Mexico, one of the critical data needs is complete community profiles of fishing communities in the southeast region in order to gain a better understanding of the fishery and those dependent on the fishery. Community profiles will then be developed in selected communities in the Gulf of Mexico region as time and funding allows. At this time, NMFS is conducting research in communities that border the Gulf of Mexico a few communities at a time. Due to the limited amount of funds to hire contract researchers and the limited time and funding available for research to be done by the region's anthropologists, the in-depth community profiling will take several years to complete.

Once community profiles are developed for some communities, it will be possible to more fully describe the impacts that new rules and regulations will have upon fishing communities. For each community chosen for profiling, it will be important to understand the historical background of the community and its involvement with fishing through time. Furthermore, the fishing communities' dependence upon fishing and fishery resources needs to be established. Kitner (2004) suggests that in order to achieve these goals, data needs to be gathered in three or more ways.

First, in order to establish both baseline data and to contextualize the information already gathered by survey methods, there is a great need for in-depth, ethnographic study of the different fishing sectors or subcultures. Second, existing literature on social/cultural analyses of fisheries and other sources in social evaluation research need to be culled in order to offer a comparative perspective and to guide the SIAs. Third, socio-economic data need to be collected on a continuing basis for both the commercial and recreational sectors, including the for-hire sector. Methods for doing this would include regular collection of social and economic information in logbooks for the commercial sector, observer data, and dock surveys (Kitner 2004).

The following is a guideline to the types of data needed:

1. Demographic information may include but is not necessarily limited to: population; age; gender; ethnic/race; education; language; marital status; children, (age & gender); residence; household size; household income (fishing/non-fishing); occupational skills; and association with vessels & firms (role & status).

2. Social Structure information may include but is not necessarily limited to: historical participation; description of work patterns; kinship unit, size and structure; organization & affiliation; patterns of communication and cooperation; competition and conflict; spousal and household processes; and communication and integration.

3. In order to understand the culture of the communities that are dependent on fishing, research to gain information may include but is not necessarily limited to: occupational motivation and satisfaction; attitudes and perceptions concerning management; constituent views of their personal future of fishing; psycho-social well-being; and cultural traditions related to fishing (identity and meaning).

4. Fishing community information might include but is not necessarily limited to: identifying communities; dependence upon fishery resources (this includes recreational use); identifying businesses related to that dependence; and determining the number of employees within these businesses and their status.

5. This list of data needs is not exhaustive or all inclusive, and this list should be revised periodically in order to better reflect on-going and future research efforts Kitner 2004).

Note for CEQ Guidance to Section 1502.22

In accordance with the CEQ Guidance for Section 1502.22 of the NEPA (1986), the Council has made "reasonable efforts, in the light of overall costs and state of the art, to obtain missing information which, in its judgment, is important to evaluating significant adverse impacts on the human environment…" However, at this time the Council cannot obtain complete social and community information that will allow the full analysis of social impacts of the proposed action and its alternatives. Although the demographic data collected by the U.S. Census can be used as a starting point for describing race and ethnicity within a community, this information can not be extrapolated to be used to fully describe the racial and ethnic mix of fishermen and people who work in the fishing industry in a given community.

Data for evaluating reasonable foreseeable significant adverse impacts on the human environment are still very limited. The social impacts on commercial and recreational fishermen, the processing sector, the consumer, fishing communities, and society as a whole are not fully addressed in this amendment due to these data limitations. There are not enough non-economic social scientists employed at this time (2008) or sufficient funding to conduct the community surveys and needed ethnographies that would allow full completion of this analysis. However, the new rules and regulations imposed by this fishing management plan will be applied equally to all participants in this fishery so that there will not be additional impacts to any particular participants based on ethnicity, race, or income. Although the demographic data collected by the U.S. Census can be used as a starting point to understand the race, ethnicity, and economic structure within a given community, this information can not be extrapolated to be used to fully describe the racial, ethnic, and economic demographics of fishermen and others who are dependent on the fishing industry in a given community or region.

Final Environmental Impact Statement (FEIS) Cover Sheet

Responsible Agencies and Contact Persons

Gulf of Mexico Fishery Management Council
2203 N. Lois Avenue, Suite 1100
Tampa, Florida 33607
Steven Atran (steven.atran@gulfcouncil.org)

813-348-1630
888-833-1844 (toll-free)
813-348-1711 (fax)
gulfcouncil@gulfcouncil.org
http://www.gulfcouncil.org

NOAA Fisheries Service (Lead Agency)
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701
Andy Strelcheck (andy.strelcheck@noaa.gov) or
Peter Hood (peter.hood @noaa.gov)

727-824-5305
727-824-5583 (fax)
http://sero.nmfs.noaa.gov

Name of Action

Reef Fish Amendment 30B: Gag – End Overfishing and Set Management Thresholds And Targets, Red Grouper – Set Optimum Yield TAC and Management Measures, Area Closures, and Federal Regulatory Compliance; Interim Rule to Reduce Overfishing of Gag.

Location of Action Gulf of Mexico

Type of Action

(X) Administrative ( ) Legislative
( ) Draft (X) Final

Filing Dates with EPA

Notice of intent (NOI) to prepare EIS published: March 5, 2007 (72 FR 9734).
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EPA comments on DEIS: none received

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. It also requires annual catch limits (ACLs) and accountability measures (AMs) that are overfished or undergoing overfishing by 2010, and for all other stocks by 2011. Red grouper are not undergoing overfishing and are not overfished. Gag are undergoing overfishing, but are not considered overfished. This action incorporates both red grouper and gag management measures as actions affecting one species invariably affect the other. Amendment 30B would: Establish management thresholds and benchmarks for gag; establish gag and red grouper total allowable catch (TAC), interim allocations, and ACLs and AMs; end gag overfishing; set management measures for gag and red grouper commercial and recreational fisheries to constrain harvests consistent with TAC; reduce grouper discard mortality; establish time/area closures to protect spawning aggregations of gag and other reef fish species; and require compliance with federal fishery management regulations by federally permitted reef fish vessels when fishing in state waters to further reduce overfishing. The interim rule would: Establish a commercial gag quota for 2009; set recreational management measures; and require compliance with federal fishery management regulations by federally permitted reef fish vessels when fishing in state waters to further reduce overfishing.

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 30B contains 12 actions (Action 2 was considered but rejected from further analysis) with a total of 46 alternatives. The amount of analysis required to evaluate these alternatives is thus very extensive, causing the EIS to exceed 150 pages. This EIS also covers an interim rule to reduce overfishing on gag. These measures are covered in Actions 8, 9, and 13.

Cover sheet ………………………………………………………………………………....xxvi
Summary……………………………………………………………………………………vii
Purpose and need…………………………………………………………………..............15
Alternatives including the proposed actions……………………………..……………………25
Affected environment……………………………………………………………………..116
Environmental consequences…………………………..………………..……………………203
List of preparers…………………………………………………...……………………………377
List of agencies, organizations, and persons to whom copies of the EIS………………………377
Index……………………………………………………………………..……………..426
References……………………………………………………………………...………………413
Response to comments on DEIS……………………………………………………………..429
Appendices………………………………………………………………..………………..na

1 INTRODUCTION

1.1 Background

Gag and red grouper are the two most abundant grouper species in the Gulf of Mexico, together accounting for more than 90 percent of overall grouper landings. The commercial fishery accounts for the majority of red grouper landings, while the recreational fishery 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. Current management of the commercial grouper fishery consists of a reef fish license limitation system, minimum size limits, trip limits, a closed season, aggregate and species-specific grouper quotas, and gear restrictions (ban on fish traps, area restrictions on longlines). Management of the recreational fishery consists of minimum size limits, aggregate and species-specific bag limits, and a closed season. In addition, all reef fish fishing is prohibited in two restricted fishing areas in the northwest Gulf (Madison-Swanson and Steamboat Lumps), and all fishing is prohibited in the Tortugas Ecological Reserves off of the Florida Keys.

Stock assessments were conducted in 2006 and 2007 under the Southeast Data, Assessment and Review (SEDAR) process for gag (SEDAR 10) and red grouper (SEDAR 12). The gag assessment was subsequently re-evaluated in May 2007 and corrections to recreational bycatch estimates were made. . While red grouper was found to have fully recovered from its previous condition of overfished and undergoing overfishing, gag was found to be undergoing overfishing, but not overfished (based on the MSST definitions proposed in this amendment) . The following is a brief description of previous and current stock assessments for these two species.

Gag – Previous Stock Assessments

Previous gag stock assessments were conducted in 1994 (Goodyear and Schirripa 1994), 1997 (Schirripa and Legault 1997), and 2001 (Turner et al. 2001).

The 1994 gag assessment determined the gag stock was at 30 percent SPR, well above the Council's 20% SPR overfished threshold. The assessment concluded the fishery was stable with no indication that the gag stocks were being overfished. However, due to data indicating a significant shift in the female-to-male sex ratio had occurred between the late 1970s (6 females:1 male) and early 1990s (34 females: 1 male), concern was expressed that there may be insufficient males to fertilize the available females. It was also noted that, if release mortality was less than the 33 percent, yield per recruit could be increased by increasing the minimum size limit to 24 inches TL (at 20% release mortality).

The 1997 gag assessment found the gag stock was at 21 percent SPR, which was still slightly above the overfished threshold, but that the fishery may be undergoing overfishing. This assessment also concluded that male biomass levels were more sensitive to fishing pressure than female biomass levels. A recommendation was made to implement a seasonal closure during the peak spawning season period (mid-February to mid-March) since gag appeared to be most susceptible to fishing during spawning, and because male gag seemed to be the first ones removed from spawning aggregations.

In 1999 the Reef Fish Stock Assessment Panel (RFSAP) met by conference call to discuss the apparent changes in gag sex ratio over time, the effect of fishing on spawning aggregations, and the implications changes in sex ratio and spawning aggregations on management of gag. The RFSAP agreed that fishing on spawning aggregations is very disruptive to reproductive biology of gag, and should be avoided. The RFSAP felt that the proposed (at that time) Madison-Swanson and Steamboat Lumps restricted fishing areas were likely too small to have any measurable effect on the gag population, but that there could be a localized site response, and that the areas could be used to evaluate the implications of closed areas on population maintenance and sustainability.

In 2000, new regulations were implemented that: 1) Increased the gag commercial minimum size limit to 24 inches TL and the gag recreational minimum size limit to 22 inches TL; 2) established a February 15 to March 15 commercial closed season on harvest of gag, black and red grouper; and 3) established two restricted fishing areas (Madison-Swanson and Steamboat Lumps) that had habitat suitable for gag and other reef fish spawning. These areas were closed year-round to reef fish fishing and most other types of fishing.

The 2001 gag assessment found that the fishing mortality rate was below $F_{30\%\ SPR}$ and that spawning stock biomass was above $SSB_{30\%\ SPR}$, indicating that the stock was neither overfished nor undergoing overfishing. The assessment also found that the proportion of male gag was 5 percent of the mature population versus an estimated 37 percent in an unfished population. The RFSAP recommended that the gag ABC be no higher than the recent average yield of about 5 million pounds until the actual (vs. projected) effects of the recently implemented size limit increases could be evaluated. The RFSAP also recommended maintaining the maximum fishing mortality rate at a more conservative level of F_{max} rather than $F_{30\%\ SPR}$ because they felt it was more compatible with the concept of MSY, and because it would allow the male biomass to be at about 10 percent of its unfished biomass.

Red Grouper – Previous Stock Assessments

Previous red grouper stock assessments were conducted in 1991 (Goodyear and Schirripa 1991), 1993 (Goodyear and Schirripa 1993) with a 1994 update (GMFMC 1994), 1999 (Schirripa, Legault and Ortiz 1999) with supplemental analyses in 2000 and 2001 (SEFSC 2001), and 2002 (SEFSC 2002). Red grouper were initially used as an indicator species for the entire shallow-water grouper aggregate, until stock assessments on gag began in 1994.

The 1991 red grouper assessment evaluated the stock status under various levels of release mortality, and concluded that the stock was at 36 percent SPR at a release mortality of 33 percent, and at 30 percent SPR at a release mortality of 66 percent. Fishing mortality rates were also evaluated under various levels of release mortality, and even under a release mortality of 66 percent the fishing mortality rate was no higher than F_{max}. Thus, the stock (and by implication the entire shallow-water grouper complex) was neither overfished nor undergoing overfishing. The RFSAP suggested that yield could be increased by reducing the minimum size limit to 16 inches, but warned that this may adversely affect other species in the shallow-water grouper complex.

The 1993 red grouper assessment concluded that in 1989 (prior to federal regulations) the stock had been at 17 to 24 percent SPR. The equilibrium SPR was estimated to be 30 percent, assuming a 33 percent release mortality rate, and 28 percent assuming a 50 percent release mortality.

In 1999, NMFS switched its stock assessment methodologies from the classical virtual population analyses (VPA) to a forward computing methodology that was more flexible, better characterized uncertainty, and was more consistent with the new National Standard guidelines requiring that stocks not exceed a maximum fishing mortality threshold (MFMT) or drop below a minimum stock size threshold (MSST). The computer model used was called ASAP (Age-Structured Assessment Model). Under the new assessment analyses, it was determined that the red grouper fishing mortality rate had increased from an average of about F = 0.3 in 1986 to F = 0.5 in 1997, and that the 1997 biomass level had declined to 26 percent of the biomass at MSY. Consequently, the assessment concluded that the stock was overfished and undergoing overfishing. However, the Standing and Special Reef Fish Scientific and Statistical Committee (SSC) subsequently questioned several portions of the assessment and Panel report.

The RFSAP subsequently met in August 2000 and reviewed updated landings, the SSC report, the NMFS response to the SSC report, and an independent review of the red grouper assessment by Dr. Patrick J. Sullivan, Cornell University (Sullivan 1999). The model was revised and rerun with updated data through 1999 based on this input plus input from fishermen present at the meeting. While the results were not as severe as in the original assessment, the red grouper stock was still found to be overfished and undergoing overfishing.

The 2002 red grouper assessment also determined that the stock was undergoing overfishing, but was no longer overfished (biomass was greater than MSST). The new assessment indicated the stock was recovering faster than previously estimated, most likely due to a strong recruitment year class in 1997. Although still undergoing overfishing, the reductions to end overfishing and rebuild the stock were less (9.4 percent) than those indicated by the 1999 assessment (approximately 45 percent).

1.2 Status of the Red Grouper and Gag Stocks in the Gulf of Mexico

1.2.1 Gag Stock Assessment (SEDAR 10) With Subsequent Reanalysis

Information in this section is summarized from the SEDAR 10 Advisory Report (SEDAR 10 2006) and a subsequent reanalysis with corrected dead discard estimates that were run in July and September 2007 (NMFS 2007a; SEFSC 2007).

Assessment methods and data

The Gulf of Mexico gag stock was assessed using a statistical forward projection catch-at-age model called CASAL (C++ algorithmic stock assessment laboratory) (Bull et al., 2005).

Data sources included both fishery-dependent and fishery-independent indices of abundance. Fishery-dependent abundance indices were available from the commercial handline fishery, the commercial longline fishery, the recreational headboat fishery and a combined index from the recreational charter and private boat fisheries (MRFSS). Two fishery-independent abundance indices were developed from the SEAMAP reef fish video survey. The assessment included data through 2004. These data were used to calculate catch estimates, and total annual size and age composition.

Catch trends

The gag stock assessment included data from 1963-2004 for commercial landings, and 1981-2004 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 misidentification 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. A portion of the unclassified grouper landings were converted to gag landings based on the proportion of gag in years when classified landings were available.

Commercial landings, which ranged from 1.22 to 1.70 mp gw in the late 1980s, more than doubled in the early 2000s to 2.28-3.13 mp gw. Since 2005, commercial gag landings have declined to 1.22 to 1.32 mp gw. Recreational landings have also increased by a somewhat lesser rate, 83 percent, from 2.31-3.75 mp in the late 1980s to 3.78-4.97 mp in the early 2000s (Table 1). Since 2005, recreational gag landings have also declined to 3.27 to 3.70 mp gw.

Commercial dead discards were virtually non-existent in the 1980s prior to minimum size limit regulations. From 1990-1999, under a 20 inch minimum size limit, dead discards were estimated to account for about 0.03 percent of the total commercial removals by weight. Since 2000, under a 24 inch minimum size limit, dead discards were estimated to account for about 1.3 percent of the total commercial removals of gag. Recreational discards occurred prior to implementation of bag limits. Estimated dead discards during 1986-1989 were about 3 percent of total recreational removals. During the 20 inch minimum size limit period of 1990-1999, dead discards were 16 percent of total recreational removals, and since the increase to a 22 inch minimum size limit in 2000, dead discards have been 23 percent of the total recreational removals by weight (Table 1.2.1.1).

While catches have increased, fishing mortality rates have also generally increased over the period of the assessment. The current overfishing threshold is $F_{30\%\ SPR}$, which has a value of F = 0.27. The fishing mortality rate has exceeded this threshold every year since 1991, and has been below the threshold only three times since 1980 (1981, 1984, and 1990). For the final year of the assessment, 2004, fishing mortality was estimated to be F = 0.40, a rate that has only been exceeded twice (1983 and 1993), and far exceeding the $F_{30\%\ SPR}$ overfishing threshold. Under the Council's preferred MFMT (F_{MAX} = 0.2) definition in this amendment, the gag stock has been undergoing overfishing since the 1970s (see Table 1.2.1.3 and Figure 1.2.1.2).

Table 1.2.1.1. Gag landings and dead discards (in millions of pounds) by sector and gear type, 1986-2004.

	Landings + Dead Discards				Landings + Dead Discards				Landings		Dead Discards		
Year	Headboat	Charter	Private	Total	Longline	Handline	Others	Total	Commercial	Recreational	Commercial	Recreational	Total
1986	0.28	0.89	2.55	3.72	0.52	1.16	0.03	1.70	1.70	3.60	0	0.12	5.42
1987	0.19	0.27	2.04	2.50	0.66	0.85	0.03	1.54	1.54	2.45	0	0.06	4.04
1988	0.15	0.58	3.09	3.82	0.40	0.79	0.02	1.22	1.22	3.75	0	0.07	5.04
1989	0.29	0.28	1.82	2.39	0.43	1.24	0.03	1.69	1.69	2.31	0	0.08	4.09
1990	0.21	0.34	0.90	1.45	0.62	1.13	0.04	1.79	1.79	1.26	0.00033	0.19	3.25
1991	0.11	0.15	2.79	3.05	0.51	0.99	0.06	1.56	1.57	2.74	0.00003	0.31	4.61
1992	0.13	0.49	1.92	2.54	0.59	1.00	0.07	1.66	1.66	2.25	0.00005	0.29	4.21
1993	0.18	1.00	1.95	3.13	0.48	1.28	0.09	1.85	1.87	2.79	0.00055	0.33	4.99
1994	0.20	0.48	1.85	2.52	0.35	1.15	0.08	1.58	1.62	2.00	0.00006	0.52	4.14
1995	0.14	0.78	2.58	3.49	0.39	1.16	0.07	1.61	1.65	2.70	0.00089	0.79	5.15
1996	0.12	0.99	1.83	2.94	0.39	1.11	0.07	1.57	1.57	2.35	0.00091	0.59	4.51
1997	0.10	0.79	2.15	3.05	0.42	1.10	0.08	1.60	1.60	2.58	0.00128	0.47	4.65
1998	0.26	1.28	2.83	4.37	0.60	1.85	0.06	2.51	2.53	3.52	0.00153	0.85	6.90
1999	0.21	1.03	3.08	4.32	0.55	1.48	0.06	2.09	2.10	3.72	0.00030	0.60	6.42
2000	0.22	1.26	4.24	5.72	0.62	1.60	0.07	2.28	2.28	4.97	0.01490	0.75	8.01
2001	0.13	1.08	3.70	4.90	1.01	2.06	0.08	3.15	3.13	4.03	0.04783	0.87	8.08
2002	0.10	1.05	4.43	5.57	1.04	1.91	0.06	3.01	2.98	4.44	0.02967	1.13	8.58
2003	0.14	1.04	4.16	5.34	1.14	1.46	0.07	2.66	2.63	3.78	0.04017	1.56	8.00
2004	0.21	1.26	5.79	7.26	1.14	1.74	0.07	2.95	2.90	4.91	0.04641	2.35	10.21

Estimation of Dead Discards

Size-at-depth distributions were developed based on the TIP survey, GULFIN and other survey data. Prior to 1990 there was no minimum size limit for grouper in federal waters, and it was assumed that all fish caught by the commercial sector were landed. After 1990, estimates of undersized discards were developed based on annual size limits and the size distributions of catches in 1984-1989. For the recreational sector, most of the size at depth data came from a small area off the Florida Panhandle where deep water occurs closer to shore. This was not considered to be representative of the entire Gulf coast. Therefore, an alternative method was used that assigned average discard mortalities based on an analysis of the distribution of B2 MRFSS discards between three zones (inshore, ocean < 10 m, ocean >10 m) in two regions (Panhandle FL and Peninsular FL, including the Florida Keys). Table 1.2.1.2 shows the assigned depth and correspondent recreational discard mortality-at-depth (Figure 1.2.1.1) for each stratum.

Figure 1.2.1.1. Estimated depth-mortality function for the Gulf of Mexico gag stock (SEDAR 10 2006).

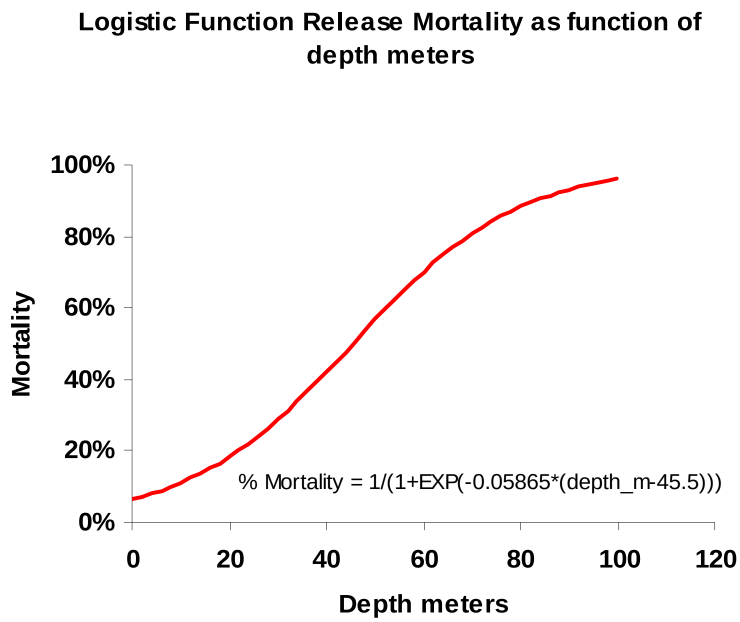


Table 1.2.1.2. Assigned average depth (m) and corresponding percent discard mortality for each of the regions (Panhandle and Peninsula/ Florida Keys) and depth zones (inshore, Ocean < 10 miles, and Ocean > 10 miles) used to estimated recreational dead discards .

Region	Zone	Average depth (m)	%mort
Panhandle	Inshore	10	11
Panhandle	Ocean<10	20	18
Panhandle	Ocean>10	40	42
Peninsula/Keys	Inshore & Ocean<10	10	11
Peninsula/Keys	Ocean>10	30	29

Status of Stock

The current overfishing threshold, or maximum fishing mortality threshold (MFMT), is $F_{30\%\ SPR}$, which is estimated in this assessment to be F = 0.27. The proposed MFMT threshold in this amendment is F_{MAX} which equals 0.20. The annual fishing mortality rate has exceeded the $F_{30\%\ SPR}$ threshold every year going back at least to 1991 and has exceeded the F_{MAX} threshold since the 1970s (Table 1.2.1.3, Figure 1.2.1.2). The most recent 4-year average F is about 0.35. Therefore, the gag stock is considered to be undergoing overfishing.

An overfished, or minimum stock size threshold (MSST), that is compatible with the SFA has not yet been adopted and approved by NMFS. The pre-SFA threshold was 20 percent SPR, which is estimated by the stock assessment, in terms of equilibrium female spawning stock biomass (SSB), to be about 14.31 million pounds (Table 2.1.1). Since adoption of the SFA, the Council has typically used an MSST based on the formula (1-M)* B_{MSY}, where M is the natural mortality rate and B_{MSY} is the stock size capable of supporting maximum sustainable yield (MSY) on a continuing basis. For gag, the assessment used an estimate of M that varied with age, but average M = 0.14. The assessment estimated $B_{30\%\ SPR}$ (as a proxy for B_{MSY}) in terms of female SSB at 21.41 million pounds (Table 2.1.1) with the corresponding MSST at 18.41 mp. Using an alternative B_{MSY} proxy of B_{MAX}, the MSY biomass level is 27.32 mp, with a corresponding MSST of 23.50 mp (Table 2.1.1). Current (2004) female SSB is estimated to be about 27 million pounds (Table 1.2.1.3, Figure 1.2.1.3). Since the current estimated biomass is above the threshold regardless of which way it is calculated, the gag stock was not overfished as of 2004.

Post-assessment Analyses of Gag by the Scientific and Statistical Committee (SSC)

In May 2008, the Council convened its SSC to review updated abundance indices and the natural mortality rate used for gag. The SSC reviewed the treatment of natural morality in the final SEDAR 10 gag assessment and discussed extensively information provided by an independent consultant hired by the commercial and recreational fishing industry. The SSC supported use of the natural mortality rate used in the final assessment, which was scaled to age-classes 3-30 using the Lorenzen method. The Lorenzen scaling resulted in the most abundant age groups (ages 2-4) receiving an effective M of above 0.2, while some of the scarce older age groups received values of M less than 0.15.

The SSC also reviewed indices of abundance used in the SEDAR 10 assessment. Indices were updated with data through 2007. All indices indicated consistent and declining trends in gag abundance since 2004, the last year used in the gag stock assessment (Figure 1.2.1.4). The SSC found that the fishery independent video survey index of abundance for gag along the Eastern GOM during the 2005-2007 period has declined relative to 2004. Results from fishery dependant indices were consistent with this trend. This may suggest that the population abundance for gag has declined since 2004, but is still not as low as it was during the 1990s.

Table 1.2.1.3. Fishing mortality rate and female spawning stock biomass at mid-season. Gray boxes indicate that F exceeds the MSY proxy threshold of F_{MAX} (0.20). Black boxes indicate that F exceeds the current overfishing threshold of $F_{30\%\ SPR}$ (0.27). (source: SEFSC 2007)

Year	F	Spawning Stock Biomass mp
1963	0.030	52.165
1964	0.037	50.907
1965	0.042	49.210
1966	0.041	46.405
1967	0.042	43.155
1968	0.048	39.738
1969	0.060	36.130
1970	0.068	32.395
1971	0.085	28.859
1972	0.107	25.473
1973	0.126	22.310
1974	0.160	19.658
1975	0.196	17.038
1976	0.205	14.870
1977	0.216	14.520
1978	0.225	13.660
1979	0.251	13.296
1980	0.259	13.536
1981	0.247	14.165
1982	0.334	15.588
1983	0.474	16.677
1984	0.205	16.021
1985	0.478	18.946
1986	0.337	16.575
1987	0.256	15.679
1988	0.348	15.720
1989	0.297	14.462
1990	0.243	13.631
1991	0.369	13.311
1992	0.337	11.929
1993	0.407	12.466
1994	0.332	12.427
1995	0.381	12.802
1996	0.300	13.265
1997	0.267	16.353
1998	0.356	19.021
1999	0.284	20.167
2000	0.334	24.618
2001	0.338	25.826
2002	0.345	25.208
2003	0.311	26.042
2004	0.396	27.213

Figure 1.2.1.2. Gag fishing mortality rate relative to F_{MAX} and $F_{30\% \ SPR}$ Overfishing Thresholds, and F_{OY} target.

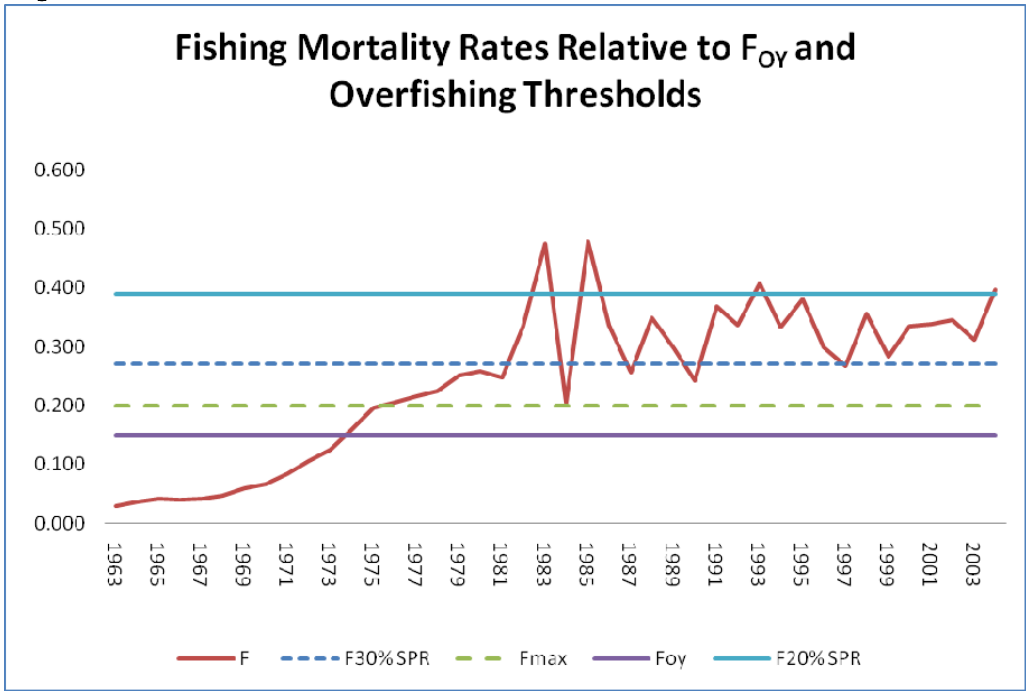


Figure 1.2.1.3. Gag spawning stock biomass (SSB) relative to MSST(FMAX) and MSST(F30% SPR), BMSY, and BOY target.

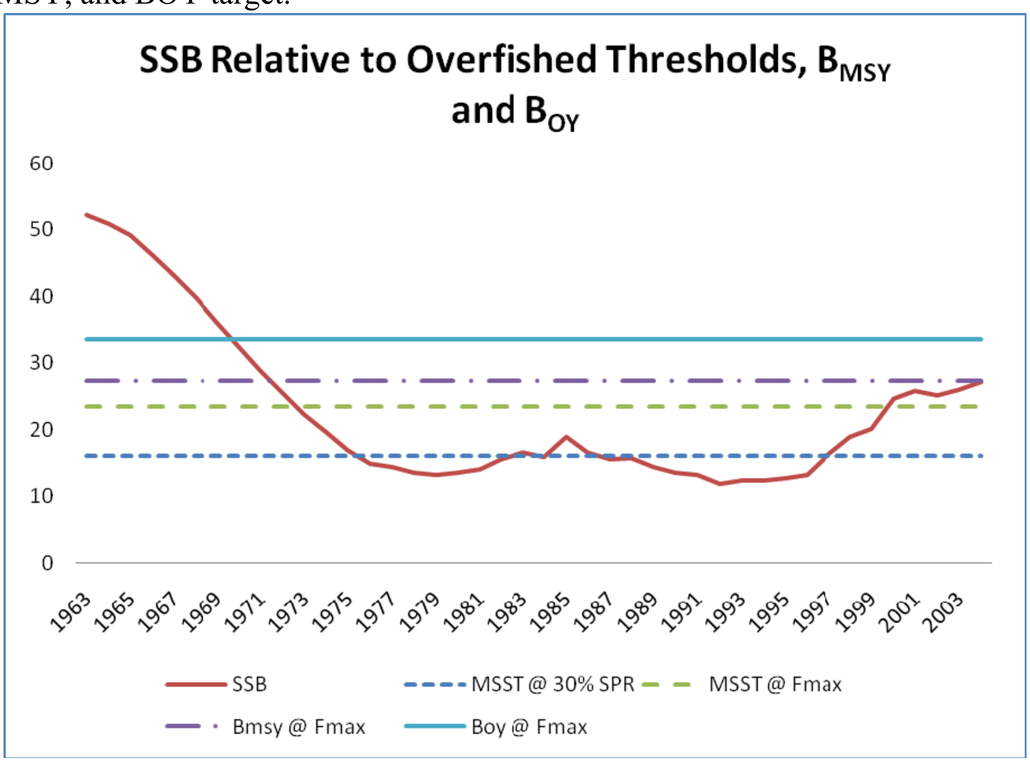
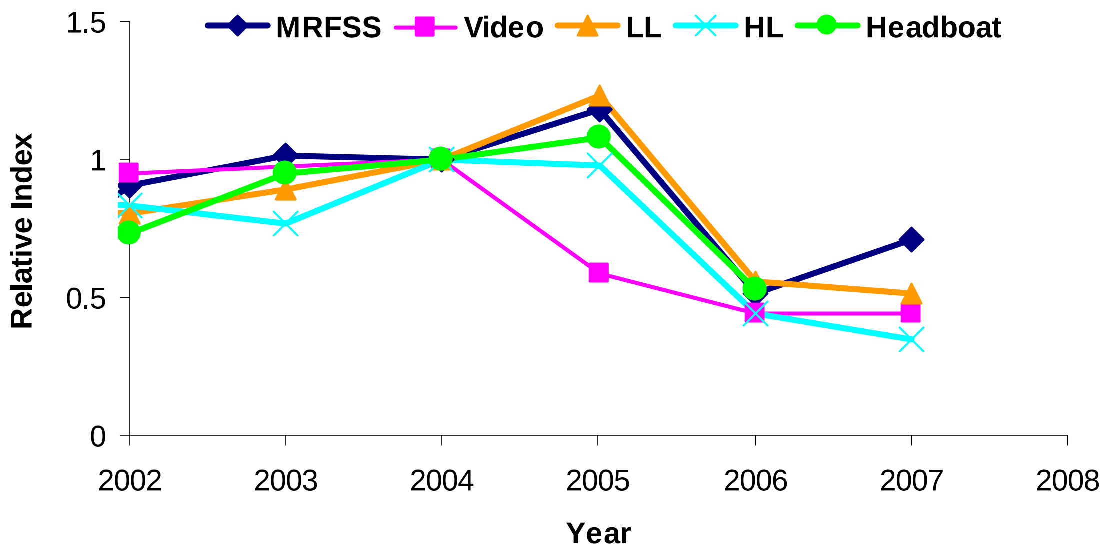


Figure 1.2.1.4. Indices of gag abundance presented to the Gulf Council's SSC in May 2008. Indices were updated through 2007 (except Headboat) and are scaled relative to 2004 levels.



1.2.2 Red Grouper Stock Assessment (SEDAR 12)

Red grouper stock status

The most recent SEDAR 12 stock assessment for red grouper was completed in early February 2007. The assessment used the ASAP model that was the basis for the 2002 assessment and included data from 1986 through 2005. Table 1.2.2.1 lists commercial and recreational landings and dead discards by year from 1986 through 2005. Approximately 99 percent of the landings were from the west coast of Florida and the rest were from Alabama. MSST and MFMT were defined for red grouper in Secretarial Amendment 1 as (1-M)*SS_{MSY} and F_{MSY} , respectively. The red grouper stock assessment concluded that spawning stock size exceeded SS_{MSY} starting in 1999 (Figure 1.2.2.1). This compares reasonably well with the results of the 2002 assessment which estimated the stock would be rebuilt by 2003 using a stock–recruit relationship of 0.8, which is similar to the 0.84 estimated by the current 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 (Figure 1.2.2.2). 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 MFMT starting in 1995 and has fluctuated but remained below MFMT with little trend through 2005 (Figure 1.2.2.3). In 2005, fishing mortality was just below the target fishing mortality level of F_{OY}. Benchmarks and threshold estimates are provided in Table 1.2.2.2.

Post-assessment Analyses of Red Grouper by the Scientific and Statistical Committee (SSC)

In May 2008, the Council's SSC reviewed abundance indices for red grouper and recommended an ABC. All four fishery dependent indices and one fishery independent indices had declined since 2004. The SSC recommended an ABC range for red grouper between 7.57mp which is the equilibrium OY, and 7.72 mp, which is equilibrium MSY. The SSC noted that the ABC range leaves little room to adjust for error or uncertainty.

Table 1.2.2.1. Red grouper landings and dead discards from the Gulf of Mexico from 1986 through 2005 in pounds.

	Landings		Dead Discards		Total
Year	Commercial	Recreational	Commercial	Recreational	
1986	6,312,986	2,400,380		20,657	8,734,023
1987	6,717,890	1,464,710	-	19,021	8,201,621
1988	4,742,496	2,476,070		34,758	7,253,324
1989	7,367,911	2,761,150		81,650	10,210,711
1990	4,809,282	1,131,710	733,671	228,556	6,903,219
1991	5,094,501	1,775,110	1,155,185	407,354	8,432,150
1992	4,463,277	2,658,180	721,264	356,598	8,199,319
1993	6,379,626	2,091,160	732,983	234,183	9,437,952

1994	4,902,862	1,808,240	446,280	224,934	7,382,316
1995	4,746,140	1,862,570	601,308	225,097	7,435,115
1996	4,454,146	893,755	566,243	159,758	6,073,902
1997	4,848,486	562,328	623,516	149,181	6,183,511
1998	3,948,566	643,058	543,057	208,428	5,343,109
1999	5,974,706	1,152,810	734,532	283,487	8,145,535
2000	5,838,300	2,107,730	621,851	300,042	8,867,923
2001	5,964,506	1,327,770	756,182	223,726	8,272,184
2002	5,907,248	1,611,110	726,561	260,670	8,505,589
2003	4,937,970	1,275,830	623,068	283,721	7,120,589
2004	5,749,039	3,000,140	812,431	421,755	9,983,365
2005	5,410,594	1,630,140	894,328	243,491	8,178,553

Source: SEDAR 12 review workshop final report

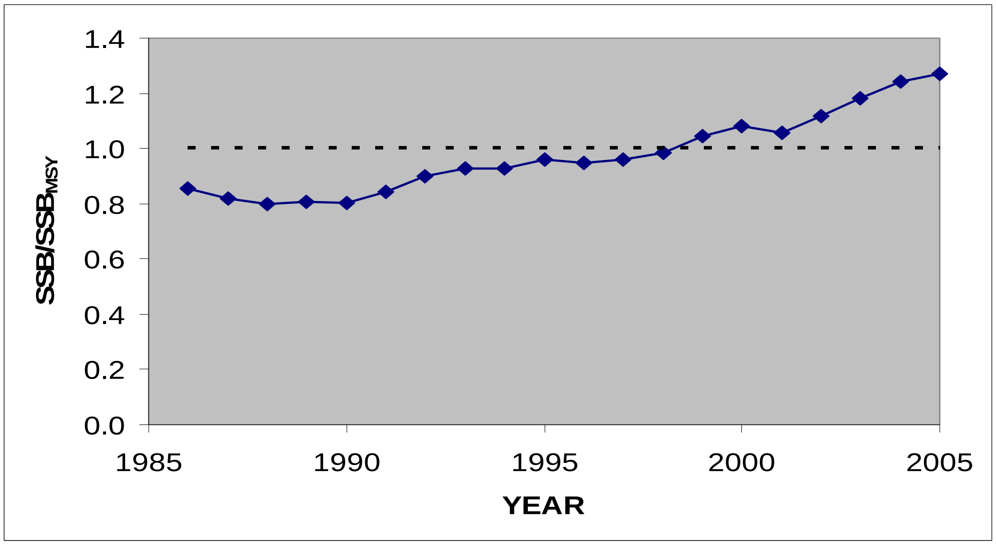


Figure 1.2.2.1. Red Grouper spawning stock in relation to the maximum sustainable yield level from 1986 through 2005. Source: SEDAR 12 Review Workshop Report.

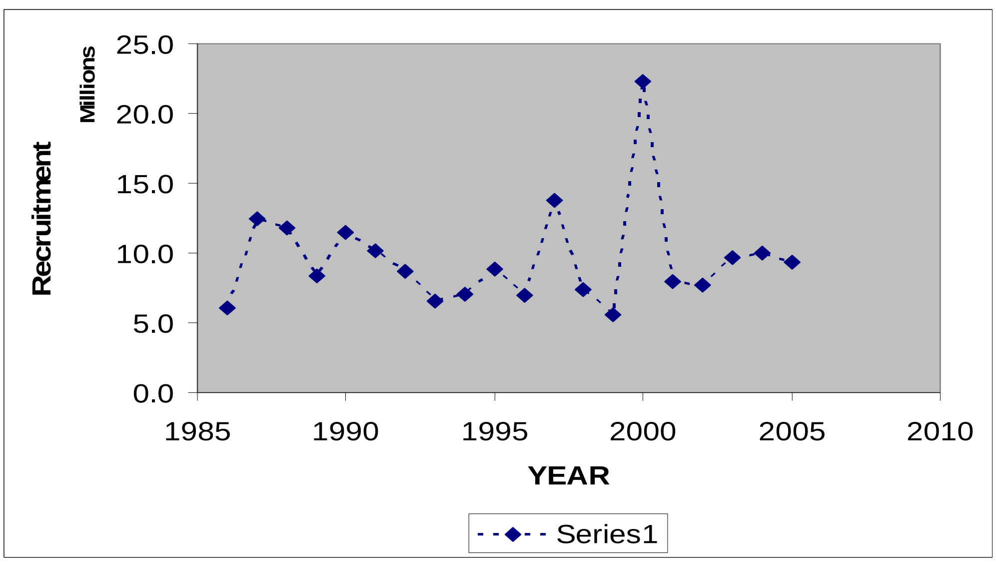


Figure 1.2.2.2. Predicted red grouper recruitment (Age 1 fish) from 1986 through 2005. Source: SEDAR 12 Review Workshop Report.

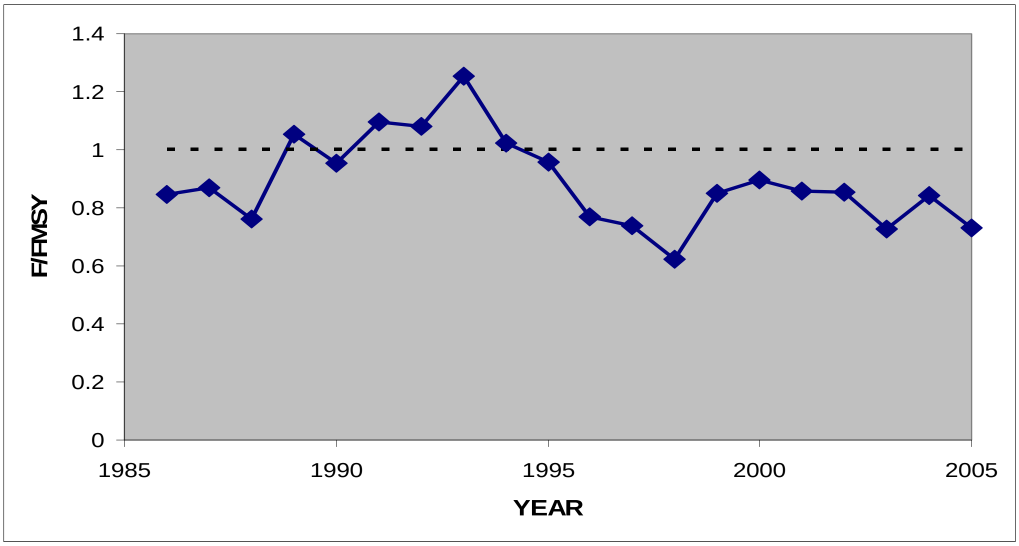
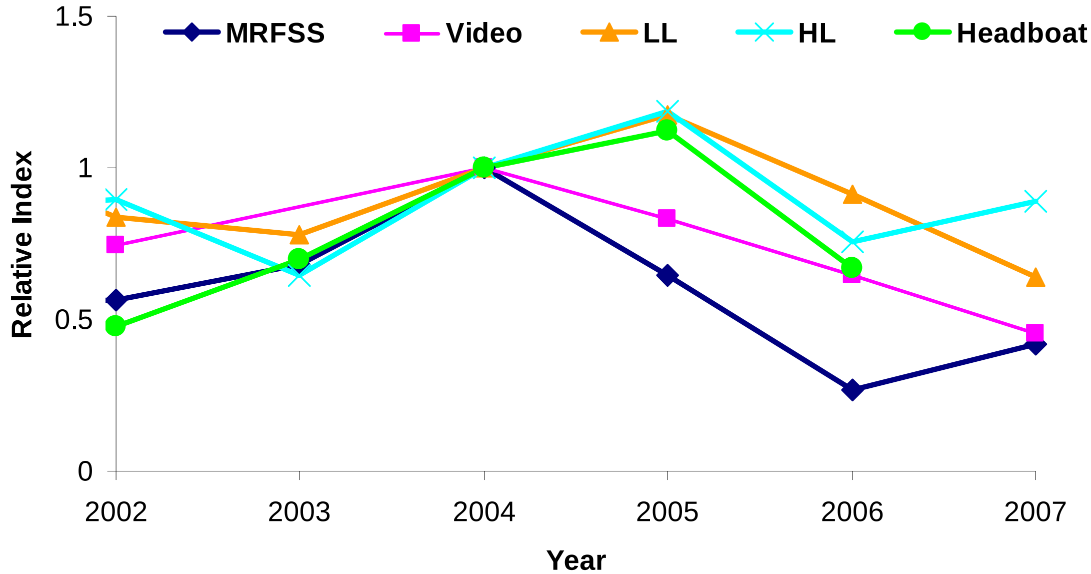


Figure 1.2.2.3. Red grouper fishing mortality in relation to overfishing threshold, MFMT, from 1986 through 2005. Source: SEDAR 12 Review Workshop Report.

Table 1.2.2.2. Benchmarks and Thresholds for red grouper in the Gulf of Mexico. Source: SEDAR 12 Review Workshop Report.

F-References			DIRECTED YIELD Refs	
$F_{0.1}$	0.1353		Y $F_{0.1}$	7.35E+06
F_{MAX}	0.2605		Y F_{MAX}	7.64E+06
$F_{30\%SPR}$	0.3403		MSY	7.72E+06
$F_{40\%SPR}$	0.2102		OY	7.57E+06
F_{MSY} MFMT	0.2133			
F_{OY} 75% of F_{MSY}	0.1600		**2004 STATUS**	
F_{2004}	0.1556		F/F_{MSY}	0.7295
			SS/SS_{MSY}	1.2711
SSB-References				
$SS\_F_{0.1}$	7.72E+08			
SS_F_{MAX}	5.18E+08			
SSM_{MSY}	5.91E+08			
SS_{OY}	7.04E+08			
SS_{2004}	7.52E+08			

Figure 1.2.2.4. Indices of red grouper abundance presented to the Gulf Council's SSC in May 2008. Indices were updated through 2007 (except Headboat) and are scaled relative to 2004 levels.



1.3 Purpose and Need for Action

Gag were declared to be undergoing overfishing in October 2006[1] based on the results of a stock assessment prepared under the Southeast Data, Assessment and Review (SEDAR) process. Following a re-analysis in 2007 using corrected data inputs, overfishing was still found to be occurring in 2004 under the maximum fishing mortality threshold of $F_{30\%\ SPR}$ as well as under any likely redefinition of MFMT. The Council has not yet established an overfished definition for gag (i.e., MSST); however, under any likely definition considered by the Council for MSST, the stock would not be declared overfished. The 2004 estimate of stock biomass is 99 percent of the stock biomass associated with F_{MAX}. However, the stock assessment did indicate stock biomass was declining. It is necessary for the Council to prepare a plan amendment to define MSST and OY, and to possibly redefine MFMT, and to set a total allowable catch (TAC) and management measures that will end overfishing of gag. Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), the Council is required to submit, and NMFS to implement, a plan to immediately end overfishing within two years of being notified of such a determination[2]. An end to overfishing is needed to assure that the gag stock can support major recreational and commercial fisheries for the foreseeable future.

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[1] Letter from NMFS Regional Administrator Roy Crabtree to Council Chairman Robin Reichers dated October 11, 2006.

[2] The Council was previously required to submit a plan to end overfishing within one year of notification, with no requirement as to the time allowed to actually implement and end overfishing. The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 modified the overfishing provisions to require that a plan to end overfishing <u>immediately in the fishery</u> be submitted <u>and implemented within two years</u>.

Red grouper were initially determined to be overfished and undergoing overfishing as of 1997 according to a 1999 stock assessment. In 2002, another red grouper stock assessment was conducted and concluded overfishing was occurring and stock biomass remained below the biomass at MSY. NOAA Fisheries Service approved and implemented Secretarial Amendment 1 to the Reef Fish FMP in 2004, which established a rebuilding plan for red grouper and reduced landings by 9.4 percent. In 2007, a new stock assessment utilizing data through 2004 (SEDAR 12 2007) found that the stock had recovered, in large part due to strong recruitment year classes in the late 1990s and 2000. In 2005, the last year assessed in the stock assessment, the stock biomass was above MSST and slightly above to its optimum yield (OY) target level. In order to achieve OY while avoiding overfishing in compliance with National Standard 1 of the MSFCMA, TAC can be increased as much as 15 percent. Therefore an increase in TAC and revised management measures are needed to reflect the improved condition of the stock.

Red grouper and gag comprise the major components of the shallow-water grouper aggregate, but until now have been managed separately, with management measures for one stock having consequences for the other stock. A purpose of this amendment is to co-manage gag and red grouper by implementing concurrent management measures.

The Magnuson-Stevens Reauthorization Act of 2006 requires that Councils develop Annual Catch Limits (ACLs) and Accountability Measures (AMs) for all stocks, with stocks that are overfished or undergoing overfishing requiring such measures by 2010. While the final NMFS guidelines for ACLs and AMs have not yet been published, implementing interim ACLs and AMs allows the Council to have greater flexibility in proposing short term management measures by providing a means to assure that overfishing will not occur, and that corrective action will be taken if it does occur.

Two restricted fishing areas (Madison-Swanson and Steamboat Lumps) were established in 2000, and subsequently reauthorized in 2004, to protect areas with habitat suitable for spawning aggregations of gag and other reef fish. Additional purposes were to provide protection for a portion of the offshore male gag population, and to evaluate the effectiveness of restricted fishing areas as a management tool. Population studies of gag in the 1990s compared to the 1970s had found that the proportion of male gag in the population had declined from 17% to between 2% and 10%, and concern was expressed by some researchers that the low proportion of male gag could reduce reproductive success (GMFMC 1998). Unlike female gag, which tend to redistribute toward shallower waters after spawning, male gag tend to stay in deeper waters year-round. Thus, offshore restricted fishing areas bracketing the shelf break at about 40 fathoms were considered to be appropriate mechanisms to selectively protect male gags. A monitoring program by the NMFS Panama City laboratory has indicated that fish are more abundant within the areas, and during the 2004 reauthorization fishermen spoke positively about benefiting from the "edge effect" of fishing just outside the areas. However, a computer ecosystem model of the reserves by the Council's Ecosystem SSC suggested that the areas were too small to have any population effects (GMFMC 2007a). As a result, expansion of the existing restricted fishing areas or creation of new time/area closures is under consideration along with extending the duration of the existing restricted fishing areas.

NMFS and state fishery management agencies usually attempt to work cooperatively to implement consistent regulations in federal and state waters, both for enforceability and effectiveness of management. However, occasionally there are situations in which federal and some state regulations differ. When there are less restrictive regulations in state waters, the effectiveness of the federal regulations is diminished. In order to stay within rebuilding requirements or prevent overfishing, the regulations for federal waters and in the remaining states may need to be tightened as a result. In order to improve effectiveness of federal management measures, federally permitted reef fish vessels can be required, as a condition of their permit, to comply with the more restrictive of federal or state reef fish regulations when fishing in state waters.

1.4 History of Management

The following summary describes only those management actions that affected grouper harvest. Please see Amendment 18A and subsequent amendments for a complete history of the Reef Fish FMP.

The Reef Fish FMP, including an EIS, was implemented in November 1984. The regulations, designed to rebuild declining reef fish stocks, included prohibitions on the use of poisons or explosives, 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. The FMP estimated a combined maximum sustainable yield (MSY) for all snapper and grouper in aggregate of 51 million pounds, and set optimum yield (OY) equal to 45 million pounds, which represented the approximate catch level at the time.

<u>Amendments</u>

Amendment 1 (EA/RIR/IRFA), to the Reef Fish FMP, 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 percent SSBR by January 1, 2000. Among the grouper management measures implemented were:

- Set a 20-inch total length minimum size limit on red, Nassau, yellowfin, black, and gag grouper;
- Set a 50-inch total length minimum size limit on jewfish (goliath grouper);
- 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 (until the SWG quota was filled). Deep-water grouper were defined as misty grouper, snowy grouper, yellowedge grouper, warsaw grouper, and scamp once the SWG quota was filled. Jewfish (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, including EA, RIR and RFA, implemented in 1990, prohibited the harvest of goliath grouper (jewfish) to provide complete protection for this species in federal waters in response to indications that the population abundance throughout its range was greatly depressed. This amendment 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 percent SSBR target to a 20 percent spawning potential ratio (SPR). The amendment also transferred speckled hind from the SWG quota category to the DWG 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/IEFA), implemented in February 1994, established restrictions on the use of fish traps, created a special management zone (SMZ) with gear restrictions off the Alabama coast, created a framework procedure for establishing future SMZs, 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 7, including EA, RIR, and 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 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. 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.

Amendment 11, including EA, RIR and IRFA, was partially approved by NMFS and implemented in January 1996. The six approved provisions are: (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 percent 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 percent SPR. The resubmission document was disapproved by NMFS.

Amendment 14, including EA, RIR and 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 EEZ, consistent with similar prohibitions in Florida state waters, the south Atlantic EEZ, and the Caribbean EEZ.

Amendment 15, including EA, RIR and 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.

Amendment 16A, including EA, RIR and IRFA, submitted to NMFS in June 1998, was partially approved and implemented on January 10, 2000. The approved measures provided: (1) that 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) that 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) that 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 NMFS Regional Administrator and published in the Federal Register. During this window of opportunity, fish trap fishermen will be required to have an appointment with NMFS 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 is therefore maintained.

Amendment 16B (EA/RIR/IRFA), implemented by NMFS 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.

Amendment 17, including EA, RIR and IRFA, was submitted to NMFS in September 1999, and was implemented by NMFS 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 (SEIS/RIR/IRFA) was implemented on September 8, 2006, except for VMS requirements which were implemented May 6, 2007. This amendment addresses: 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 USCG 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) require devices and protocols for the safe release in incidentally caught endangered sea turtles and smalltooth sawfish, 5) update the total allowable catch procedure to incorporate the SEDAR assessment methodology, 6) change the permit application process to an annual procedure and simplify income qualification documentation requirements, and 7) require electronic vessel monitoring systems (VMS) aboard vessels with federal reef fish permits, including vessels with both commercial and charter vessel permits.

Amendment 19 (EA/RIR/IRFA), also known as the Generic Amendment Addressing the Establishment of the Tortugas Marine Reserves, or Generic EFH Amendment 2, was implemented on August 19, 2002. This amendment established 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 of Mexico EEZ.

Amendment 21 (EA, RIR, IRFA), implemented in July 2003, continued the Steamboat Lumps and Madison-Swanson restricted fishing areas 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 areas 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 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 27, submitted to NMFS on June 27, 2007, has been partially approved by NMFS and a final rule was published on January 29, 2008. This amendment, effective June 1, 2008, requires the use of non-stainless steel circle hooks when using natural baits to fish for Gulf reef fish, and requires the use of venting tools and dehooking devices when participating in the commercial or recreational reef fish fisheries.

Regulatory Amendments and Emergency and Interim Rules

A July 1991 regulatory amendment, implemented November 12, 1991, provided a one-time increase in the 1991 quota for SWG from 9.2 MP to 9.9 MP to provide the commercial fishery an opportunity to harvest 0.7 MP that went unharvested in 1990.

A November 1991 regulatory amendment, implemented June 22, 1992, raised the 1992 commercial quota for SWG 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 percent.

An August 1999 regulatory amendment, implemented June 19, 2000, increased the commercial size limit for gag 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 restricted fishing areas (Steamboat Lumps and Madison-Swanson) that are closed year-round to fishing for all species under the Council’s jurisdiction.

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 lbs. gutted-weight. If on or before August 1 the fishery is estimated to have landed more than 50 percent of either the shallow-water grouper or the
red grouper quota, then a 7,500-lb trip limit takes effect; and if on or before October 1 the fishery is estimated to have landed more than 75 percent of either the shallow-water grouper or the red grouper quota, then a 5,500-lb (2,495-kg) 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 2 to 1 fish per person per day, in the aggregate grouper bag limit from 5 to 3 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 1 per person and the November-December 2005 recreational closed season on red grouper only were allowed to proceed. The approves 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 gutted weight aggregate deep-water 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.

A March 2006 regulatory amendment, implemented July 15, 2006, established a recreational red grouper bag limit of 1 fish per person per day as part of the 5 grouper per person aggregate bag limit, and prohibited for-hire vessel captains and crews from retaining bag limits of any grouper while under charter. 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.

Secretarial Amendments

Secretarial Amendment 1, implemented July 15, 2004, established 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 deep-water grouper from 1.35 to 1.02 MP GW. The recreational bag limit for red grouper was also reduced to two fish per person per day.

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 of Mexico 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 of Mexico 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 pelagics. [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 (EEZ) of the Gulf of Mexico 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 Gulf of Mexico Fishery Management Council (GMFMC) is considering the establishment of an individual fishing quota (IFQ) to control participation or effort in the commercial grouper fishery of the Gulf of Mexico. If an IFQ is established, the GMFMC is considering October 15, 2004, as a possible control date regarding the eligibility of catch histories in the commercial grouper fishery [69 FR 67106].

2 MANAGEMENT ALTERNATIVES

2.1 Action 1. Set Gag Thresholds and Benchmarks

Reef Fish Amendment 1 (GMFMC 1989) in 1990 established an overfished threshold for reef fish stocks of 20% SPR, and both an overfishing and optimum yield (OY) level at the yield associated with fishing at $F_{20\%\ SPR}$. Subsequent to the Sustainable Fisheries Act of 1996 (SFA), NMFS published new guidelines for setting management thresholds and targets. Status determination criteria are defined by 50 CFR 600.310 to include a minimum stock size threshold (MSST), i.e., the overfished criterion, and a maximum fishing mortality threshold (MFMT), i.e., the overfishing criterion. In addition, the OY target under a precautionary approach is to be set at a level safely below the level associated with fishing at the status determination criteria, and is to be based on maximum sustainable yield (MSY) as reduced by any relevant economic, social, or ecological factor.

In response to the new guidelines, the Council in 1999 submitted a Generic SFA Amendment to all of its FMPs (GMFMC 1999a) to establish SFA compliant thresholds and targets. For most of the reef fish (other than Nassau grouper, goliath grouper and red snapper) the Generic SFA Amendment proposed defining MSY as 30% SPR, OY as 40% SPR, and MFMT (overfishing) as $F_{30\%\ SPR}$. The amendment did not define MSST, but instead stated that overfished thresholds will be implemented for each stock by framework measure as estimates of SSB_{MSY} and MSST are developed by NMFS, the RFSAP, SSC, and the Council.

NMFS accepted the definition of MFMT as $F_{30\%\ SPR}$, but disapproved all MSY, OY and MSST proposed definitions based on SPR. In its disapproval letter, NMFS stated that SPR is not biomass based and is not an acceptable proxy for biomass reference points such as MSY or MSST. (However, NMFS did subsequently state that SPR is still a viable proxy to SSB_{MSY} in data moderate or data poor situations – e-mail from Michael McLemore to RFSAP October 5, 1999). As a result of this decision, MSST and OY for reef fish stocks were, depending upon one’s interpretation, either undefined or left at the pre-SFA definition of 20% SPR. SFA-compliant definitions for OY, MSST, and MFMT have subsequently been defined, or redefined, on a stock-by-stock basis as assessments have provided the necessary information to make such determinations. As of this amendment, status determination criteria and targets have been defined in the Reef Fish FMP for red snapper, vermilion snapper, greater amberjack, and red grouper (definitions for gray triggerfish are being developed in Amendment 30A).

Alternative 1: No Action - MSST = $SSB_{20\%SPR}$, MFMT = $F_{30\%SPR}$, and OY = the yield at $F_{20\%SPR}$.

Preferred **Alternative 2: Set minimum stock size threshold (MSST), maximum fishing mortality threshold (MFMT), and optimum yield (OY) based on the biomass reference point corresponding to maximum yield per recruit (MAX), which in this**

instance is the proxy for maximum sustainable yield (MSY). Set MFMT equal to F_{MAX}, set MSST equal to:

Preferred **Option a. (1-M)*SSB_{MAX} (M = 0.15)**
Option b. 0.75*SSB_{MAX}
Option c. 0.50*SSB_{MAX}

and set OY equal to:

Option d. the yield at 60 percent of F_{MAX}
Preferred **Option e. the yield at 75 percent of F_{MAX}**
Option f. the yield at 90 percent of F_{MAX}

Alternative 3: Set minimum stock size threshold (MSST), maximum fishing mortality threshold (MFMT), and optimum yield (OY) based on SPR. Maintain MFMT at $F_{30\%SPR}$, set MSST equal to:

Option a. (1-M)*$SSB_{30\%SPR}$ (M = 0.15)
Option b. 0.75*$SSB_{30\%SPR}$
Option c. 0.50* $SSB_{30\%SPR}$

and set OY equal to:

Option d. the yield at 60 percent of $F_{30\%SPR}$
Option e. the yield at 75 percent of $F_{30\%SPR}$
Option f. the yield at 90 percent of $F_{30\%SPR}$

Alternative 1 leaves the existing definitions unchanged. MSST and OY remain at their pre-SFA levels of 20% SPR and the yield associated with $F_{20\% SPR}$ respectively. MFMT is at the Generic SFA Amendment level of $F_{30\% SPR}$. The NMFS guidelines permit MSST to be defined within a range of biomass levels down to a minimum of ½ * SSB_{MSY}. As can be seen in Table Gag-1, the standing stock biomass level associated with 20% SPR is very close to the minimum level, but is allowed under the guidelines. Setting MSST at this level reduces the likelihood of the stock being declared overfished, but will require much more restrictive management measures to rebuild the stock if it does fall this low. MFMT of $F_{30\% SPR}$ provides an overfishing threshold that is more conservative than MSST, and if adhered to, should maintain long-term average stock biomass at or above 30% SPR, avoiding the probability of an overfished determination. The pre-SFA OY level of the yield at $F_{20\% SPR}$ sets OY at a less conservative level than MSY (which is essentially equivalent to the yield at F_{MAX} or $F_{40\% SPR}$). This is not allowed under the SFA, which requires that OY be reduced from MSY. Therefore, Alternative 1 is not an acceptable alternative.

Preferred **Alternative 2** defines MSST, MFMT and OY in terms of the biomass reference point, maximum-yield-per-recruit (MAX) as a proxy for MSY. This refers to the fishing mortality rate that produces the greatest yield from an average individual fish recruited to the fishery after taking into account growth and mortality rates. In the case of gag, F_{MAX} also corresponds closely to F_{MSY} and is therefore an ideal proxy. In terms of SPR, this is also very close to 40% SPR. Setting MFMT equal to F_{MAX} results in an overfishing threshold that will keep the fishing mortality at levels consistent with keeping the stock at or above biomass levels corresponding to MSY over the long-term.

MSST is typically set at a level below SSB_{MSY} in order to allow for short-term fluctuations in biomass. ***Preferred*** **Option a** utilizes a formula recommended in the NMFS *Technical Guidance on the Use of Precautionary Approaches to Implementing National Standard 1 on the Magnuson-Stevens Fishery Conservation and Management Act* (Restrepo et al. 1998) that ties the threshold to the biology of the species. Long-lived species with a low natural mortality rate usually take longer to recover if overfished due to the need to rebuild a large number of age-classes, and this formula produces a more conservative threshold. Conversely, short-lived species with a high natural mortality rate generally can recover quickly from an overfished condition, and the formula produces a less conservative threshold that allows for more fluctuation. In the case of gag, which has a natural mortality rate (averaged across all ages) of M = 0.15, this results in $(1\text{-}M)*SSB_{MAX} = 0.85*SSB_{MAX}$. Under this option, the specific MSST level could change if the estimated natural mortality rate is changes. **Options b and c** set MSST at a fixed level that will not change with subsequent assessments, but also does not take into account the biology of the species. **Option c** is the minimum allowed MSST of ½ * SSB_{MAX}, and is close to the no action level of 20% SPR (Table Gag-1). As indicated in the discussion for Alternative 1, setting MSST at this level reduces the likelihood of the stock being declared overfished, but will require much more restrictive management measures to rebuild the stock if it does fall this low. **Option c** sets MSST at an intermediate level of 0.75 * SSB_{MAX}.

For OY there are also three options. The middle option, ***Preferred*** **Option e**, sets OY at the yield associated with fishing at 75% of F_{MAX}, which at equilibrium yields about 94% of the MSY yield while maintaining stock biomass at 125% to 131% of SSB_{MAX} levels (Restrepo et al. 1998). This OY level is projected to result in a probability of exceeding MFMT of no greater than 20% to 30%. **Options d and f** bracket the Technical Guidance recommendation at 60% and 90% of F_{MAX} respectively. As previously stated, the purpose of OY is to set the catch level at a safe level.

Alternative 3 is similar to Alternative 2, except that it defines MSST, MFMT and OY in terms of 30% SPR as a proxy for MSY. This is consistent with maintaining the existing MFMT of $F_{30\%\ SPR}$ and adjusting the other thresholds and targets to the same basis. 30% SPR was selected in the Generic SFA Amendment as an average MSY proxy across all reef fish species, but does not represent the best available scientific information when a species-specific proxy is available. The SEDAR 10 gag stock assessment found that using maximum yield per recruit was a very close proxy to the estimated MSY for gag, as was 40% SPR. 30% SPR is a less conservative proxy, and will produce catch levels likely to exceed true MSY.

Table 2.1.1. Possible definitions for MSST (Overfished threshold) in order from least to most conservative. Values based on the Lorenzen M3P model run.

Criteria	Equilibrium SSB Level at Criteria	Stock Status rel. to (SSB_{2004} = 27.01 mp)	Additional comments
½ * SSB_{MAX}	13.66 mp	not overfished	
$SSB_{20\% SPR}$	14.31 mp	not overfished	(no action, Pre-SFA definition
0.75 * $SSB_{30\% SPR}$	16.06 mp	not overfished	
0.75 * SSB_{MAX}	20.49 mp	not overfished	
$SSB_{30\% SPR}$	21.41 mp	not overfished	
(1-M)*SSB_{MAX}	23.22 mp	not overfished	***Alt. 2 - Preferred option a***
SSB_{MAX}	27.32 mp	overfished	

Table 2.1.2. Possible definitions for MFMT (Overfishing threshold) in order from least to most conservative. Values based on the Lorenzen M3P model run.

Criteria	F value	Stock Status rel. to (F_{2004} = 0.40)	Additional comments
$F_{20\% SPR}$	0.39	overfishing is occurring	
$F_{30\% SPR}$	0.27	overfishing is occurring	(no action, current definition)
F_{max}	0.20	overfishing is occurring	***Preferred Alt. 2***
$F_{40\% SPR}$	0.19	overfishing is occurring	

Table 2.1.3. Possible definitions for OY (optimum yield) in order from least to most conservative. Values based on the Lorenzen M3P model run.

Criteria	F value	Equilibrium Yield	Stock Status rel. to(F_{2004} = 0.40)
60% of F_{max}	0.12	4.41 mp*	F_{2004} exceeds F_{OY}
75% of F_{max}	0.15	4.82 mp	F_{2004} exceeds F_{OY} ***Alt 2 – Pref. option e***
90% of F_{max}	0.18	4.93 mp	F_{2004} exceeds F_{OY}
100% of F_{max}	0.20	4.94 mp	F_{2004} exceeds F_{OY}

* estimated by interpolation

Defining the OY, MFMT and MSST of a species does not alter the current harvest or use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying OY, MFMT and MSST, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, specifying these parameters may be considered to have indirect economic effects. Restrictive management measures are required by all alternatives, but weighing both short-term losses and long-term benefits, Preferred Alternative 2 appears to provide more stable streams of net benefits over time than any of the other alternatives.

Alternative 1 would continue the status quo and would not stop overfishing of gag grouper as required by the SFA. Preferred **Alternative 2** and **Alternative 3** would not have any direct impact on the fishermen, fishing-dependent businesses, or communities that depend on the gag grouper fishery in the short term because this is an administrative action that will set the thresholds and benchmarks. It is important for the council to define MSST and OY to stop overfishing.

Review of Gag Natural Mortality Rate by SSC

Alternatives 2 and 3 each contain an option to define MSST as a function of the natural mortality rate of gag ($(1\text{-}M)*SSB_{MSY\ Proxy}$). In the SEDAR 10 (2006) gag assessment, an age-varying natural mortality rate was used that was scaled to an overall natural mortality rate of M = 0.15. The selection of natural mortality rate affects not only the status of the stock, but also the degree to which a stock is allowed to decline below $SSB_{MSY\ Proxy}$ before being declared overfished. In May 2008, the Standing and Special Reef Fish SSC met along with scientists representing the SEFSC and a consortium of commercial and recreational fishing interests to review the selection of M for gag (GMFMC 2008).

Industry consultant Dr. Trevor Kenchington presented a review of various methodologies for estimating M, producing results ranging from 0.15 to 0.48. He noted that all of the methods are imprecise. However, he felt that Hoenig's (1983) method places a high level of reliance on the estimate of maximum age alone, which is uncertain, and that it ignores the effect of sample size. Dr. Kenchington felt that M = 0.15 was inconsistent with observed ages of gag, and that the results from looking at multiple methods, and ignoring unreasonable high or low results, suggest that M is in the range of 0.2 to 0.3.

SEFSC assessment scientist Clay Porch reviewed estimates of natural mortality used in previous gag assessments. The 1994 gag assessment (Schirripa and Goodyear 1994), using a maximum observed age of gag at that time of 21 from an exploited stock, felt that M = 0.20 was an appropriate estimate, but evaluated M at both 0.20 and 0.15. The October 2001 RFSAP (GMFMC 2001) noted that several gag were aged at 25 years old or older, and used M = 0.15. It reviewed input by Dr. Kenchington at that time, but given that the stock has been fished for many years and with many ages susceptible to harvest the Panel did not find that the M was unreasonably low. The SEDAR 10 (2006) assessment, using a maximum age of 31, came up with an M = 0.13 for the GOM. The SEDAR 10 assessment also evaluated several alternative models, in which M ranged from 0.15- 0.22 and 0.17-0.33 in the Gulf of Mexico and South Atlantic, respectively. Estimates of natural mortality recommended by the DW were consistent with recently published mortality data (e.g., McGovern et al. 2005) as well as those applied in the previous gag assessment. In the 2007 SEDAR review, the Review Panel concluded they had no criteria or data to recommend change to the specification of M in each base case.

The SSC noted that there is no one satisfactory method of estimating M. It was also felt that Hoenig's (and possibly other) methods estimate total mortality rather than natural mortality except in an unexploited stock. After reviewing and discussing the presentations, the SSC recommended that the Council request that the SEFSC test the sensitivity of the model to various values of M, such as 0.1 - 0.2, with the Lorenzen function scaled between ages 3-30. This is expected to provide some information as to how management advice might be affected by the choice of M. The SSC also recommended that the Council encourage NMFS to organize a national workshop on the treatment of natural mortality in stock assessment modeling, recognizing the commonality of this problem and the difficulty of reaching acceptable methods.

However, realizing that these analyses and workshop could not be completed quickly, the SSC advised the Council to proceed with management actions that are developed from the current SEDAR assessment, until any new information forthcoming from the above suggestions would warrant changes be considered.

Summary of Socio-Economic Impacts:

Defining the OY, MFMT and MSST of a species does not alter the current harvest or use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying OY, MFMT and MSST, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, specifying these parameters may be considered to have indirect economic effects. Restrictive management measures are required by all alternatives, but weighing both short-term losses and long-term benefits, **Preferred Alternative 2** appears to provide more stable streams of net benefits over time than any of the other alternatives.

Alternative 1 would continue the status quo and would not stop overfishing of gag grouper as required by the SFA. Preferred **Alternative 2** and **Alternative 3** would not have any direct impact on the fishermen, fishing-dependent businesses, or communities that depend on the gag grouper fishery in the short term because this is an administrative action that will set the thresholds and benchmarks. It is important for the council to define MSST and OY to stop overfishing.

2.2 Action 2. Red Grouper Minimum Stock Size Threshold (moved to Considered but Rejected)

[This section title is included to maintain consistency of section numbering with earlier drafts.]

2.3 Action 3. Set Gag TAC

Alternatives 2 through 4 below are based on using F_{MAX} as a proxy for F_{MSY} (Alternative 2 in Action 1), and are summarized in Table 2.3.1 on the next page. Alternatives 2 and 3 manage TAC at the OY level, while Alternatives 4 and 5 manage at the MSY (proxy) level. If the Council selects $F_{30\%\ SPR}$ as the F_{MSY} proxy (Alternative 3 in Action 1) rather than F_{MAX}, then the TAC values summarized in Table 2.3.2 should be substituted.

Alternative 1. No action. Do not set a gag TAC. Gag TAC remains undefined.

Preferred **Alternative 2. Set directed TAC on a yearly basis for gag during 2009 through 2011 at the yield for each year as defined by the constant F_{OY} projection (based on 75% of F_{MAX}) from the 2007 assessment and reevaluation. TAC in 2009 would be 3.38 mp, TAC in 2010 would be 3.62 mp, and TAC in 2011 would be 3.82 mp. TACs for subsequent years would be set in a subsequent amendment, and**

would remain at the 2011 level until such an amendment is implemented. TAC would be updated and revised, as needed, based on periodic stock assessments.

Alternative 3. Set directed TAC for gag in three year constant catch intervals using the first year of the three-year interval as defined by the constant F_{OY} projection (based on 75% of F_{MAX}) from the 2007 assessment and reevaluation. During the first three-year interval, 2009 through 2011, TAC would be 3.38 mp. TAC for subsequent three-year intervals would be set through a subsequent amendment, and would remain at the previous level until such an amendment is implemented. TAC would be updated and revised, as needed, based on periodic stock assessments.

Alternative 4. Set directed TAC on a yearly basis for gag during 2009 through 2011 at the yield for each year as defined by the constant F_{MAX} (as proxy for F_{MSY}) projection from the 2007 assessment and reevaluation. TAC in 2009 would be 4.25 mp, TAC in 2010 would be 4.39 mp, and TAC in 2011 would be 4.50 mp. TACs for subsequent years would be set in a subsequent amendment, and would remain at the 2011 level until such an amendment is implemented. TAC would be updated and revised, as needed, based on periodic stock assessments.

Alternative 5. Set directed TAC for gag in three year constant catch intervals using the first year of the three-year interval as defined by the constant F_{MAX} (as proxy for F_{MSY}) projection from the 2007 assessment and reevaluation. During the first three-year interval, 2009 through 2011, TAC would be 4.25 mp. TAC for subsequent three-year intervals would be set through a subsequent amendment, and would remain at the previous level until such an amendment is implemented. TAC would be updated and revised, as needed, based on periodic stock assessments.

Table 2.3.1. USE THIS TABLE TO COMPARE TAC IF ACTION 1 – ALTERNATIVE 2 IS SELECTED – BASE TAC ON MAXIMUM YIELD PER RECRUIT. The following TACs are based on the Lorenzen M3P model run, and assume that F_{MAX} is the proxy for F_{MSY}, and that F_{OY} = 75% of F_{MAX}.

	Alt. 1	*Pref.* Alt. 2	Alt. 3	Alt. 4	Alt. 5
Year	No Action	F_{OY} annual	F_{OY} 3-yr step	F_{MAX} annual	F_{MAX} 3-yr step
2009	undefined	3.38 mp	3.38 mp	4.25 mp	4.25 mp
2010	undefined	3.62 mp	3.38 mp	4.39 mp	4.25 mp
2011	undefined	3.82 mp	3.38 mp	4.50 mp	4.25 mp
Equilibrium yield	4.53 mp*	4.82 mp		4.94 mp	
Equilibrium SSB	16.47 mp	33.51 mp		27.32 mp	

* Equilibrium yield under the no action alternative assumes that the fishing mortality rate will continue at a rate equal to the geometric mean of $F_{2001} – F_{2004}$.

Table 2.3.2. USE THIS TABLE TO COMPARE TAC IF ACTION 1 – ALTERNATIVE 3 IS SELECTED – BASE TAC ON 30% SPR. The following TACs are based on the Lorenzen M3P model run, and assume that $F_{30\%\ SPR}$ is the proxy for F_{MSY}, and that F_{OY} = 75% of $F_{30\%\ SPR}$.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5
Year	No Action	F_{OY} annual	F_{OY} 3-yr step	$F_{35\%\ SPR}$ annual	$F_{35\%\ SPR}$ 3-yr step
2009	undefined	4.23 mp	4.23 mp	5.23 mp	5.23 mp
2010	undefined	4.38 mp	4.23 mp	5.16 mp	5.23 mp
2011	undefined	4.48 mp	4.23 mp	5.08 mp	5.23 mp
Equilibrium yield	4.53 mp*	4.94 mp		4.71 mp	
Equilibrium SSB	16.47 mp	37.47 mp		21.41 mp	

* Equilibrium yield under the no action alternative assumes that the fishing mortality rate will continue at a rate equal to the geometric mean of $F_{2001} - F_{2004}$.

The gag stock has been determined to be undergoing overfishing, i.e., it is being fished at a rate exceeding MFMT. While reducing F to MFMT will eliminate overfishing, the long-term objective under National Standard 1 is to achieve optimum yield. Furthermore, upcoming guidelines for implementing annual catch limits (ACL) will likely require that catch limits be based on OY or below. The alternatives in this section (other than no action) provide for setting TAC at the F_{OY} level. The stock will be rebuilding until it reaches the equilibrium level capable of supporting OY, consequently TAC under a constant F_{OY} will increase until equilibrium is reached. The actions in this section provide a range of alternatives for implementing an increasing TAC until equilibrium is reached. TACs are in terms of landed yield. However, dead discards are included in the calculation of F.

Alternative 1 is the no action alternative. Without a TAC, overfishing is likely to continue to occur and OY will not be achieved. Under this condition, stock biomass will decline below SSB_{MSY}, and may decline below MSST, resulting in an overfished designation. It has been speculated that fishing effort, and thus F, may have been restricted in recent years due to rising fuel prices and increased storm activity. However, as shown in Table 1.2.1.1, landings have remained near historical highs in recent years despite rising costs and a very active hurricane season in 2004.

Preferred **Alternative 2** sets TAC at the F_{OY} level for the three years 2009-2011 using a constant F approach which in which the TAC level changes each year based on the projected stock growth from the SEDAR 10 assessment. This approach assumes that the stock will improve as predicted by the projections. TACs for subsequent years will remain at the 2011 level unless revised in a future amendment. Although the gag stock is not declared to be in an overfished condition, the assessment's Lorenzen M3P model run projects that spawning stock biomass level will have dropped below SSB_{MSY} in 2006. Fishing at F_{OY} beginning in 2008 is projected to restore the stock biomass to a level above SSB_{MSY} by 2010 (Table 2.3.3). As noted in Amendment 30A, management measures such as bag, size, or trip limits and season closures which allow the catch to increase in proportion to availability are less likely to create overages since the TAC is increasing proportionally to availability as well.

A SEDAR assessment update for gag is scheduled for 2009, which will produce a new TAC schedule for subsequent years including any adjustments that may be needed for TACs in 2010 and beyond. If this update is delayed, TAC for the years beyond 2011 would remain at the 2011 level until an assessment or assessment update can be conducted.

Alternative 3 also sets TAC based on the F_{OY} level, but uses a stepped approach to managing TAC levels during rebuilding period by setting TAC at three year intervals rather than annually. Overall catches during each three-year interval could be expected to be lower than for the comparable annual TAC adjustment. This alternative sets TAC for the first three-year interval (2009-2011). Annual TACs for subsequent three-year intervals will need to be implemented in a future amendment. Since catches in each interval will be constrained at a slightly lower level in years 2 and 3 of each step compared to Alternative 2, the probability of successfully achieving SSB_{MSY} will be slightly higher. However, management measures such as bag, size, or trip limits and season closures which allow the catch to increase in proportion to availability could result in overages in years 2 and 3 of each interval, and could trigger action under the accountability measures discussed later in this amendment.

Alternative 4 is similar to Alternative 2 except that it sets TAC at the F_{MAX} level (as a proxy for F_{MSY}) rather than the F_{OY} level for the three years 2009-2011. Under the constant F approach the TAC level changes each year based on the projected stock growth from the SEDAR 10 assessment. This level of F is sufficient to end overfishing under either of the definitions of MFMT being considered in Action 1 ($F_{MAX} = 0.20$ or $F_{30\%\ SPR} = 0.27$). However, under MFMT = F_{MAX}, the fishing mortality rate will be right at the threshold and is likely to generate frequent overfishing situations as it fluctuates above and below the threshold. At the less conservative MFMT of $F_{30\%\ SPR}$, such threshold crossovers may still occur but will be less frequent. Although the gag stock is not declared to be in an overfished condition, the assessment's Lorenzen M3P model run projects that spawning stock biomass level will have dropped below SSB_{MSY} in 2006. Fishing at F_{MAX} beginning in 2009 is projected to end the decline in SSB, but the recovery will be more gradual and is not projected to reach SSB_{MSY} until 2042. As with Alternative 2, management measures such as bag, size, or trip limits and season closures which allow the catch to increase in proportion to availability are less likely to create overages since the TAC is increasing proportionally to availability as well.

Alternative 5 is similar to Alternative 3 except that it sets TAC based on the F_{MAX} level, using a stepped approach to managing TAC levels during rebuilding period by setting TAC at three year intervals rather than annually. The alternative sets TAC for the first three-year interval (2009-2011), with TACs for subsequent three-year intervals to remain at the 2011 level until set in a future amendment. Overall catches during each interval could be expected to be lower than for the comparable annual TAC adjustment scenario since TAC for each three-year interval will be set at the lower year 1 level based on the constant F rebuilding trajectory. Since catches will be constrained at a slightly lower level in years 2 and 3 of each step compared to Alternative 4, the probability of exceeding the MFMT overfishing threshold in subsequent years will be slightly lower than Alternative 4, and the probability of successfully rebuilding the stock to SSB_{MSY} will be slightly higher. However, management measures such as bag, size, or trip limits and season closures which allow the catch to increase in proportion to availability could result in overages in years 2 and 3 of each interval, and could trigger action under the accountability measures discussed later in this amendment.

Table 2.3.3. Gag spawning stock biomass relative to SSB_{MSY} in 2004 (final year of the stock assessment, and projections for 2006-2012. Values less than 1.0 indicate that the biomass level is below SSB_{MSY}. Note: this does not mean the stock a considered overfished. The overfished threshold (MSST) is typically set below SSB_{MSY} and is set in Action 1. Under the standard overfished definition of $(1-M)*SSB_{MSY}$, overfished status is a value less than 0.85. Shaded cells indicate a projected overfished condition.

	SSB ratio at F_{OY}	SSB ratio at F_{MAX}
2004	0.99	0.99
2005	0.87	0.87
2006	0.80	0.80
2007	0.85	0.85
2008	0.88	0.88
2009	0.96	0.92
2010	1.02	0.95
2011	1.06	0.95
2012	1.09	0.96

Table 2.3.4. Estimates of landed gag yield from commercial and recreational fisheries. 1986-2004 SEDAR 10 Assessment Advisory Report. 2005-2007 pers. Comm. (Porch). 2007 are preliminary landings. Values in pounds gutted weight.

Year	Commercial	Recreational	Total
1986	1,701,441	3,597,491	5,298,932
1987	1,538,166	2,447,832	3,985,998
1988	1,216,494	3,747,483	4,963,977
1989	1,692,830	2,314,324	4,007,154
1990	1,793,090	1,259,887	3,052,977
1991	1,565,320	2,748,231	4,313,551
1992	1,663,880	2,245,860	3,909,740
1993	1,865,116	2,787,852	4,652,968
1994	1,618,740	1,999,707	3,618,447
1995	1,651,664	2,700,221	4,351,885
1996	1,566,658	2,353,437	3,920,095
1997	1,597,645	2,573,108	4,170,753
1998	2,530,686	3,519,315	6,050,001
1999	2,097,739	3,721,784	5,819,523
2000	2,283,311	4,972,529	7,255,840
2001	3,128,510	4,031,469	7,159,979
2002	2,983,506	4,435,518	7,419,024
2003	2,626,122	3,773,139	6,399,261
2004	2,901,692	4,913,422	7,815,114
2005	2,487,228	3,534,222	6,021,450
2006	1,326,011	1,946,631	3,272,642
2007*	1,220,155	2,477,852	3,697,737

* Preliminary landings

In general, setting a TAC for gag necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. Since regulations proposed for the recreational sector in this amendment are input controls, the interaction of commercial and recreational harvest of gag described above for the current conditions still applies. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified.

Preferred Alternative 2 would set the TAC on a yearly basis for gag during 2009 through 2011 at the yield for each year as defined by the constant Foy projection from 2007 assessment and reevaluation. Subsequent TACs would need to be implemented in a future amendment and would stay at the 2011 level in the absence of an amendment. As the stock rebuilds, this alternative will allow the TAC to increase each year based on the projected stock growth. If the TAC can be increased each year, commercial and recreational fishermen, fishing-dependent businesses, and communities that are involved with the fishery will benefit from having more fish to harvest.

Although **Alternatives 3** and **5** would help to end overfishing, they use a step approach to raising the TAC. As the stock recovers, fishermen would not be able to harvest the maximum amount possible each year because the TAC would not be adjusted on a yearly basis. **Alternative 4** is similar to **Alternative 2** except that it starts with a higher TAC and there is more of a chance with fluctuations in the stock that gag grouper could continue to be undergoing overfishing which could require more drastic management measures in the future to end overfishing.

<u>Summary of Socio-Economic Impacts</u>:

Setting a TAC for gag necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified with available information.

Within the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also led to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure led to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change. Using an economic model, estimates of the potential effects of each alternative were generated. Based on overall effects on the commercial sector, the alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4**, **Alternative 5**, **Alternative 2**, and **Alternative 3**. If a grouper IFQ program is implemented under Amendment 29, the possibility of a quota closure will be eliminated. However, in all other aspects, the economic effects and ranking of the alternatives would remain the same.

The effects of **Alternative 1** would be a gain of $1.1 million initially. However, since overfishing would continue to occur, the stock would eventually become overfished, leading to losses in yield and the requirement to implement a rebuilding plan. Initial losses from the rest of the alternatives would be $22.9 million for **Alternative 2**, $25.8 million for **Alternative 3**, $8.8 million for **Alternative 4**, and $10.6 million for **Alternative 5**. As the stock builds towards its OY (**Alternatives 2 and 3**) or MSY (**Alternatives 4 and 5**) biomass level, yields will increase. Over the long term, both the equilibrium OY yield (4.82 mp – Table 2.3.1) and the equilibrium MSY yield (4.94 mp – Table 2.3.1) are higher than the equilibrium yield under no action (4.53 mp – Table 2.3.1).

Preferred Alternative 2 would set the TAC on a yearly basis for gag during 2009 through 2011 at the yield for each year as defined by the constant Foy projection from 2007 assessment and reevaluation. As the stock biomass increases, this alternative will allow the TAC to increase each year based on the projected stock growth. If the TAC can be increased each year, commercial and recreational fishermen, fishing-dependent businesses, and communities that are involved with the fishery will benefit from having more fish to harvest.

Although **Alternatives 3 and 5** would help to end overfishing, they use a step approach to raising the TAC. As the stock recovers, fishermen would not be able to harvest the maximum amount possible each year because the TAC would not be adjusted on a yearly basis. **Alternative 4** is similar to **Alternative 2** except that it starts with a higher TAC and there is more of a chance with fluctuations in the stock that gag grouper could continue to be undergoing overfishing which could require more drastic management measures in the future to end overfishing.

2.4 Action 4. Set Red Grouper TAC

Secretarial Amendment 1 established a rebuilding plan for red grouper which set target directed catch at 6.56 mp gutted weight for the first three years (2003-2005) of the rebuilding plan and was expected to allow the catch to increase to 7.23 mp gutted weight during the second three-year period (2006-2008). However, due to large increases in catch by the recreational fishery in 2004, the catch was held at 6.56 mp gutted weight and new regulations to control harvest in the recreational fishery were implemented in 2005 and 2006. Subsequently, in 2007, the red grouper stock was determined to be rebuilt, in part due to higher than average recruitment and modifications to how natural mortality is calculated (SEDAR 12, 2006). Spawning stock biomass (SSB) in 2005 was 1.27 times the SSB at MSY and 1.07 times the SSB at OY. Fishing mortality in 2005 was 72 percent of F_{MSY} and 97 percent of F_{OY}. The Council's goal is to manage all fisheries at levels that optimize yield. This action contains proposals to maintain the red grouper TAC at 6.56 mp gutted weight or increase red grouper TAC to either equilibrium MSY or equilibrium OY levels.

Alternative 1. No action. Do not change the red grouper TAC. The red grouper TAC remains at 6.56 mp gutted weight.

Preferred **Alternative 2. Set red grouper TAC at the constant catch level corresponding to fishing at equilibrium OY. TAC would be 7.57 mp gutted weight.**

Alternative 3. Set red grouper TAC at the constant catch level corresponding to fishing at equilibrium MSY. TAC would be 7.72 mp gutted weight.

Action 6 establishes annual catch targets and annual catch limits (ACL). The ACLs are maximum fishing levels set by the SSC under Section 302 of the MSFCMA and cannot be exceeded. ACLs were set by the Standing and Special Reef Fish SSC in May 2008 at 4.25 million pounds in 2009 for gag, and at a range of 7.57 to 7.72 million pounds for red grouper (GMFMC 2008). The annual catch targets for red grouper are based on the TAC selected in this section, and cannot exceed the ACL.

After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs at the equilibrium OY or MSY level or the yield at F_{OY} or F_{MSY}, whichever is less. A SEDAR assessment update for red grouper is scheduled for 2009, which will produce a new TAC schedule for subsequent years including any adjustments that may be needed for TACs in 2010 and beyond.

Recent Trends in Catch Per Unit of Effort Indices

In May 2008, the Standing and Special Reef Fish SSC received a summary from the SEFSC on trends in gag and red grouper CPUE indices since 2004 (GMFMC 2008). SEAMAP video surveys show indices of abundance for both gag and red grouper have declined by about 50% between 2004 and 2007. The SSC (GMFMC 2008) concluded that this suggests that the population abundance has declined since 2004, but they also noted that the 50% decline in the index does not necessarily mean a corresponding decline in abundance. Other reasons for a decline in the index could be that the fish have moved outside of the normal fishing grounds due to red tide or other environmental reasons. There was a very strong red tide event in 2005, lasting from mid-May to August, and FWC-FWRI haul seine sampling of age-0 gag in seagrass beds of Apalachicola Bay, Tampa Bay, Charlotte Harbor have shown an upward trend in recent years. The SSC noted that while there has been a decline in the fishery dependant indices from 2004 to 2007, they are not as low as during the 1990s.

For 2008, preliminary commercial landings of red grouper through June are up by 72 percent from 2007 (from 1.17 to 2.01 mp gutted weight[3]), and preliminary recreational landings of red grouper reported by MRFSS (type A+B1) (as of 8/20/09) for waves 1, 2 and 3 are up by 16 percent from 2007 (368 to 429 thousand pounds whole weight)

Indices of abundance for red grouper have been collected since 1992, except for the years 1998-2000 and 2003. The year 2004 was a historical high for the index, and while the index has subsequently declined from that high, it remains within its historical range of fluctuation (Figure 2.4.1).

[3] Source: memo from Roy Crabtree to Wayne Swingle dated July 10, 2008, Preliminary 2008 Gulf Grouper and Tilefishes Landings.

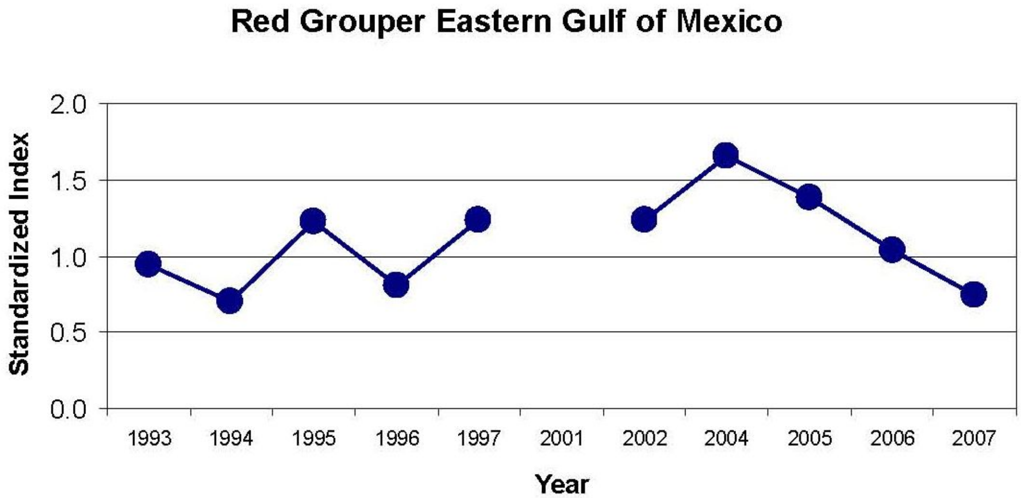


Figure 2.4.1. Standardized design-based red grouper index of abundance in the eastern Gulf of Mexico (NMFS 2008).

The current red grouper TAC was set in 2004 at 6.56 mp gutted weight, with a commercial quota of 5.31 mp gutted weight and a recreational target catch level of 1.25 mp gutted weight. The TAC and both sector allocations were exceeded in 2004 and 2005. In 2006, a 6,000 pound gutted weight aggregate grouper trip limit was implemented, replacing the 10,000/7,500/5,500 pound gutted weight trip limit implemented by emergency rule in 2005. In addition, a one-time two-month recreational red grouper closed season (November 1-December 31) and a one red grouper bag limit were implemented by interim rule to address overfishing and return recreational landings to the 1.25 mp gutted weight target catch level. In 2006, a regulatory amendment was implemented that replaced interim regulations. This amendment established a one red grouper bag limit and a recreational closed season from February 15 to March 15 for gag, black grouper and red grouper. As a result of these changes, combined with possible reductions in effort due to a weakening U.S. economy and high fuel prices, and recent declines in indices of abundance suggesting either potential declines in stock abundance or movement of stock outside of the normal fishing grounds due to red tide or other environmental (see above), landings have remained below the TAC for 2006-2007 (Table 2.4.1).

Table 2.4.1. Landings of red grouper 2004-2007, in millions of pounds, gutted weight.

Year	Commercial	Recreational	Total
2004	5.75	3.00	8.75
2005	5.41	1.63	7.04
2006	5.14	1.01	6.15
2007	3.54	1.04	4.58

Landings for 2004-2005 are from Table 1.2.2.1. Commercial landings for 2006-2007 are from the NMFS Southeast Regional Office Quota Monitoring website. Recreational landings for 2006 include MRFSS and headboat data. Recreational landings for 2007 are from MRFSS only, and do not include headboat data. 2007 landings are preliminary.

Alternative 1, No action, would maintain the TAC at the current level of 6.56 mp gutted weight. This yield would be below equilibrium OY and approximately one mp of landings per year would be forgone. However, relative to 2006 and 2007 landings and effort levels (6.15 and 4.58 mp gutted weight, respectively), no yield would be forgone in the short-term if the status quo TAC is maintained. Projections indicate that, at equilibrium, stock biomass is expected to be approximately 33 percent above SSB_{MSY} and twelve percent above SSB_{OY}. In the near term, the recent increase in stock abundance is partially the result of a strong 1999 year class entering the fishery. Stock biomass is projected to decline as the 1999 year class ages and moves through the fishery. Recently updated indices of abundance show a decline from the high of 2004 (Figure 2.4.1). This may suggest that the population abundance has declined since 2004, but it is still not as low as it was during the 1990s. Other causes for a decline in the index could be movement of fish due to red tide or other reasons (GMFMC 2008). A stock assessment for red grouper is scheduled for 2009 and will provide an update on the status of the stock. Overall, **Alternative 1** is the most conservative of any of the Action 4 TAC alternatives and would result in the lowest likelihood of overfishing occurring.

Preferred **Alternative 2** would allow regulations to be modified to attain a fishery-wide catch at equilibrium OY, 7.57 mp gutted weight. The fishery would be managed at the equilibrium OY target level until a new stock assessment is completed. After completion of the next red grouper stock assessment, red grouper TAC would be set either equal to equilibrium OY or the yield at F_{OY}, whichever is less. Projections indicate red grouper stock biomass will continue to increase with a 7.57 mp gutted weight TAC, although more slowly than **Alternative 1**. As the 1999 year-class moves through the fishery, stock biomass may begin to decline. Recently updated indices of abundance show a decline from the high of 2004 (Figure 2.4.1). This may suggest that the population abundance has declined since 2004, but it is still not as low as it was during the 1990s. Other causes for a decline in the index could be movement of fish due to red tide or other reasons (GMFMC 2008). If the population is declining and continues to decline, then assessment projections may be overly optimistic with regard to the condition of the stock. If SSB has declined then there will be an increased risk that overfishing may occur and the stock will become overfished if TAC is increased. However, preliminary landings for the first four to five months of 2008 show an increase over 2007 landings. A stock assessment for red grouper is scheduled for 2009 to determine the latest status of this stock. The Council chose **Alternative 2** as preferred because the red grouper stock was at or above SSB_{OY} in 2004 and this alternative accomplishes their intent to manage all reef fish species at OY levels once rebuilt. There is a higher probability that the stock would become overfished or undergo overfishing relative to **Alternative 1**, but a lower probability that the stock would become overfished or undergo overfishing relative to **Alternative 3.**

Alternative 3 would allow the fishery-wide catch to increase to the equilibrium MSY yield, 7.72 mp gutted weight. After completion of the next red grouper stock assessment, red grouper TAC would be set either equal to equilibrium MSY or the yield at F_{MSY}, whichever is less. Under this alternative, stock biomass would be expected to decline from approximately 27 percent above SSB_{MSY} to SSB_{MSY}. Recently updated indices of abundance suggest that declines in abundance may have already occurred from the 2004 high, although the index is still within its historical range. Other causes for a decline in the index could be movement of fish due to red tide or other reasons (GMFMC 2008). A new stock assessment for red grouper is scheduled for 2009. This assessment will provide new information on whether or not SSB has dropped below SSB_{MSY}. If SSB has declined, then the TAC and ACL will be set to a lower yield corresponding to the yield at F_{MSY}. **Alternative 3** is the least conservative of the red grouper TAC Alternatives. The TAC level proposed by **Alternative 3** is the maximum that could be implemented for the red grouper stock, given that the Council's SSC recommended allowable biological catch be set no higher than 7.57 to 7.72 mp gutted weight. At a constant equilibrium MSY yield, the average fishing mortality rate over time would be expected to be at F_{MSY}. However, there would be normal fluctuations in stock biomass levels, and fishing mortality rate would fluctuate inversely to stock biomass. In years when biomass is below SSB_{MSY} the fishing mortality rate would exceed the overfishing threshold.

Alternatives 2 and 3 are based on setting equilibrium yields on a continuing basis for a fully recovered stock, as opposed to constant fishing mortality rate yields where TAC may change from year to year. The difference in equilibrium TAC is small because at OY equilibrium the number of fish caught will be less than at MSY equilibrium but at a larger average size. Restrepo et al. (1998) indicated that when a stock is at equilibrium, the difference between the OY and MSY yields is only about 6 percent, but the difference between the OY and MSY fishing mortality rates is 25 percent. In the case of red grouper, the difference between equilibrium OY and equilibrium MSY is only 2 percent. Setting TAC equal to equilibrium MSY or equilibrium OY is currently more conservative than setting TAC equal to the yields associated with fishing at F_{MSY} or F_{OY} because the stock biomass level is estimated to be above SSB_{MSY} and close to or slightly above SSB_{OY}. Projections conducted during SEDAR 12 (2007) indicate that at current biomass levels the yield at F_{MSY} in 2009 could be set as high as 9.91 mp gutted weight, while the yield at F_{OY} could be set as high as 7.94 mp gutted weight. However, at these TACs the stock would be driven down and TAC would then need to be reduced in subsequent years.

Summary of Socio-Economic Effects:

In general, setting a TAC for red grouper necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. Since regulations proposed for the recreational sector in this amendment are input controls, the interaction of commercial and recreational harvest of gag described above for the current conditions still applies. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified.

Within the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also lead to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure leads to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change. Using an economic model, estimates of the potential effects of each alternative were generated. Based on overall effects on the commercial sector, the alternatives may be ranked in descending order as follows: **Alternative 2, Alternative 1,** and **Alternative 3.**

Alternative 1 would keep the TAC at current levels and would not allow fishermen to harvest at the OY level. **Preferred Alternative 2** would raise the TAC from current levels and allow fishermen to harvest at the OY level and the stock would continue to rebuild. Commercial and recreational fishermen and businesses involved with the red grouper fishery would benefit from having more fish to harvest. **Alternative 3** would also raise the TAC, but there would be a chance that the stock could undergo overfishing or reduced ACLs if there are fluctuations in the stock, which may require more restrictive management measures in the future to end overfishing. If the TAC had to be reduced in the future, there would be a negative impact on commercial and recreational fishermen and businesses involved with the red grouper fishery because there would be less fish to harvest.

2.5 Action 5. Red Grouper and Gag Allocations

Amendment 1 to the Reef Fish FMP states allocation procedures should be regularly reviewed. The purpose of **Action 5** is to consider the allocation process and the need to update it. As catch limits are set for a species, the allowed catch must be divided among the fishing sectors. In addition, an objective of this amendment is to reduce harvest of gag. Management measures differ between the commercial and recreational sectors; therefore, allocations should be defined in order to choose the appropriate suite of measures to achieve the necessary harvest goals.

At their November 2007 meeting, the Council recognized the difficulties involved in this type of decision and established an Ad Hoc Allocation Committee composed of Council members to examine fair and equitable ways to allocate all FMP resources between recreational and commercial fisheries. Once completed, the principles for setting allocations should be more transparent and understandable, and hopefully more acceptable to the various sectors in the fisheries. The interim allocations proposed in this action would be in effect until such time the Council, through the recommendations of the Ad Hoc Allocation Committee, could implement a separate amendment to allocate grouper resources between recreational and commercial fisheries. In developing or revising allocations, National Standard 4 requires allocations to be: 1) fair and equitable, 2) reasonably calculated to promote conservation, and 3) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of fishing privileges. However, guidance on National Standard 4 acknowledges that “inherent in an allocation is the advantaging of one group to the detriment of another.”

The framework procedure originally created in Amendment 1 to the Reef Fish FMP, and most recently modified by Amendment 18, states when setting TAC via the framework, allocations should be based on historical percentages harvested by each user group during the base period of 1979-1987, or by other criteria as specified by the Council through a plan amendment. Commercial grouper landings were not identified by species until 1986, so landings data on individual grouper species under the base period exist only for the last two years (1986-1987). For grouper in aggregate, Amendment 1 created a recreational:commercial allocation of 35:65. Because these allocations have changed over time, the proportion of landings for each sector is different than the time series established in the framework provisions.

Setting allocations based on historical landings has a complication unique to gag. Many gag, particularly in the years prior to 1990, were labeled as black grouper, a common local name for gag. Beginning with the 1994 gag stock assessment, Schirripa and Goodyear (1994) used proportions of recreational landings by county in Florida to estimate commercial landings of gag and black grouper; for Texas through Alabama, fish labeled as gag or black grouper were assumed to be gag.

Secretarial Amendment 1, implemented in 2004, created a commercial red grouper species quota within the aggregate shallow water grouper quota. Because no allocation existed for individual grouper species, the red grouper quota developed in that amendment was based on achieving an equal percentage reduction of landings from the commercial and recreational sectors. Landings during 1999-2001 were used as a current landings base period from which to achieve the reductions specified under the rebuilding plan. However, short-term fluctuations in landings occurred during those years because a strong 1996 red grouper year-class entered the fishery. Also, new grouper regulations took effect in 2000 and may have resulted in a short-term shift in recreational fishing directed more to gag (see Secretarial Amendment 1, page 36). The result was a recreational:commercial ratio in red grouper landings of 19:81 during the base years. Secretarial Amendment 1, in achieving equal percentage reductions, recognized the short-term nature of that ratio and explicitly stated it was not setting an allocation. As stated in Secretarial Amendment 1 (pages 36-37)

> As the [1996] year-class is fished out and exits the fishery, the commercial-to-recreational ratio should revert back towards historical levels. Single-species grouper allocations are not specified in Reef Fish Amendment 1, and the current amendment does not attempt to address the question of single-species grouper allocations.

This situation shows the danger of setting an allocation based on too short a time series, or on a time series during which the short-term impacts of new regulations may have an inordinate impact. In addition, the recreational landings data primarily came from MRFSS, which was less precise during the early years than the later years (Figure 2.5.1).

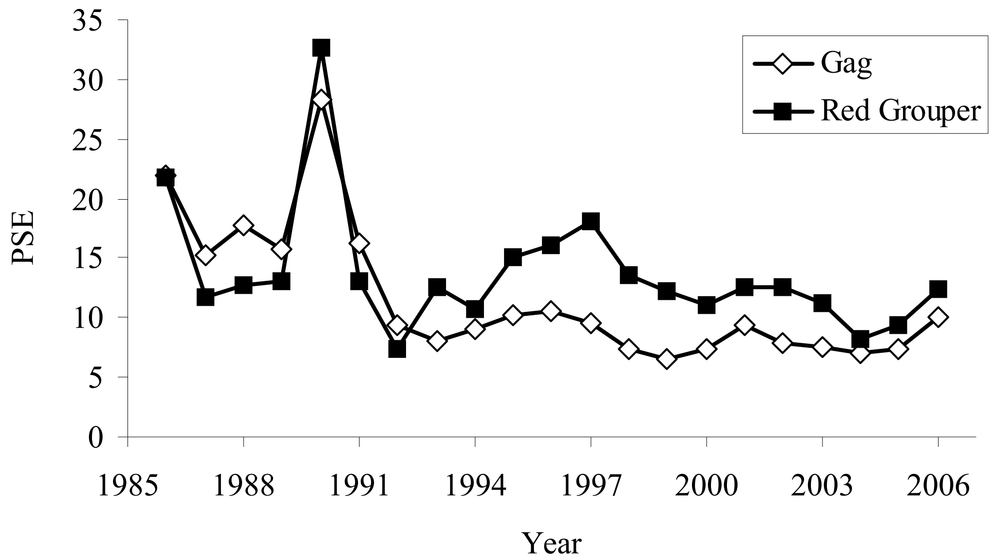


Figure 2.5.1. Percent standard error in landings estimates (weight) by year for gag and red grouper from MRFSS data.

While there have been large year-to-year fluctuations in the ratio of recreational to commercial gag and red grouper catches, particularly in years immediately following the implementation of a new size limit (1990, 2000), an examination of five-year moving averages shows only modest changes in any five-year time period (Table 2.5.1).

Table 2.5.1. Five-year running averages of recreational to commercial catch ratios for gag and red grouper.

	Gag			Red Grouper	
5-Year Period	Recreational	Commercial		Recreational	Commercial
86-90	63%	37%		25%	75%
87-91	62%	38%		25%	75%
88-92	61%	39%		29%	71%
89-93	57%	43%		27%	73%
90-94	56%	44%		27%	73%
91-95	60%	40%		28%	72%
92-96	59%	41%		27%	73%
93-97	60%	40%		22%	78%
94-98	59%	41%		20%	80%
95-99	61%	39%		18%	82%
96-00	63%	37%		18%	82%
97-01	62%	38%		18%	82%
98-02	61%	39%		20%	80%
99-03	61%	39%		21%	79%
00-04	61%	39%		25%	75%
01-05	59%	41%		24%	76%
02-06	60%	40%		24%	76%

Alternative 1. Revert to the allocation of TAC between the recreational and commercial fisheries as specified for framework actions in Amendment 1 to the Reef Fish FMP as the average share during the years 1981 through 1987. Only 1986-1987 landings are used since grouper were not identified to species in the commercial fishery until 1986. The recreational:commercial proportions would be gag 65:35, red grouper 23:77.

Alternative 2. No Action. Maintain the current allocation of TAC between the recreational and commercial fisheries as the recent 5-year average share during the years 2001 through 2005. The recreational:commercial proportions would be gag 59:41, red grouper 24:76.

***Preferred* Alternative 3. Establish an interim allocation of TAC between the recreational and commercial fisheries as the average share during the years 1986 through 2005. The recreational:commercial proportions would be gag 61:39, red grouper 24:76.**

Discussion: **Alternative 1** (1986-1987 two-year average) would not set new allocations, but would allow allocations to revert to those calculated according to the Amendment 1 procedure. Only the years 1986 and 1987 of the Amendment 1 base period have grouper landings by species for both the commercial and recreational sectors, so the allocations in this alternative are based on only two years of data when recreational landings estimates had low precision (Figure 2.5.1). Although Amendment 1 set allocations for implementation via framework action, landings have shifted from those allocations in subsequent years (Table 2.5.2). Compared to landings from recent years (**Alternative 2)**, **Alternative 1** provides an additional six percent of gag allocation to the recreational sector, and an additional one percent of red grouper allocation to the commercial sector.

Table 2.5.2. Allocation adjustments between recreational and commercial fisheries based on landings from various time periods within the historical period 1986 through 2005.

Amendment 1 Allocation (only 1986-1987 landings are available by species)						
		Recreational	Commercial	Total	% Rec	% Comm
Average	Gag	3,022,622	1,619,803	4,642,465	65%	35%
	Red	1,932,545	6,515,438	8,447,983	23%	77%
Recent Average Landings (2001-2005)						
		Recreational	Commercial	Total	% Rec	% Comm
Average	Gag	4,137,554	2,825,412	6,962,966	59%	41%
	Red	1,768,998	5,593,871	7,362,869	24%	76%
Full Time Series Average (1986-2005) (Preferred Alternative)						
		Recreational	Commercial	Total	% Rec	% Comm
Average	Gag	3,183,842	2,025,492	5,209,334	61%	39%
	Red	1,731,698	5,428,528	7,160,226	24%	76%

Alternative 2 (recent five-year average) maintains interim allocations similar to the most current landings available. This alternative continues the allocations under which the fishery currently operates. Maintaining this allocation would cause the least disruption to the fishery of the three alternatives. For gag, this alternative gives the lowest allocation to the recreational sector and the highest to the commercial sector of any of the alternatives. The change in red grouper allocation is only slightly higher for the recreational sector and slightly lower for the commercial sector than the allocations set by **Alternative 1.**

Preferred Alternative 3 (20-year average) sets interim allocations based on all available years during which grouper were identified by species. This alternative 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 follows the intent of Amendment 1 which stated (p. 227)

> The proposed allocation based on the historical percentage harvested by each user group during 1979-87 provides the best available basis for allocating reef [fish] resources because it represents the longest time period of documented commercial and recreational annual harvests.

The gag allocation for the recreational sector in **Preferred Alternative 3** is four percent lower than that set by Amendment 1 (**Alternative 1**), but two percent higher than recent landings (**Alternative 2**). The red grouper allocation differs by only one percent from **Alternative 1** and is the same as **Alternative 2**.

The alternatives in this action may have indirect effects on the physical environment due to differences in the gear used by each sector. The commercial sectors for both gag and red grouper use bottom longlines and other gear which can impact the bottom habitat. The recreational sectors use hook-and-line which does not disturb the bottom, but can entangle in other structures. Any shift in allocation toward the commercial sector, particularly in the red grouper fishery, could increase the use of longline gear and thus the potential for physical impacts. However, the differences in red grouper allocation among the alternatives are small. The alternatives in order of lowest to highest potential impacts on the physical environment are **Alternative 2, Preferred Alternative 3, and Alternative 1** (see Section 5.5.1).

Changes in the gag and red grouper allocations could have an indirect effect on the biological environment by changing the amount of dead discards in each sector. The gag recreational fishery has proportionally higher amounts of dead discards (23 percent) than does the commercial fishery (1.3 percent). Thus any shift in allocation toward the recreational sector may increase dead discards in the gag fishery. The proportion of dead discards to landings for red grouper is similar between the two sectors and the proposed shifts in allocation are small, so the difference in red grouper dead discards among alternatives would be minimal. Therefore, the alternatives in order of lowest to highest potential gag dead discards are **Alternative 2, Preferred Alternative 3, and Alternative 1** (see Section 5.5.2).

Action 3 would establish a gag TAC, which would require new monitoring to ensure landings for each sector stay within their allocation. The alternatives in this action change allocation only, and would not require any new administrative action.

The Council chose **Alternative 3** as their preferred alternative because the allocation was based on the longest and most robust time series of data. Further, these data track how the fishery has been shared between the recreational and commercial sectors over time. The gag allocation in this alternative falls between the other two alternatives. Although **Alternative 1** is based on allocations from Amendment 1, the council felt the data time series was too short and using this data would ignore changes in the fishery during the intervening 20 years. **Alternative 2** most closely reflects the current practice, but is also based on a short data time series which may not account for the effects of regulations and biological variability. The allocations in **Alternative 3** may also be influenced by regulations; however, because commercial quotas were not filled before 2004 and most recreational fishermen did not catch their five-grouper bag limit, only landings from recent years have likely been affected by fishing restrictions.

Summary of Socio-Economic Effects

Action 5 considers alternative reallocations of the gag and red grouper TACs between the recreational and the commercial sectors. **Alternative 1** reverts to the allocation of TAC between the recreational and commercial fisheries as specified for framework actions in Amendment 1 based on catches during the years 1981 through 1987. Only 1986-1987 grouper landings are available at the species level for both commercial and recreational sectors. Using these years, the gag TAC is allocated 65 percent to the recreational sector and 35 percent to the commercial sector. Under this alternative, the red grouper TAC will be allocated as follows: 23 percent to the recreational sector and 77 percent to the commercial sector. **Alternative 1** is associated with changes in economic benefits due to discrepancies observed between the specified allocation and recreational and commercial recorded landings. Under **Alternative 1**, aggregate decreases in net present value based on a 7 percent discount rate, are estimated at $ 6.6 million, approximately. **Alternative 2**, the no action alternative, would allocate gag and red grouper based on observed landings during 2001-2005. The allocation corresponding to current landings is used as a benchmark in this analysis and thus, is not associated with changes in economic value. **Preferred Alternative 3** would reallocate gag and red grouper based on the longest existing data series (1986-2005). For gag and red grouper, recreational/commercial splits would be 61:39 and 24:76, respectively. It is anticipated changes in net present value based on a 7 percent discount rate are estimated at about -$2.84 million under **Preferred Alternative 3**.

The differences in these three alternatives are small and any changes to the allocations would have minimal impacts on the recreational or commercial fisheries. **Alternative 2** would have the least impacts on the commercial or recreational fisheries because the allocation would be based on the recent landings for 2001- 2005 so each sector could continue to harvest what they had been harvesting. **Alternative 1** would have the most negative impacts on the commercial fishery because they would lose six percent of the average gag grouper share they harvested in 2001-2005. This could impact communities such as Madeira Beach, St. Petersburg, and Panama City, Florida that are substantially involved in these fisheries. Although the three alternatives do not change the share allocation very much, in the long term, any shift in allocation could have a negative impact on the sector that loses shares. The cumulative impacts, when it is combined with other actions in the reef fish fishery, can lead to a loss of income and possibly a loss of jobs for the commercial sector. A loss of shares for the recreation sector can have a negative impact on the recreational fishery when combined with other regulations in the reef fish fishery.

2.6 Action 6. Shallow-water grouper Annual Catch Limits and Accountability Measures

The Gulf of Mexico gag stock, a component of the shallow-water grouper complex, is undergoing overfishing based on the 2007 SEDAR Review stock assessment and the preferred overfishing definition selected by the Council in Action 1. The reauthorized Magnuson-Stevens Act as amended through January 12, 2007, requires that the Council specify annual catch limits (ACLs) and accountability measures (AMs) by 2010 for each stock/stock complex undergoing overfishing, and by 2011 for all other managed stocks. These regulatory provisions will reduce the likelihood overfishing will occur by ensuring AMs are implemented if ACLs are exceeded. NOAA Fisheries Service is currently drafting guidelines for implementing ACLs and AMs; proposed guidelines were published in early June 2008 for public review and comment. The Council is proceeding with implementation of ACLs and AMs for shallow-water grouper to assure that the 2010 deadline is met.

Anecdotal information provided by recreational anglers at and after the January, April, and June 2008 Council meetings suggested reductions in effort has occurred since completion of the gag stock assessment. This anecdotal information is supported by MRFSS effort estimates, which show a 25 percent decline in effort since 2004 and a 12 percent decline in effort from the baseline average of 2004-2006. High fuel prices and economic recession may impact effort in the short-term, thereby reducing fishing pressure and landings of gag and other reef fish species. If this effort reduction results in a decrease in fishing mortality, then the Council could consider more liberal regulatory measures to constrain recreational harvest (see Alternative 7 in Action 9). However, if fishing effort and mortality reductions do not persist into the future, then there is a greater risk that the Council will not be able to constrain recreational harvest to the allowable catch level. If recreational harvest is not constrained to necessary levels, then overfishing may continue, which would have negative consequences for the gag stock and shallow-water grouper fishery. To prevent this from occurring, Action 6 proposes ACLs and AMs for the shallow-water grouper fishery, with individual ACLs and AMs for gag and red grouper. These alternatives differ in how conservatively the ACL is set (e.g., yield at F_{MAX} or F_{OY} for gag; equilibrium OY or MSY yields for red grouper) and how the AM is implemented (annually vs. multiyear average; in-season vs. post-season).

It should be noted that there are key differences in how ACL/AMs would be implemented in this amendment versus the ACL/AM alternatives approved in Amendment 30A to the Reef Fish FMP. One difference is based on the status of the respective fisheries (overfishing vs. overfished) involved. ACLs/AMs established in Amendment 30A address not only species undergoing overfishing, but also species that are overfished and under rebuilding plans. Because greater amberjack and gray triggerfish are overfished, proposed ACL/AM measures require landings overages to be "paid back" in the following fishing year(s) to ensure rebuilding progress is maintained. In contrast, no species in this amendment is considered overfished. Proposed AMs would not require overages to be "paid back" in the following fishing year(s). Instead, commercial quotas and recreational target catch levels would not be increased in the subsequent fishing year(s) if ACL overages occur in the previous fishing year(s). Additionally, if overages do occur, AMs would ensure landings and the recreational season length are reduced to target catch levels in the following fishing year; thus preventing chronic overfishing from occurring.

Another key difference is that, under the Reef Fish Fishery Management Plan, the fishery for shallow-water grouper is managed as a unit, within which red grouper and gag are components of that unit. Due to similarities in life history, habitat, and in how the fishery is conducted, the species comprising the shallow-water grouper aggregate are managed through a common set of regulations, with more restrictive sub-regulations for individual species where needed to maintain a desired balance. In the case of the recreational fishery, deep-water grouper are also included in the fishery for aggregate bag limits.

Alternative 1. No action. Do not establish annual catch limits or accountability measures for shallow-water grouper (SWG).

Alternative 2. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the AA for Fisheries will file a notification closing the entire commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits specified in Table 6.1, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If recreational landings, as estimated by the SEFSC, reach or are projected to reach the red grouper or gag target catch level specified in Table 6.1, then the AA would file a notification closing the entire recreational SWG fishery for the remainder of the fishing year. In addition, if despite such a closure, recreational red grouper or gag landings exceed the respective annual catch limits specified in Table 6.1, then the AA would file a notification maintaining the prior year red grouper or gag target catch level and reduce the length of the recreational SWG season by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target allowable catches for that following fishing year. Landings will be evaluated relative to the applicable ACLs on an annual basis for the years 2009-2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.

Table 6.1 - Commercial quotas, recreational target catch levels, and annual catch limits for gag, red grouper, and SWG (Action 6, Alternative 2). Target catches and annual catch limits for gag are based on the yield at F_{OY} and target catches and annual catch limits for red grouper are based on equilibrium OY. All values are in millions of pounds gutted weight.

Recreational Fishery						
Year	Gag		Red Grouper			
	Target Catch[1]	ACL[1]	Target Catch[1]	ACL[1]		
2009	2.06	2.06	1.82	1.82		
2010	2.21	2.21	1.82	1.82		
2011	2.33	2.33	1.82	1.82		
Commercial Fishery						
Year	Gag		Red Grouper		Shallow-water grouper	
	Quota[1]	ACL[1]	Quota[1]	ACL[1]	Quota[2]	ACL[2]
2009	1.32	1.32	5.75	5.75	7.48	7.48
2010	1.41	1.41	5.75	5.75	7.57	7.57
2011	1.49	1.49	5.75	5.75	7.65	7.65

[1] Annual yield at F_{OY} for gag and equilibrium OY yield for red grouper; [2] Sum of annual gag and red grouper quotas plus 0.68 mp of other SWG.

Alternative 3. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the AA for Fisheries will file a notification closing the commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits specified in Table 6.2, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If recreational landings, as estimated by the SEFSC, reach or are projected to reach the red grouper or gag target catch level specified in Table 6.2, then the AA would file a notification closing the entire recreational SWG fishery for the remainder of the fishing year. In addition, if despite such a closure, recreational red grouper or gag landings exceed the respective annual catch limits specified in Table 6.2, then the AA would file a notification maintaining the prior year red grouper or gag target catch level and reduce the length of the recreational SWG season by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target allowable catches for that following fishing year. Landings will be evaluated relative to the applicable ACLs on an annual basis for the years 2009-2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.

Table 6.2 - Commercial quotas, recreational target catch levels, and annual catch limits for gag, red grouper, and SWG (Action 6, Alternative 3). Target catches for gag are based on the yield at F_{OY} and target catches for red grouper are based on equilibrium OY. Annual catch limits for gag are based on the yield at F_{MAX} and annual catch limits for red grouper are based on equilibrium MSY. All values are in millions of pounds gutted weight.

Recreational Fishery						
	Gag		Red Grouper			
Year	Target Catch[1]	ACL[2]	Target Catch[1]	ACL[3]		
2009	2.06	2.59	1.82	1.85		
2010	2.21	2.68	1.82	1.85		
2011	2.33	2.75	1.82	1.85		
Commercial Fishery						
	Gag		Red Grouper		Shallow-water grouper	
Year	Quota[1]	ACL[2]	Quota[1]	ACL[3]	Quota[4]	ACL[5]
2009	1.32	1.66	5.75	5.87	7.48	7.94
2010	1.41	1.71	5.75	5.87	7.57	7.99
2011	1.49	1.76	5.75	5.87	7.65	8.04

[1] Annual yield at F_{OY} for gag and equilibrium OY yield for red grouper; [2] Annual yield at F_{MAX}; [3] Equilibrium MSY yield; [4] Sum of annual gag and red grouper quotas plus 0.68 mp of other SWG; [5] Sum of annual gag and red grouper ACLs plus 0.68 mp of other SWG.

Alternative 4. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the Assistant Administrator (AA) for Fisheries will file a notification closing the commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits (ACL) specified in Table 6.3, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If annual recreational landings, as estimated by the SEFSC following the conclusion of the fishing year, exceed the red grouper or gag ACLs specified in Table 6.3, the AA would file a notification maintaining the prior year red grouper or gag target catch level. In addition, the notification would reduce the length of the recreational SWG 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. Recreational landings will be evaluated relative to the applicable ACLs as follows: For 2009, only 2009 red grouper and gag landings will be compared to the ACLs specified for 2009; in 2010, the average of 2009 and 2010 red grouper and gag landings will be compared to ACLs specified for 2010; and in 2011, the average of 2009-2011 red grouper and gag landings will be compared to ACLs specified for 2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.

Table 6.3 - Commercial quotas, recreational target catch levels, and annual catch limits for gag, red, and SWG (Action 6, Alternative 4). Target catches and annual catch limits for gag are based on the yield at F_{OY} and target catches and annual catch limits for red grouper are based on equilibrium OY. Recreational annual catch limits and target catches for gag in 2010 and later are based on multiyear averages. All values are in millions of pounds gutted weight.

Recreational Fishery						
	Gag		Red Grouper			
Year	Target Catch	ACL	Target Catch[1]	ACL[1]		
2009	2.06[1]	2.06[1]	1.82	1.82		
2010	2.14[2]	2.14[2]	1.82	1.82		
2011	2.20[3]	2.20[3]	1.82	1.82		
Commercial Fishery						
	Gag		Red Grouper		Shallow-water grouper	
Year	Quota[1]	ACL[1]	Quota[1]	ACL[1]	Quota[4]	ACL[4]
2009	1.32	1.32	5.75	5.75	7.48	7.48
2010	1.41	1.41	5.75	5.75	7.57	7.57
2011	1.49	1.49	5.75	5.75	7.65	7.65

[1] Annual yields at F_{OY} for gag; equilibrium OY yield for red grouper; [2] Average 2009 and 2010 yield at F_{OY} (gag) or equilibrium OY yield (red grouper); [3] Average 2009-2011 yield at F_{OY} (gag) or equilibrium OY yield (red grouper); [4] Sum of annual gag and red grouper quotas plus 0.68 mp of other SWG.

Preferred **Alternative 5. If commercial landings, as estimated by the SEFSC, reach or are projected to reach the red grouper, gag, or SWG quota then the Assistant Administrator (AA) for Fisheries will file a notification closing the commercial SWG fishery in accordance with the application of quota closures specified in Action 8. In addition, if despite such a closure, commercial red grouper, gag, or SWG landings exceed the respective annual catch limits (ACL) specified in Table 6.4, then the AA would file a notification maintaining the prior year red grouper, gag, or SWG commercial quota in the following fishing year. If recreational landings, as estimated by the SEFSC following the conclusion of the fishing year, exceed the red grouper or gag ACLs specified in Table 6.4, the AA would file a notification maintaining the prior year red grouper or gag target catch level. In addition, the notification would reduce the length of the recreational SWG 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. Recreational landings will be evaluated relative to the applicable ACLs as follows: For 2009, only 2009 red grouper and gag landings will be compared to the ACLs specified for 2009; in 2010, the average of 2009 and 2010 red grouper and gag landings will be compared to ACLs specified for 2010; in 2011, the average of 2009-2011 red grouper and gag landings will be compared to ACLs specified for 2011. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented.**

Table 6.4 - Commercial quotas, recreational target catch levels, and annual catch limits for gag, red, and SWG (Action 6, Alternative 5). Target catches for gag are based on the yield at F_{OY} and target catches for red grouper are based on equilibrium OY. Annual catch limits for gag are based on the yield at F_{MAX} and annual catch limits for red grouper are based on equilibrium MSY. Recreational annual catch limits and target catches for gag in 2010 and later are based on multiyear averages. All values are in millions of pounds gutted weight.

Recreational Fishery						
	Gag		Red Grouper			
Year	Target Catch	ACL	Target Catch[3]	ACL[4]		
2009	2.06[1]	2.59[2]	1.82	1.85		
2010	2.14[7]	2.64[9]	1.82	1.85		
2011	2.20[8]	2.67[10]	1.82	1.85		
Commercial Fishery						
	Gag		Red Grouper		Shallow-water grouper	
Year	Quota[1]	ACL[2]	Quota[3]	ACL[4]	Quota[5]	ACL[6]
2009	1.32	1.66	5.75	5.87	7.48	7.94
2010	1.41	1.71	5.75	5.87	7.57	7.99
2011	1.49	1.76	5.75	5.87	7.65	8.04

[1]Annual (recreational after 2008 and commercial) yields at F_{OY} for gag; multiyear and annual yields based on equilibrium OY for red grouper; [2] Annual yield at F_{MAX}; [3] Annual yield at equilibrium OY; [4] Annual yield at equilibrium MSY; [5] Sum of annual gag and red grouper quotas plus 0.68 mp of other SWG; [6] Sum of annual gag and red grouper ACLs plus 0.68 mp of other SWG; [7] Average 2009 and 2010 yield at F_{OY} for gag and equilibrium OY for red grouper; [8] Average 2009-2011 yield at F_{OY}; [9] Average 2009 and 2010 yield at F_{MAX}; [10] Average 2009-2011 yield at F_{MAX}.

Discussion:

Action 6 includes five ACL/AM alternatives. With the exception of **Alternative 1** (no action, no action), all of the alternatives are intended to increase the likelihood that gag overfishing ends and is prevented, and overfishing of other SWG species is prevented. The SWG fishery includes eight species of grouper: red grouper, gag, black grouper, scamp, yellowfin grouper, yellowmouth grouper, red hind, and rock hind.

Alternative 1 would maintain status quo regulations. Accountability measures would not be established to constrain harvest at or near target management goals (i.e., yield at F_{OY} or equilibrium OY) and below overfishing limits (i.e., yield at MFMT). The Council could implement management measures through framework action to constrain harvest if landings overages occur, but the measures would likely not take effect until several years after the overage because of the time it takes to draft and implement regulatory measures. By not specifying AMs, landings may exceed target catch levels and overfishing levels; thereby, reducing the likelihood that overfishing is prevented or ended. **Alternative 1** is the least conservative of any of the alternatives considered in Action 6.

Alternative 2 proposes a mechanism for implementing AMs for the commercial and recreational sectors if the ACL for a sector, as summarized in Table 6.1, is exceeded. Landings would be evaluated on an annual basis to determine if ACLs have been exceeded. ACLs triggering AMs are set at the yield associated with F_{OY} for gag and equilibrium OY for red grouper. After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs for **Alternative 2** at either equilibrium OY or the yield at F_{OY}, whichever is less. No recreational ACLs are established for the recreational SWG fishery since gag and red grouper represent a majority of SWG landings (95 percent by number during 2004-2006) and other SWG species (e.g., red hind, rock hind, yellowmouth grouper, etc.) are infrequently landed, making it more difficult to accurately monitor landings. The commercial ACL for the entire SWG fishery is the sum of annual yield at F_{OY} for gag and equilibrium OY for red grouper plus 0.68 million pounds for other SWG (2001-04 average landings from Turner 2006). **Alternative 2** does not provide a buffer between the target catch level or quota and the annual ACL. If sector landings exceed the ACL, then the AA would issue a notice maintaining the previous year's recreational catch level or commercial quota in the following fishing year. Additionally, the AA would reduce the length of the recreational SWG fishing season in the following year by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target catch level for that fishing year. The commercial fishery would be closed when the gag, red grouper, or SWG quota is projected to be met. **Alternative 2** would set the most restrictive ACLs, would not provide a buffer between the ACL and target recreational catch level or commercial quota, and would not provide for multiyear averaging of landings as proposed in **Alternative 4** and **5**. For these reasons, **Alternative 2** is the most conservative and would provide the greatest biological benefits to the commercial and recreational SWG fisheries. **Alternative 2** has the greatest likelihood of preventing and ending overfishing of any of the alternatives considered in Action 6.

Alternative 3 is similar to **Alternative 2**, except the gag ACL would be set at the yield associated with F_{MAX} rather than F_{OY} and the red grouper ACL would be set at equilibrium MSY rather than equilibrium OY (see Table 6.2). After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs for **Alternative 3** at either equilibrium MSY or the yield at F_{MSY}, whichever is less. Landings would be evaluated on an annual basis to determine if ACLs are exceeded. **Alternative 3** provides a buffer between the target catch level or quota and the sector specific ACL. The magnitude of the buffer varies by species and year, with the greatest buffer occurring between the gag recreational target catch level or commercial quota and the ACL. Similar to **Alternative 2**, recreational ACLs would only be established for gag and red grouper, which represent a majority of SWG recreational landings (95 percent by number). Commercial ACLs would be established for gag, red grouper, and the entire SWG fishery. The ACL for the entire commercial SWG fishery would be the annual yield at F_{MAX} for gag plus the equilibrium MSY for red grouper plus 0.68 million pounds for other SWG (2001-04 average landings from Turner 2006). Sector landings could exceed the target catch level or quota in a given year, but could not exceed the specified ACL. If the ACL is not exceeded, no action would be taken by the AA. If landings exceed the ACL, then the RA would issue a notice maintaining the previous year recreational catch level or commercial quota in the following fishing year. Additionally, the AA would reduce the length of the recreational SWG fishing season in the following year by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target catch level for that fishing year. The commercial fishery would be closed when the gag, red grouper, or SWG quota is projected to be met. Because **Alternative 3**

provides a buffer between the quota or target catch level and the ACL, it is less conservative than **Alternatives 2** and **4**. However, **Alternative 3** is more conservative than **Alternative 5** because it would not allow multiyear averaging of landings.

Alternative 4 is similar to the preferred ACLs and AMs approved by the Gulf Council for gray triggerfish in Amendment 30A to the Reef Fish FMP. Annual catch limits would be based on the yield at F_{OY} for gag and equilibrium OY for red grouper. After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs for **Alternative 4** at either equilibrium OY or the yield at F_{OY}, whichever is less. This alternative would provide no buffer between the ACL and annual recreational catch target or commercial quota. However, **Alternative 4** would allow landings to be averaged over multiple years. In 2009, landings would be compared only to the 2009 ACL to determine if AMs should be implemented. In 2010, average landings for 2009-10 would be compared to the 2010 ACL. In 2011 (and beyond), average landings for 2009-11 would be compared to the 2011 ACL. Target catches, quotas and ACLs would then remain at the 2011 levels until a subsequent amendment is implemented. Multiyear landings averages will allow year-to-year fluctuations to occur, without necessarily triggering AMs. For example, in **Alternative 2**, if landings in 2009 are below the specified ACL, but average landings for 2009-2010 are above the ACL, then AMs would be triggered after the 2010 fishing season. If average landings do not exceed the ACL, then no action would be taken by the AA. If average landings do exceed the ACL, then the AA would not increase the recreational target catch level or commercial quota in the following year for the sector experiencing the overage. Additionally, commercial landings would be constrained by quotas and the fishery would be shut-down in-season if the quota(s) is met or projected to be met. For the recreational fishery, the AA would reduce the length of the recreational SWG fishing season in the following year by the amount necessary to ensure recreational gag or red grouper landings do not exceed the recreational target catch level for that fishing year. Because **Alternative 4** ACLs are based on the yield at F_{OY} for gag and the equilibrium OY for red grouper, this alternative is the second most conservative of any of the alternatives considered in Action 6. Only **Alternative 2** is more conservative and would provide greater biological benefits.

Preferred Alternative 5 is similar to **Alternative 4**. The main difference between these two alternatives is that ACLs for **Preferred Alternative 5** are based on the yield at F_{MAX} for gag and equilibrium MSY for red grouper, rather than F_{OY} and equilibrium OY. After completion of the next red grouper stock assessment (expected to be conducted in 2009), it is the Council's intent to set red grouper ACLs for **Preferred Alternative 5** at either equilibrium MSY or the yield at F_{MSY}, whichever is less. Because **Preferred Alternative 5** allows multiyear averaging of landings data and provides a buffer between the annual catch target or quota and ACL, it is less conservative than **Alternatives 2-4**, but more conservative than **Preferred Alternative 1**. **Preferred Alternative 5** would have the lowest probability of triggering AMs of any of the alternatives considered, except **Alternative 1**. It would therefore have the second greatest likelihood of allowing overfishing. If overages occur, AMs would be the same as those described for **Alternative 4**; i.e., annual catch levels or quotas would not be increased in the following fishing year, the commercial SWG fishery would be closed when quotas are met or projected to be met, and the recreational SWG season would be shortened to ensure landings remain at target catch levels.

Action 6 would have no direct effect on the physical environment. Indirect effects on the physical environment may include reductions in fishing effort and habitat-gear interactions. With the exception of **Alternative 1**, alternatives in Action 6 would benefit the biological environment. Benefits would include an increased likelihood of ending overfishing of gag and preventing overfishing of SWG. By ending overfishing, the age and size distribution of the gag population would be allowed to expand to sustainable levels that optimize yield over the long-term. By preventing overfishing, SWG fisheries could be maintained at sustainable levels.

This action considers several scenarios for the establishment of ACLs and accountability measures in the recreational and commercial SWG fisheries. In the commercial sector, **Alternatives 2** and **4** may be more stringent than the other alternatives. **Alternative 2** is expected to be the most restrictive because it would not provide a buffer between the ACL and the respective quotas and require an annual evaluation of ACL. **Alternatives 3** and **5**, on the other hand, are anticipated to result in less adverse short-run economic impacts than **Alternatives 2** and **4**. However, the probability of generating more benefits in the future would be greater under **Alternatives 2** and **4** because they minimize the probability of overfishing. In the recreational sector, **Alternatives 2** and **3** are anticipated to result in more adverse short-run economic impacts on fishery participants. The saving factor of **Alternative 3**, relative to **Alternative 2**, is the provision for higher ACLs than target catches. Higher ACLs are associated with a higher probability that more restrictive measures may be implemented in the future.

There are generally two types of effects that may ensue under **Alternatives 2-5**. The first one relates to the rippling effects of changes in the harvest sector on the supporting industries, such as fish dealers/processors and marinas, and on fishing communities. In the short term, losses in the harvest sector will translate into adverse economic consequences on supporting industries and fishing communities. Over the long-term, these adverse economic impacts may be partly, if not fully, compensated by future benefits from a healthy SWG fishery. For supporting industries, this compensation may be true at the industry level, but those booted out of the business would not likely be compensated. The case with fishing communities may be somewhat different, because the outgoing fishery dependent segment may be replaced by other dependencies and developments in the area. In addition, the fishery dependent segment of the area's population may have already dispersed into other areas or are engaged in other activities whose viability they deem to be more sustainable over the long term. The second type of effects would occur if fishing participants shift effort to other fisheries. In addition to increasing fishing pressure on other fish stock that may also be subject to rebuilding schedules, effort shifts can reduce the benefits derived by the usual participants in that fishery. It is likely that this shift in benefits away from the usual participants in the indirectly affected fishery may result in net losses to the industry, because the new entrants may not be as efficient.

2.7 Action 7. Shallow-Water Grouper, Red Grouper and Gag Commercial Quotas

The grouper quotas discussed in this section apply to both the interim rule and the subsequent rulemaking from Amendment 30B. Discussions of short-term effects apply to the interim rule as this action would cover the time period between January 1, 2009, and the implementation of rulemaking via Amendment 30B (anticipated to be effective in the summer of 2009 assuming

Amendment 30B is approved). Discussions of both short- and long-term effects apply to Amendment 30B. This action addresses long-standing grouper management.

Alternative 1. No action. Do not adjust the red grouper or shallow-water grouper quotas and do not specify a quota for gag. The shallow-water grouper quota would remain 8.80 mp and the red grouper quota would remain 5.31 mp.

Alternative 2. Set the commercial gag and red grouper quotas by multiplying the TAC for each year by each species' commercial allocation.* The allowance for the commercial other shallow water grouper will be 0.32 mp which is the average landings for the baseline years used in Secretarial Amendment 1 of 1999-2001. The aggregate commercial shallow-water grouper quota for each year is the sum of the gag and red grouper quotas, plus the other shallow-water grouper allowance.

***Preferred* Alternative 3. Set the commercial gag and red grouper quotas by multiplying the TAC for each year by each species' commercial allocation.* The allowance for the commercial other shallow water grouper will be 0.41 mp which is the average landings for the baseline years of 2001-2004. The aggregate commercial shallow-water grouper quota for each year is the sum of the gag and red grouper quotas, plus the other shallow-water grouper allowance.**

*Actions 3 and 4 set the gag and red grouper TACs, respectively, and Action 5 sets the interim allocations for these species.

Table 2.7.1. Current vs. new commercial quotas under the preferred alternatives for Actions 1 (gag benchmarks based on maximum yield-per-recruit), 3 (gag TAC set annually based on OY), 4 (red grouper TAC based on equilibrium OY), 5 (allocations based on full time series), and 7 (0.68 mp allowance for other shallow-water groupers). Values are in million pounds.

	Gag Quota	Red Grouper Quota	Other Grouper Allowance	Aggregate Quota
Current	undefined	5.31	0.41	8.80
2009	1.32	5.75	0.41	7.48
2010	1.41	5.75	0.41	7.57
2011	1.49	5.75	0.41	7.65

Alternative 1 leaves the commercial quotas at their existing levels. While red grouper TAC is expected to be increased, the red grouper recreational to commercial allocation could shift from the recent levels used in Secretarial Amendment 1 for the red grouper rebuilding plan, which would offset increases to the commercial allocation. Depending upon the red grouper TAC and allocations selected in Actions 4 and 5, the red grouper commercial allocation could either increase or decrease. In either case, this will create a mismatch between the red grouper quota and allocation. If the new red grouper commercial allocation is below the current 5.31 mp quota, the red grouper optimum yield would not be achieved. Conversely, if the allocation is above 5.31 mp, harvest in excess of optimum yield will occur. Gag commercial allocation will likely

decrease under most combinations of gag TAC and recreational to commercial allocation. In the absence of a species quota, gag will be constrained only by the aggregate quota, and may continue to undergo overfishing.

Alternative 2 and *Preferred* Alternative 3 adjust the commercial red grouper quota, and set a new commercial gag quota, based on the TACs and allocations selected in previous actions, plus an allowance for other shallow-water groupers. Where the alternatives differ is how the shallow-water grouper aggregate quota is determined. Both represent the average annual harvest of the remaining shallow-water grouper species during two baseline series. **Alternative 2** uses the baseline years of 1999-2001, as used in Secretarial Amendment 1. This results in an "other" shallow-water grouper allowance of 0.32 mp gutted weight. ***Preferred* Alternative 3** uses the baseline years of 2001-2004, which is the original baseline used in the gag stock assessment. This results in an "other" shallow-water grouper allowance of 0.41 mp. For both **Alternative 2 and *Preferred* Alternative 3**, the total shallow-water grouper would be the sum of the gag and red grouper quotas, plus the "other" shallow-water grouper allowance. Depending upon the relative changes in red grouper and gag quotas (based on Actions 3, 4, and 5), the aggregate quota could either increase or decrease from its current level of 8.80 mp gutted weight.

The "other" shallow-water grouper allowance in **Alternative 2** and ***Preferred* Alternative 3** is not a quota. Exceeding this allowance will not result in any quota closure action as long as the shallow-water aggregate quota has not been reached. However, exceeding the "other" shallow-water grouper allowance infers that either or both of the gag and red grouper landings will be below their quotas when the aggregate shallow-water grouper quota is reached.

Effects of Action 7 alternatives on the physical, biological/ecological, economic, social, and administrative environments are discussed in detail in Section 5.7. Effects on the physical environment, while minor because of the gears used by the reef fish fishery, are tied to commercial fishing effort. Alternatives that reduce the quota would likely have a lower level of fishing effort associated with it. Although alternatives in this action would dictate how quotas are set, the actual quotas for **Alternative 2 and *Preferred* Alternative 3** would be set through decisions made in **Actions 3 and 5** for gag, and **Actions 4 and 5** for red grouper. Given that potential quotas under **Alternative 2 and *Preferred* Alternative 3** are below the current 8.80 mp quota provided in the no action **Alternative 1**, **Alternative 1** would negatively affect the physical environment more than **Alternative 2 and *Preferred* Alternative 3**. The potential quotas for ***Preferred* Alternative 3** are slightly greater than those of **Alternative 2**, thus ***Preferred* Alternative 3** would affect the physical environment more negatively than **Alternative 2**, but this difference would be negligible.

For the biological/physical environment, alternatives that reduce the quota would likely have a lower level of F and provide a benefit to this environment. Although alternatives in this action would dictate how quotas are set, the actual quota for **Alternative 2 and *Preferred* Alternative 3** would be set through decisions made in **Actions 3 and 5** for gag, and **Actions 4 and 5** for red grouper. Given that potential quotas under **Alternative 2 and *Preferred* Alternative 3** are below the current 8.80 mp quota provided in the no action **Alternative 1**, **Alternative 1** would negatively affect the biological/ecological environment more than **Alternative 2 and *Preferred* Alternative 3**. The potential quotas for ***Preferred* Alternative 3** are slightly greater than those of **Alternative 2** because of the additional 110,000 pounds in the "other" shallow-water grouper quota. Therefore, ***Preferred*** **Alternative 3** would require a higher overall F to harvest the quota and, therefore, have more negative effects on the biological/ecological environment than **Alternative 2**.

Explicitly stated in the two alternatives to the current quota regime is the dependence of the two sub-quotas on the chosen TAC and commercial/recreational allocation ratio. As intimated in the discussions for setting TACs and allocations, the actual economic effects would also depend on the specific regulatory measures adopted for the subject fisheries. Hence, evaluation of the economic effects of the quota alternatives was undertaken by assuming not only specific TAC and allocation ratio but also specific management measures contained in other sections of this amendment. Using this approach necessitated the consideration of the no action alternative (**Alternative 1**) as equivalent to the baseline scenario wherein all alternatives were assumed to be the no action alternative. On the basis of overall effects on the commercial fishery, the alternatives may be ranked in descending order as follows: **Alternative 1, *Preferred* Alternative 3, and Alternative 2.**

Alternative 1 would not have any short-term impacts on the recreational or commercial red or gag grouper fisheries; because it would not adjust the red grouper or shallow water grouper quotas and it would not set a quota for the gag grouper. If the aggregate quota decreases for **Alternative 2** and ***Preferred*** **Alternative 3**, there would be negative impacts on the gag and red grouper fisheries because there would be less fish to harvest. When combined with other reductions in the reef fish fishery, fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries may be negatively impacted due to a reduction in catch. This could cause a reduction in profits for the fishermen, and possibly a loss of jobs in the processing sector. If the aggregate quota increases, then fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries would benefit from an increase in fish to harvest. This could increase the income for the fishermen and for the processing sector.

For the administrative environment, **Alternative 2 and *Preferred* Alternative 3** would require administrators to make minor adjustments to the Reef Fish FMP which fall within the scope and capacity of the current management system and are not expected to significantly affect the administrative environment. **Alternative 1** would continue the current quotas and not change current management practices. **Alternative 2** and ***Preferred*** **Alternative 3** would require a new segment of the grouper fishery to be monitored-gag. This would entail in season monitoring of trip ticket data for this category and would increase the administrative burden of grouper management. However, this increase should be minimal because these types of activities already take place and the system for monitoring grouper quotas already exists.

If the aggregate quota increases, then fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries would benefit from an increase in fish to harvest. If the stock can be increased, it would benefit the fishermen and people involved in the processing sector in communities such as Madeira Beach, St. Petersburg, and Panama City, Florida.

The Council selected **Alternative 3** as their preferred alternative for several reasons. This alternative is expected to increase the abundance and sustainability of gag as a result of reduced

F required by the quota, while maintaining the red grouper stock at or near its optimum yield biomass level. This alternative also used a more recent time series than **Alternative 2** in setting the "other" shallow water grouper species allowance, thus better reflecting current fishing patterns. From an economic perspective, ***Preferred*** **Alternative 3** has the greatest short-term economic costs, but it should provide long-term benefits to the commercial fishery by allowing the gag stock to recover while allowing the red grouper to be harvested at OY.

2.8 Action 8. Application of Quota Closures

This action is intended to control quota harvest under non-IFQ management approaches. If an IFQ program is adopted for grouper in the future, the alternatives under consideration in this action would no longer be needed because fishermen would be allowed to fish their individual quotas throughout the year as long as they had an allocation left to fish. Additionally, this action does not apply to the interim rule, but would become effective through the resultant rulemaking from Amendment 30B if approved.

To evaluate the effects of these alternatives, quotas based on the preferred alternatives of Actions 3, 4, 5, and 7 were applied to 2004-2006 gag, red grouper, and SWG landings data (SERO 2008). These years were selected because they are recent and should provide a good range for comparison. Gag and red grouper landings in 2004 and 2005 were high and the SWG fishery was closed in the fall of each year. In contrast, 2006 gag and red grouper landings were low and the SWG and red grouper fisheries did not meet their respective quotas (Table 2.8.1). Landings data from 2007, although not used in these analyses, were similar to 2006 landings and the SWG fishery also failed to fill any of its quotas. Preliminary recruitment data suggests no increases in recruitment to the fishery until at least 2010 (SERO 2008).

In selecting a preferred alternative, there are a few cautionary notes. The analyses are dependent on 2004 to 2006 landings data. As noted, 2004 and 2005 had high landings of both gag and red grouper, while 2006 and 2007 had relatively low landings. Therefore, the selection of a preferred alternative should be based on the year(s) the Council feels best reflect 2009 landings. In addition, it is necessary to weigh the importance of extending the SWG fishery with the number of discards that can occur with the various options. In general, the longer the season extension, the greater the number of discards. Given a commercial discard mortality rate of 67 percent, the effect of these discards could be important in reducing overfishing. Finally, analyses in SERO (2008) indicate the type of trip limit chosen could have disproportional affects on different sectors of the commercial fishery. Sectors that land more gag, or who fish in more northern locations, are likely to be affected more by lower trip limits than other sectors.

Alternative 1. No action. The commercial shallow-water grouper fishery closes when either the red grouper quota or the shallow-water grouper quota is reached, whichever comes first.

Alternative 2. The commercial shallow-water grouper fishery closes when either the red grouper quota, gag quota, or shallow-water grouper quota is reached, whichever comes first.

***Preferred* Alternative 3: When 80 percent of the gag or red grouper quota is reached or projected to be reached, the directed fishery for the applicable species would be closed; however, an incidental harvest trip limit would be allowed until either the gag, red grouper, or shallow-water grouper quota is reached or projected to be reached, upon which the shallow-water grouper fishery would close. The incidental harvest trip limit provision would not be implemented unless the quota for the applicable species is projected to be harvested prior to the end of the fishing year. If implemented, the incidental harvest trip limit would be:**

Option a: 100 pounds.
***Preferred* Option b: 200 pounds.**
Option c: 500 pounds.

Alternative 4. The commercial shallow-water grouper fishery closes when either the red grouper quota, gag quota, or shallow-water grouper quota is reached, whichever comes first. For gag, a trip limit would apply to extend the grouper fishing year. The gag trip limit would be:

Option a: 300 pounds or
Suboption i: 15 percent of the grouper caught on a trip, whichever is greater.
Suboption ii: 20 percent of the grouper caught on a trip, whichever is greater.
Option b: 300 pounds.
Option c: 500 pounds.
Option d: 1,000 pounds.

Discussion: **Alternative 1**, no action, closes the commercial SWG fishery when either the red grouper or SWG quotas are reached. No measures are specified for the gag quota, meaning that fishing for gag could continue after the gag quota is filled and until one of the other quotas is filled. In the past, the red grouper quota has been filled before the gag allocation is reached. However, with the possibility the red grouper commercial quota may increase while the commercial gag quota is reduced, the reverse may occur. Therefore, this alternative could allow for commercial overfishing of gag. Based on applying quotas of 1.32 mp (2009) for gag, 5.75 mp for red grouper, and 7.64 mp for SWG to 2004-2006 landing data, it is likely the SWG quota will be filled prior to the red grouper quota (Table 2.8.1). This is because gag landed in excess to this species' quota would be added to the SWG quota.

Alternative 2 closes the commercial SWG fishery when either of three quotas is reached, the red grouper quota, the gag quota, or the SWG quota. This is a logical extension of **Alternative 1** to incorporate the gag quota. However, while this would stop commercial overfishing of either gag or red grouper, it would likely result in the fishery not being able to fill the quota for the other species. From a biological perspective, this "weakest link" approach would assure that the SWG species are fished at conservative levels and that there would be a greater than 50 percent probability that the overall shallow-water aggregate would be kept in a healthy condition. From an economic perspective, this would result in lost revenues from being unable to harvest a portion of a quota. From a National Standard 1 perspective, this would prevent optimum yield from being attained by the fishery for the species closed prior to its quota being reached.

These points are illustrated in the following example. By using a gag quota of 1.32 mp (2009) and a red grouper quota of 5.75 mp (derived from Actions 3, 4, and 5) and applying these quotas to 2004-2006 landings data, the SWG fishery would have been closed once the gag quota was filled (Table 2.8.1). This would have occurred in early June for 2004, late June for 2005, and late November for 2006. Only 35 percent, 47 percent, and 87 percent of the red grouper quota could have been harvested assuming the fishery behaved similarly to these years, respectively, using the 2009 gag quota (Table 5.8.1). Note the commercial gag quotas are based on 39 percent of the TACs listed in **Preferred Alternative 2** of **Action 3**. It should be noted that as the gag TAC increases from 3.13 mp in 2008 to 4.13 mp in 2013, the SWG fishery should be able to remain open longer.

Preferred Alternative 3 addresses the under-harvest of SWG species described in the previous alternative by limiting the harvest of the commercial fishery for only the species whose incidental harvest trigger is reached first. The trigger is based on a certain percentage of the total gag or red grouper quota being filled, after which time an incidental harvest for that species by trip is allowed as the fishery continues to harvest other grouper species. The incidental harvest under **Preferred Alternative 3** would be a trip limit for the grouper species that reaches the incidental trip limit trigger first. For example, if the gag trigger was reached first, the harvest of gag would be limited to a trip limit, but red grouper and other grouper species could be landed without restrictions except for the general 6,000 pound grouper trip limit.

Fishing on the remaining SWG species would be allowed to continue under **Preferred Alternative 3** until either the gag or red grouper quotas are met, or SWG quota is reached, whichever occurs first. If the SWG quota is reached before either the red or gag grouper quota is met, this would result in an under harvest of the either species, but by a smaller margin than under **Alternative 2**. However, this will prevent an uncontrolled increase in harvest of the remaining SWG species. With the exception of red grouper and gag, the remaining SWG species have not had stock assessments and their status is unknown.

Under present fishing conditions and given the proposed limits to harvest being developed in Amendment 30B, gag is the species most likely to trip the incidental harvest trigger. SERO (2008) used 2004-2006 gag landings data to evaluate 17 different management scenarios. Applying the 2009 quota of 1.32 mp to 2004-2006 landings data, 80 percent of the gag quota is projected to be reached in May of 2004 and 2005, and in July for 2006 under the **Preferred Alternative 3** scenario. Once the trigger is reached, the harvest of gag would be restricted to a trip limit.

To ensure the incidental trip limit does not prevent the fishery from catching a species' quota should the incidental harvest trigger be reached late in the fishing year, a provision is included to allow the trigger to be bypassed. If such a provision was not included, the quota for the species the trigger was applied to could keep the fishery from harvesting the quota. For example, should the 80 percent quota trigger be met on December 1 of the fishing year, it is unlikely the fishery would be able to harvest the remaining 20 percent of the quota by the end of the fishing year even without the incidental harvest trip limit. Therefore, a provision to allow the bycatch trigger to be bypassed was included in the alternative. If projections indicate the gag quota would not be met regardless of whether the incidental trip limit was applied or not, the trip limit would not be applied to the fishery for that year.

Table 2.8.2 compares the ability of different incidental harvest levels to allow the SWG fishery to continue once the 80 percent incidental harvest trigger has been met. Under the trip limit scenarios, an incidental trip limit of 100 pounds (**Option a**) extends the season the most. Under 2004 and 2005 conditions, the season could have been extended an additional 149 to 161 days, respectively. A 200 pound incidental harvest trip limit (**Preferred Option b**) would have shortened the season by 63 to 72 days in 2004 and 2005 relative to **Option a**. Neither **Option a** or **Preferred Option b** would have closed the fishery in 2006 when landings were lower. Incidental harvest trip limits of 300 pounds and greater significantly shorten the SWG fishing season. The 500-pound trip limit proposed in **Option c** would reduce the number of days the fishing season would be open relative to **Option b** by an additional 48 to 60 days for 2004 and 2005. In addition, under 2006 conditions, the fishery would have closed in December under the 500 pound trip limit.

Alternative 4 proposes two types of trip limits. One is a trip limit with an allowance to exceed the limit by either 15 (**Option a, suboption i**) or 20 percent (**Option a, suboption ii**) of the total amount of grouper landed if this percentage would yield more than 300 pounds. Otherwise, the trip limit would be 300 pounds if less than 2,000 or 1,500 pounds of grouper were landed, respectively. The other type of trip limit is a fixed limit that cannot be exceeded. In this case, trip limits of 300 (**Option b**), 500 (**Option c**), and 1,000 pounds of gag (**Option d**) are considered.

Under **Alternative 4** options, a 300 pound trip limit (**Option b**) would ensure gag could be harvested throughout the SWG fishing year until at least December (Table 2.8.3). Under 2004 and 2005 fishing conditions, the red grouper fishery would have been projected to meet its quota in late November and late October, respectively. Thus, the fishery would have closed because of the red grouper quota being met, not gag. If the trip limit is 300 pounds or 15 percent of the SWG caught on a trip (**Option a, suboption i**), then the gag quota would be filled in a similar time-frame to the red grouper fishery under 2004-2006 conditions. Increasing the gag trip limit to 300 pound or 20 percent of the SWG caught on a trip limit (**Option a, suboption ii**) reduces the time the SWG fish can stay open from **suboption i** by less than 30 days. A 1,000 pound trip limit (**Option d**) projects the SWG fishery to stay open the shortest time period.

Table 2.8.3 compares projected gag quota closures based on the different Action 8 alternatives. Alternatives projected to allow the fishery to remain open past that of **Preferred Alternative 3, Option b**, particularly under 2004 and 2005 conditions, include **Alternative 3, Option a** and **Alternative 4, Options a-c**. **Alternative 2, Alternative 3, Option c**, and **Alternative 4, Option d** would cause the fishery to close earlier than the preferred alternative.

Table 2.8.1. Actual shallow-water grouper closure date and estimated time to gag, red grouper, and shallow-water grouper fishery closures. For gag, the 2009 quota is 1.32 mp GW. For red grouper and shallow-water grouper, the quotas are 5.75 mp GW and 7.64 mp GW, respectively. These quotas are applied to 2004-2006 landings data. See Section 5.8 for more details.

Year	2004	2005	2006
Actual SWG fishery closure	November 15	October 10	Quota not filled
Gag fishery close – no incidental harvest	Early June	Late June	Late November
Red grouper fishery close	Late November	Late October	Quota not filled
SWG fishery close	Early October	Late August	Quota not filled

Table 2.8.2. Comparison estimated gag closure dates and days the SWG fishery could stay open after the 80 percent quota trigger is met for different incidental harvest levels.

Trigger date	Incidental harvest	Gag closure date	Days beyond the projected 80% quota trigger date the SWG fishery could stay open
8-May, 2004	100 lbs	4-Oct	149
	200 lbs	2-Aug	86
	300 lbs	8-Jul	61
	500 lbs	25-Jun	48
16-May, 2005	100 lbs	19-Oct	156
	200 lbs	8-Aug	84
	300 lbs	25-Jul	70
	500 lbs	15-Jul	60
23-Jul, 2006	100 lbs	no closure	161
	200 lbs	no closure	161
	300 lbs	18-Dec	148
	500 lbs	12-Dec	142

Table 2.8.3. Comparison of SWG fishery closures and days open relative to Preferred Alternative 3, Preferred Option b based on a straight quota closure (Alternative 2), a gag incidental harvest once an 80 percent gag harvest trigger is reached (Preferred Alternative 3, Options a-c), and various trip limits (Alternative 4, Options a-d).

Alternative	Trip Limit	2004		2005		2006	
		Closure date	Days open	Closure date	Days open	Closure date	Days open
2	Gag fishery close – no incidental harvest	Early June		Late June		Late Novemb er	
3, Option a	Gag fishery with 100 lbs incidental harvest	4-Oct	63	19-Oct	72	no closure	0
3, Option b	Gag fishery with 200 lbs incidental harvest	2-Aug	--	8-Aug	--	no closure	0
3, Option c	Gag fishery with 500 lbs incidental harvest	25-Jul	-8	15-Jul	-24	12-Dec	19
4, Option a, Suboption i	300 lbs or 15% of grouper landed	17-Nov	107	11-Nov*	95	no closure	0
4, Option a, Suboption ii	300 lbs or 20% of grouper landed	28-Oct	87	13-Oct	66	no closure	0
4, Option b	300 lbs	15-Dec*	135	27-Dec*	141	no closure	0
4, Option c	500 lbs	5-Oct	64	17-Sep	40	no closure	0
4 Option d	1,000 lbs	25-Jul	-8	23-Jul	-16	no closure	0

*The gag quota would be filled after the red grouper quota.

Effects of **Action 8** alternatives on the physical, biological/ecological, economic, social, and administrative environments are discussed in Section 5.8. Effects on the physical environment, while minor because of the gears used by the reef fish fishery, are tied to commercial fishing effort. Greater effort implies greater effects. For **Alternatives 1-4**, **Alternative 2** would likely reduce effort the most, thus having the most positive effect on the physical environment. **Alternative 1, Preferred Alternative 3**, and **Alternative 4,** depending on the amount of effort shifting to other reef fish species, allow the grouper fishery to stay open longer and would allow greater interaction of fishing activities with the physical environment. For the biological/ecological environment, **Alternative 2** protects the SWG stocks the most by protecting gag from overfishing and allowing for an under-harvest of other shallow-water species. **Alternative 1** would adversely affect the biological/ecological environment because it could allow gag overfishing to continue. **Preferred Alternative 3** and **Alternative 4** are intermediate to **Alternatives 1** and **2** because they provide both harvest limits for gag, red grouper, and SWG species, while providing a mechanism for greater harvests than under **Alternative 2**.

Although by itself a fishery closure would have direct effects on the commercial sector, evaluation of its economic effects would still have to consider other relevant actions in this amendment, such as TACs, allocations, quotas, and size limit. Based on simulation results of the various alternatives several generalizations can be made. First, the fishery would be economically better off if no closures were to occur, or if a closure were to occur, it should happen very late in the fishing year as in **Alternative 1**. Second, a partial fishery closure as in **Alternatives 3 and 4** would provide a better economic scenario than a total fishery closure as in **Alternative 2**. Third, if the limiting gag quota were included as one of the closure triggers, some form of trip limits (or other measures) to slow down the harvest of gag would result in lower economic losses. Fourth, introduction of measures to slow down the harvest of gag early in the fishing year would produce lower economic losses than when such measures were introduced later in the year. Fifth, there appears to be some gag trip limit levels, such as the 500 pounds, that would tend to minimize the sum of negative effects from the gag trip limit and fishery closure.

Based on total economic effects, the various alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4c**, **Alternative 4d**, **Alternative 4aii**, **Alternative 4ai**, **Alternative 4b**, **Preferred Alternative 3b**, **Alternative 3a**, **Alternative 3c**, and **Alternative 2**. The use of either a 3 percent or 7 percent discount rate would not affect the ranking of management alternatives.

In the short term, **Alternative 1** will not have any impacts on the commercial shallow-water grouper fishery because it does not change the way closures are determined now. **Alternative 2** would close the shallow-water grouper fishery if the quota of any of the individual species is met. This would prevent fishermen from harvesting at the optimum yield and could reduce the income they would have made if they could have harvested the full quota of the other species. This could have a negative impact on the processors and dealers who would have less fish from the other species in the shallow-water grouper complex. **Alternative 3** would allow fishermen to continue to harvest incidental catch of gag or red grouper at a given level once 80 percent of the gag or red grouper quota is reached and the harvest of that species closed. This alternative would only be applicable if it is projected that the quota would be reached before the end of the year. This would allow fishermen to continue to harvest a certain amount of the applicable species of the fish they catch while fishing for other species in the complex. Option A would allow fishermen to keep 100 pounds of incidental catch, less than Preferred Option B or Option C. The quota may be met slower under Option A. Preferred Option B would allow fishermen to keep 200 pounds, more than Option A, but less than Option C. Option C would allow fishermen to keep 500 pounds of incidental catch but the quota could be met sooner under this option than under Option A or Preferred Option B.

With regard to the administrative environment, **Alternative 1** would continue the current quota management and so would not add to the burden of managing these fisheries. **Alternative 2, Preferred Alternative 3**, and **Alternative 4** would require gag be added to the current quota monitoring program. **Preferred Alternative 3** and **Alternative 4** would add an enforcement requirement to ensure incidental harvest trip limits are adhered to once the incidental harvest trigger has been met.

The Council selected **Alternative 3, Option b** as preferred because it mitigates the under-harvest of SWG species which could occur under **Alternative 2**. **Preferred Alternative 3** also avoids the potential of allowing gag overfishing as could occur under the no action alternative. This alternative lets the harvest of gag or red grouper occur unhindered, with the exception of the 6,000 pound trip limit, until 80 percent of the quota is landed for the species first achieving this trigger. After this point, the 200-pound incidental trip limit allows the fishery to continue until either the gag, red grouper, or SWG quota is filled. This incidental harvest trip limit is advantageous because it would allow the "weak link" species to be landed regardless of what reef fish species are targeted on a fishing trip after the incidental harvest trigger is met. It also is a simpler rule to follow for fishermen than trip limits based on a percentage of the grouper harvested on a trip as well as easier to enforce dockside. **Option b** is a compromise between **Option a** and **c** by allowing a moderate increase the extension of the fishing season, but with a lower level of bycatch than **Option a**.

2.9 Action 9. Recreational harvest of gag and red grouper

Background

The following discussion provides background information on management measures (size limits, bag limits, and seasonal closures) the Council may consider for managing the SWG recreational fishery.

Estimated Reductions in Gag Recreational Harvest

Table 2.9.1 summarizes various gag reductions necessary to end overfishing and achieve OY. These reductions are based on the final August 2007 gag assessment model run (SEFSC 2007) and various allocations proposed in Action 5. Percent reductions in harvest to achieve either F_{OY} (41 percent) or F_{MAX} (25 percent) were determined by comparing 2004-06 gag landings with 2009 landings from the gag stock assessment projections (see Table 2.3.1). The 2004-06 baseline was chosen because it reflects recent changes in the fishery possibly resulting from lower recruitment and changes in fishing conditions (e.g., reduced effort due to higher fuel prices, etc.). If instead 2005-2007 landings were used as the baseline for determining reductions in harvest then a 22 percent reduction in landings would be necessary to achieve F_{OY}. This reduction is consistent with the reduction necessary to end overfishing using the 2004-06 baseline. Based on the 2004-06 baseline, a minimum reduction in TAC of 25 percent is necessary to end gag overfishing. This reduction would have a 50 percent probability of ending overfishing. Reducing TAC to the yield associated with F_{OY} would increase the probability overfishing is ended and is consistent with proposed NOAA Fisheries Service guidance and the recent MSFCMA reauthorization, which require regional fishery management Council's to set annual catch limits for fisheries to ensure overfishing does not occur (Sec. 303(a)(15)). Although managing gag to achieve F_{OY} may not ensure overfishing is entirely prevented, it will greatly increase the probability that overfishing does not occur.

Table 2.9.1. Percent reductions in landings by sector to achieve gag F_{OY} or F_{MAX} for various allocations. Allocations are rounded to the nearest 10,000 pounds.

TAC (mp gw)	Allocation Rec:Comm			Landings			% Reduction to End Overfishing	
	Years	Rec	Comm	Rec	Comm	Total	Rec	Comm
Baseline	2004-2006	61%	39%	3,464,758	2,238,310	5,703,068	n/a	n/a
F_{OY} TAC = 3.38 mp gw in 2009								
3.38	1986-1987	65%	35%	2,200,000	1,180,000	3,380,000	37%	47%
3.38	2001-2005	59%	41%	1,990,000	1,390,000	3,380,000	43%	38%
3.38	1986-2005	61%	39%	2,060,000	1,320,000	3,380,000	41%	41%
F_{MAX} TAC = 4.25 mp gw in 2009								
4.25	1986-1987	65%	35%	2,760,000	1,490,000	4,250,000	20%	33%
4.25	2001-2005	59%	41%	2,510,000	1,740,000	4,250,000	28%	22%
4.25	1986-2005	61%	39%	2,590,000	1,660,000	4,250,000	25%	26%

Estimated Increases in Red Grouper Recreational Harvest

The most recent red grouper assessment indicates F_{2005} was near the target F level (F_{OY}). Projections conducted by the SEFSC indicate SSB will remain above SSB_{MSY} and fluctuate around its current level through at least 2015 if fishing mortality and total removals are held at or near OY. The long-term sustainability of catch levels in excess of MSY/OY will in part depend on how future recruitment compares to the long term average used in the projection analyses Fishing mortality is estimated to stabilize near the 2005 F level if landings are maintained at either current or OY levels. However, indices of abundance developed after the above described projections indicate potential decreases in red grouper availability and abundance. The Council's SSC concluded that these declines "… may suggest that the population abundance for these species has declined since 2004, but is still not as low as it was during the 1990s."

The SEDAR 12 review panel recommended allowable biological catch (ABC) be set at 7.94 million pounds gutted weight (mp gw) in 2009 (= yield at F_{OY}). However, in Action 4 the Council elected to set TAC slightly less than the recommended ABC at 7.57 mp gw (= equilibrium OY). The Council previously implemented the 6.56 mp TAC in 2004 after the red grouper stock was determined to be undergoing overfishing. However, this TAC did not fully constrain harvest. Despite implementation of the 6.56 mp gw TAC in 2004, total red grouper landings in 2004 and 2005 exceeded the TAC (8.8 mp gw landed in 2004; 7.0 mp gw landed in 2005). In 2006 and 2007, red grouper landings were less than the 6.56 mp TAC (6.1 mp gw landed in 2006; 4.6 mp gw landed in 2007). During 2000-2005, red grouper landings averaged 7.46 mp, or only 0.11 mp less than the equilibrium OY. Therefore, setting landings equal to equilibrium OY is consistent with the level of harvest prior to 2006. However, it should be noted that the high landings observed during this time period were in part due to the particularly strong 1996 and 1999 year-classes entering the fishery.

Determining the allowable increase in red grouper recreational harvest to achieve OY is not straight-forward because of year-to-year changes in recruitment, potential changes in SSB in recent years as indicated by abundance indices, and the numerous regulatory changes that have taken place since 2004 (e.g., one fish bag limit, recreational seasonal closure, elimination of fish traps). Table 2.9.2 summarizes allowable recreational and commercial landings to achieve various red grouper TACs. Differences in allowable landings for each sector are based on different allocation schemes and TAC levels.

Table 2.9.2. Allowable red grouper landings by sector for various TACs and allocations.

TAC (mp gw)	Allocation Rec:Comm			Landings		
	Years	Rec	Comm	Rec	Comm	Total
Baseline = 6.56	1986-1987	23%	77%	1,510,000	5,050,000	6,560,000
	2001-2005	24%	76%	1,570,000	4,990,000	6,560,000
	1986-2005	24%	76%	1,570,000	4,990,000	6,560,000
Equilibrium OY = 7.57	1986-1987	23%	77%	1,740,000	5,830,000	7,570,000
	2001-2005	24%	76%	1,820,000	5,750,000	7,570,000
	1986-2005	24%	76%	1,820,000	5,750,000	7,570,000
Equilibrium MSY = 7.72	1986-1987	23%	77%	1,780,000	5,940,000	7,720,000
	2001-2005	24%	76%	1,850,000	5,870,000	7,720,000
	1986-2005	24%	76%	1,850,000	5,870,000	7,720,000

Based on the Council's preferred alternative in Action 4, increasing red grouper TAC to equilibrium OY and allocating TAC based on 1986-2005 landings would allow recreational TAC to be increased from 1.25 mp gw to 1.82 mp gw. However, it should be noted that the 1.25 mp gw TAC did not constrain recreational harvest in 2004 (3.0 mp) or 2005 (1.6 mp). In 2006 and 2007, landings declined to around 1 mp gw. The decrease in landings during 2005-07 may be partially explained by more restrictive management measures and a reduction in effort, but the reduction may also be due to a decline in SSB, which has reduced the availability of red grouper to anglers. NMFS video survey data for 2004-2006 from the eastern Gulf of Mexico indicates red grouper abundance declined from 2004 through 2007. Similarly, the MRFSS fishery dependent index declined from 2004-2006, before slightly increasing in 2007. It is currently unknown what recreational anglers could land under prevailing management measures and average long-term recruitment conditions.

Because of uncertainty in how much recreational red grouper harvest can be increased, a range of management measures to achieve fishing mortality rates that are at or near F_{OY} is presented in Action 9. The goal of this action is to ensure total fishing mortality on red grouper does not increase since fishing mortality in 2005 was right at the target level (F_{OY}). Any increase in recreational red grouper F resulting from this action must be offset by other actions that reduce F, such as elimination of the commercial trap fishery in February 2007 and reallocation of TAC (see Action 5). During 2001-05, the commercial reef fish trap fishery accounted for 10 percent of the red grouper landings and 14 percent of the overall fishing mortality. During this same time period, the recreational fishery accounted for 24 percent of the overall red grouper landings and 16 percent of the total fishing mortality. Reallocating red grouper using the 1986-2005 landings time series is not likely to greatly affect fishing mortality for either sector, since the preferred allocation in Action 5 is similar to what was landed during 2001-05. In contrast, elimination of the trap fishery would allow fishing mortality to be shifted to other sectors. For example, if 31 percent of the landings and fishing mortality were shifted from the trap fishery to the recreational sector during 2005, then red grouper recreational landings could have been increased by 12 percent and landings would have approximated the proposed 1.82 million pound catch level specified by Actions 4 and 5.

The Council will need to weigh the benefits of potentially large increases in harvest, which may increase fishing mortality and prevent F_{OY} from being achieved, with more conservative increases in harvest that could minimize the risk of overfishing. The less conservative recreational management measures are set, the more likely overfishing is to occur in the future. Accountability measures and ACLs proposed in Action 6 are intended to ensure landings remain at or near target levels and chronic overfishing does not occur if recreational management measures proposed in Action 9 do not sufficiently reduce or constrain recreational harvest.

Bag Limits

Currently there is no species-specific bag limit for gag. Gag are included in the 5-grouper aggregate bag limit, which includes 12 other grouper species. Within the aggregate bag limit, recreational anglers are allowed one red grouper per day, one warsaw grouper per vessel per day, and one speckled hind per vessel per day.

Table 2.9.3 summarizes reductions in harvest for various gag bag limits and release mortality rates. The revised 2007 gag assessment estimates recreational release mortality is 20 percent (SEFSC 2007). Specifying a 3 or 4 gag bag limit would reduce average harvest by 4.2 and 1.4 percent respectively, indicating few anglers harvest more than three gag per trip. If the bag limit is reduced to 2 or 1 gag per angler per day, then harvest would be reduced by 10.8 and 26.3 percent, respectively. Charter vessels would be most affected by reductions to the bag limit, followed by private anglers and then headboat anglers.

Table 2.9.3. Percent reductions in gag harvest for various bag limits.[4]

	% reduction gag	
Bag Limit	rel = 0%	rel = 20%
5	0.0	0.0
4	1.8	1.4
3	5.3	4.2
2	13.5	10.8
1	32.8	26.3

Red grouper currently are restricted to one fish within the five grouper aggregate bag limit. The one red grouper bag limit was implemented in August 2005 through interim rule and then continued by Regulatory Amendment starting in July 2006. Prior to implementation of the red grouper bag limit, landings had averaged 1.6 mp gw (2000-2003). Landings during 2005-2007 averaged 1.2 mp gw. Table 2.9.4 summarizes increases in red grouper recreational harvest for various red grouper bag limits. Increasing the red grouper bag limit from 1 to 2 fish is estimated to increase harvest by 31 percent. If the bag limit is increased to 3, 4, or 5 red grouper, then it is estimated red grouper harvest would increase by 39, 44, and 46 percent, respectively.

[4] Gag bag limit analyses based on catch rates during 2003-2005.

Table 2.9.4. Percent increases in red grouper harvest for various bag limits.[5]

Bag Limit	% increase red
5	45.5
4	43.8
3	39.4
2	30.6
1	0.0

If the recreational bag limit for red grouper is eliminated, a one, two, or three gag grouper bag limit is implemented, and the aggregate bag limit is modified, then red grouper harvest is estimated to increase as summarized in Table 2.9.5.

Table 2.9.5. Percent increase in red grouper harvest if the red grouper bag limit is eliminated, a one, two or three gag grouper bag limit is established, and the aggregate bag limit is reduced.

Gag Bag	Agg Bag	% Increase Red
1	5	44.6
1	4	41.2
1	3	35.0
1	2	16.7
2	5	43.3
2	4	37.7
2	3	27.5
3	5	42.5
3	4	33.0
3	3	22.6

Decreasing the aggregate bag limit, eliminating the red grouper bag limit, and not establishing a recreational gag bag limit is estimated to change gag and red grouper harvest as summarized in Table 2.9.6. A two-fish aggregate grouper bag limit would decrease gag harvest by 14 percent and allow red grouper harvest to increase by 22 percent.

Table 2.9.6. Reductions in gag grouper harvest and increases in red grouper harvest associated with various aggregate bag limits. This analysis assumes no species-specific bag limits for either red or gag grouper.

	% reduction gag		
Agg Bag	rel = 0%	rel = 20%	% increase red
5	0.0	0.0	44.1
4	4.7	3.8	40.3
3	9.1	7.3	34.5
2	17.2	13.8	22.4

5 Red grouper bag limit analyses based on catch rates during 2003-2004. 2005 data was not used because the red grouper bag limit was reduced to one fish that year.

The 5-grouper aggregate bag limit has been in effect since implementation of Amendment 1 to the Reef Fish FMP. As described above, the aggregate bag limit includes 13 species of grouper, with additional restrictions on the amount of red grouper, warsaw grouper, and speckled hind that can be harvested. SERO (2007) estimated that 5 percent of anglers catching grouper (includes both landings and discards) during 2003-2005 landed 3 or more grouper, and 3 percent of anglers landed 4 or more grouper. Table 2.9.7 summarizes decreases in the harvest of all grouper species for various aggregate bag limits. A two grouper aggregate bag limit (assuming an average release mortality rate of 20 percent) would decrease the harvest of all grouper species recreationally harvested by 14 percent.

Table 2.9.7. Reductions in grouper harvest (all species) associated with various aggregate bag limits and release mortality rates.

	% Reduction - All Grouper		
Bag Limit	0%	10%	20%
5	0.0	0.0	0.0
4	3.0	2.7	2.4
3	7.9	7.1	6.3
2	17.4	15.7	13.9
1	37.7	33.9	30.2

<u>Recreational Closed Season</u>

The February 15 to March 15 recreational grouper closure became effective December 18, 2006 (71 FR 66878). This closed season was implemented to reduce red grouper fishing mortality and prevent or minimize bycatch of gag and black grouper as a result of more restrictive red grouper regulations. The closure occurs simultaneously with the commercial grouper closure and includes important spawning seasons for all three species. The closure is expected to reduce gag harvest by approximately 7.8 percent unless there is effort shifting to the open season by trips that would have occurred during the closed season. Table 2.9.8 summarizes the average percent reduction in recreational gag and red grouper harvest by month. The primary recreational fishing season for gag is March through June, and for red grouper is May through August. Gag spawn in the Gulf of Mexico from mid-January until mid-April, with a peak in spawning during March (SEDAR 10 2006). Red grouper spawn from February until mid-July, with peak spawning occurring in March, April and May (Fitzhugh et al. 2006).

Table 2.9.8. Percent reduction in the recreational harvest of gag and red grouper by month.

Month	Percent Landings	
	Gag	Red Grouper
Jan	6.7%	3.4%
Feb	6.1%	3.4%
Mar	10.5%	7.1%
Apr	10.2%	6.9%
May	10.2%	12.4%
Jun	9.8%	12.5%
Jul	7.0%	15.8%
Aug	6.9%	15.8%
Sep	7.6%	7.0%
Oct	8.0%	7.2%
Nov	8.4%	4.2%
Dec	8.6%	4.2%

Regional Landings

During the June 2008 Gulf Council meeting, the Council added a new alternative to Action 9. This alternative includes a two gag bag limit, two red grouper bag limit, four grouper aggregate bag limit, and various closed seasons for SWG. MRFSS landings along the west coast of Florida were post-stratified into three regions to examine the impacts of various closed seasons on each region. Regions were defined as follows: Panhandle (Escambia through Dixie Counties), Peninsular Florida (Levy – Collier Counties), and the Florida Keys (Monroe County). Figures 2.9.1 and 2.9.2 summarize post-stratified West Florida MRFSS landings by region and wave for 2003-2005. The Florida Keys accounted for only a small fraction of overall red grouper (5.6 percent) and gag landings (0.5 percent). Peninsular Florida accounted for 58.5 percent of annual gag landings and 57.3 percent of annual red grouper landings. The Florida Panhandle accounted for 41 percent of the annual gag landings and 37.1 percent of the annual red grouper landings. Gag landings peaked during May-August in the Panhandle and during the winter months along Peninsular Florida. Red grouper landings increased in spring, were highest during summer, and declined in fall for both the Panhandle and Peninsular Florida regions.

Figure 2.9.1. Percentage of annual MRFSS gag landings by West Florida sub-region and wave.

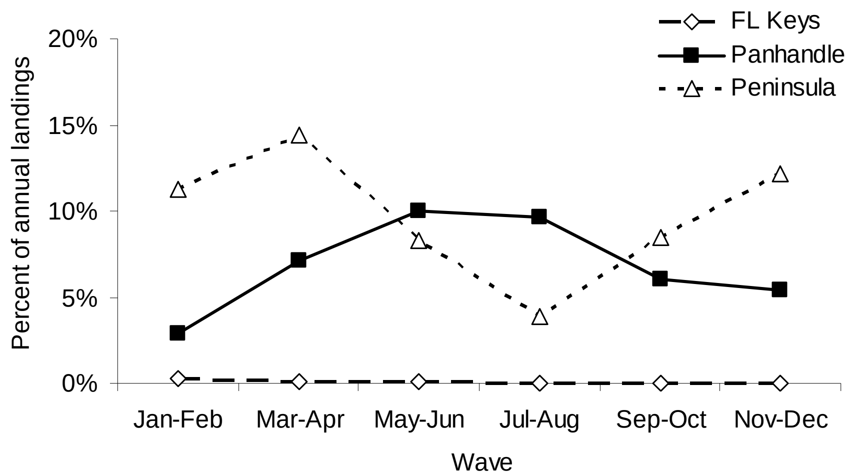
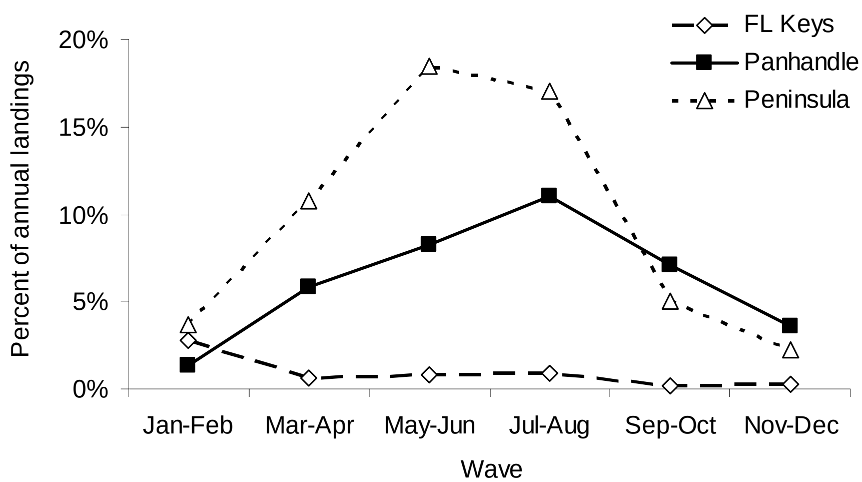


Figure 2.9.2. Percentage of annual MRFSS red grouper landings by West Florida sub-region and wave.



<u>Minimum Size Limits</u>

In 1990, a 20-inch total length (TL) minimum size limit was established for gag. This size limit was increased to 22-inches TL for the recreational fishery and 24-inches TL for the commercial fishery in 2000 in order to reduce harvest. Size limits are intended to reduce fishing mortality, increase the size of fish caught, and increase the likelihood fish reach maturity and spawn before being harvested. However, size limits can also negatively affect fisheries by increasing bycatch and dead discards. Currently, the recreational minimum size limit is slightly below the size at 50 percent maturity (i.e., 23 inches TL, SEDAR 10 2007).

Since implementation of the 22-inch minimum size limit in 2000, the number of gag discarded dead by recreational anglers has increased significantly. Most discards are assumed to be the result of minimum size limit regulations, although some anglers may discard gag if they have reached their 5-aggregate grouper bag limit or if they believe a larger legal-sized gag could be landed (hi-grade).

Table 2.9.9 summarizes changes in harvest associated with various size limits and release mortality rates. Based on a 20-percent release mortality rate, increasing the minimum size limit to 24-inches TL would reduce harvest by 19.5 percent. Although larger size limits may reduce harvest, they will further increase bycatch and reduce yield-per-recruit (YPR) because of losses due to discard mortality. Ortiz (2007) estimated gag YPR would decrease by 3.3 percent if the recreational size limit was increased from 22 to 24 inches TL.

Table 2.9.9. Reductions in gag harvest associated with various recreational minimum size limits and release mortality rates.

	Percent Reduction	
Size Limit	rel = 0.0	rel = 0.2
22	0.0	0.0
23	10.4	8.3
24	24.4	19.5
25	36.5	29.2
26	47.7	38.1

During the October 2007 Council meeting, the Council requested staff analyze the effect of lowering the minimum size limit to 20-inches TL. Limited size distribution data on gag discards are available to conduct such an analysis. Headboat observer data collected off Florida during 2005 and 2006 was used to estimate changes in landings resulting from a 20-inch size limit. Of 2,306 gag observed caught, 17.6 percent were landed and 82.4 percent were discarded (Figure 2.9.1). Of the 1,899 gag discarded, 13.9 percent were between 20 and 22 inches TL. Because no size distribution data were available for the charter or private sectors, it was assumed that lowering the gag minimum size limit by 2-inches TL would reduce gag discards by 14 percent in these sectors. Reducing the minimum size limit was estimated to decrease dead discards, but increase catch-per-unit effort (CPUE). To offset increases in fishing mortality and CPUE, staff analyzed a 20-inch minimum size limit in combination with a one fish bag limit. The model used to conduct bag limit analyses (see above) was modified to accommodate changes in size (Andy Strelcheck, pers. comm.). The 20-inch minimum size limit, in combination with a one gag bag limit, reduced charterboat harvest by 19.7 percent, private harvest by 6.2 percent, and increased headboat harvest by 14.4 percent. Across all modes, harvest was decreased by 8.5 percent. The more likely a sector was to harvest one or more gag under status quo conditions the greater the reduction in harvest. Because headboats infrequently catch one gag per angler, there was potential for an increase in harvest to occur despite a large reduction in discards.

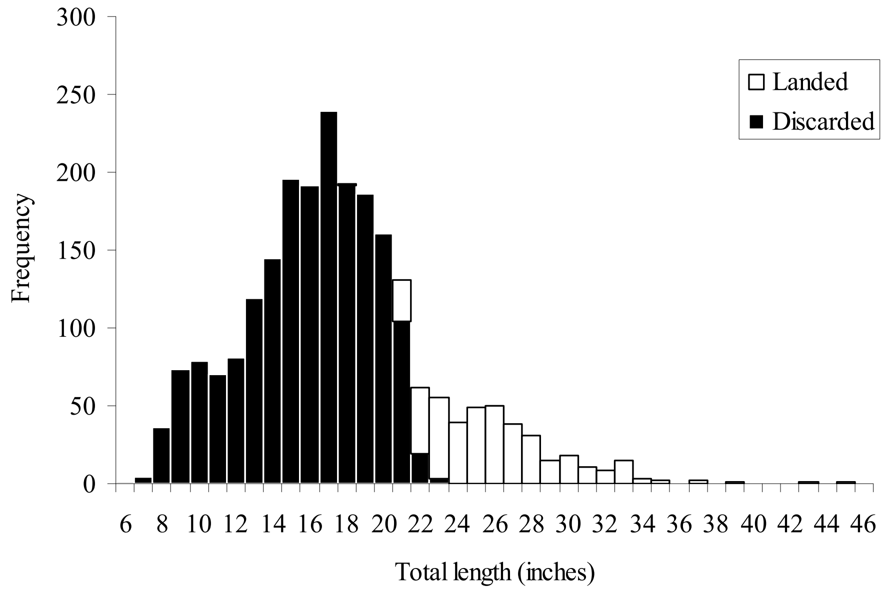


Figure 2.9.1. Size distribution of gag landings and discards from Florida headboat observer trips, 2005-2006.

Combination Analyses

Table 2.9.10 and Table 2.9.11 summarize various management measure combinations that would reduce the recreational harvest of gag and increase the recreational harvest of red grouper. Combinations consider bag limits of 1, 2, or 3 gag grouper, bag limits of 2, 3, 4, or 5 red grouper, eliminating the red grouper bag limit, reducing the aggregate bag limit, and extending the seasonal closure for shallow-water grouper. Table 2.9.10 summarizes gag management measures needed to achieve a 45 percent reduction in harvest, assuming Action 5, Alternative 3 is selected as the preferred allocation. This reduction is slightly greater than the reduction necessary to achieve F_{OY}. Table 2.9.11 summarizes gag management measures needed to achieve 29 percent reduction in harvest under the same assumed allocation. This reduction is slightly greater than the reduction necessary to achieve F_{MAX}. Changes in red grouper harvest associated with various management measures are also summarized in Tables 2.9.10 and 2.9.11.

Table 2.9.10. Estimated reductions in recreational gag harvest (to achieve F_{OY}) and increases in recreational red grouper harvest for various management measure combinations

Bag Limit			Size Limit		Closed Season	% change in harvest		Days
Gag	Red	Agg	Gag	Red	Shallow Water Grouper	Gag	Red	Open
1	--	5	22	20	Feb 1 - Apr 30	-46%	19%	276
1	--	4	22	20	Feb 1 - Apr 30	-46%	17%	276
1	--	3	22	20	Feb 1 - Apr 30	-46%	12%	276
1	5	5	22	20	Feb 1 - Apr 30	-46%	20%	276
1	4	5	22	20	Feb 1 - Apr 30	-46%	19%	276
1	3	4	22	20	Feb 1 - Apr 30	-46%	15%	276
1	2	3	22	20	Feb 1 - Apr 30	-46%	8%	276
1	--	5	22	20	Jan 15 - Apr 15	-45%	22%	274
1	--	4	22	20	Jan 15 - Apr 15	-45%	19%	274
1	--	3	22	20	Jan 15 - Apr 15	-45%	14%	274
1	3	3	22	20	Jan 15 - Apr 15	-45%	17%	274
1	2	3	22	20	Jan 15 - Apr 15	-45%	10%	274
1	--	5	22	20	Jan 1 - Apr 15	-47%	20%	260
1	--	4	22	20	Jan 1 - Apr 15	-47%	17%	260
1	--	3	22	20	Jan 1 - Apr 15	-47%	12%	260
1	5	5	22	20	Jan 1 - Apr 15	-47%	20%	260
1	4	4	22	20	Jan 1 - Apr 15	-47%	19%	260
1	3	3	22	20	Jan 1 - Apr 15	-47%	15%	260
1	2	2	22	20	Jan 1 - Apr 15	-47%	8%	260
2	--	5	22	20	Jan 1 - May 15	-45%	-12%	230
2	--	4	22	20	Jan 1 - May 15	-45%	-15%	230
2	--	3	22	20	Jan 1 - May 15	-45%	-21%	230
2	3	5	22	20	Jan 1 - May 15	-45%	-14%	230
2	2	4	22	20	Jan 1 - May 15	-45%	-20%	230
2	--	5	22	20	Nov 1 - Mar 31	-47%	11%	214
2	--	4	22	20	Nov 1 - Mar 31	-47%	7%	214
2	--	3	22	20	Nov 1 - Mar 31	-47%	-1%	214
2	3	5	22	20	Nov 1 - Mar 31	-47%	8%	214
2	2	4	22	20	Nov 1 - Mar 31	-47%	1%	214
--	--	2	22	20	Jan 1 - May 15	-47%	-2%	230
1	--	5	24	20	Feb 15 - Mar 31	-49%	32%	320
1	--	4	24	20	Feb 15 - Mar 31	-49%	29%	320
1	--	3	24	20	Feb 15 - Mar 31	-49%	23%	320
1	3	4	24	20	Feb 15 - Mar 31	-49%	27%	320
1	2	3	24	20	Feb 15 - Mar 31	-49%	19%	320
1	--	5	24	20	Feb 1 - Mar 15	-47%	35%	322
1	--	4	24	20	Feb 1 - Mar 15	-47%	32%	322
1	--	3	24	20	Feb 1 - Mar 15	-47%	26%	322
1	3	4	24	20	Feb 1 - Mar 15	-47%	30%	322
1	2	3	24	20	Feb 1 - Mar 15	-47%	22%	322
2	--	5	24	20	Feb 1 - Apr 30	-47%	19%	276
2	--	4	24	20	Feb 1 - Apr 30	-47%	17%	276
2	--	3	24	20	Feb 1 - Apr 30	-47%	12%	276
2	--	5	24	20	Jan 1 - Apr 15	-49%	20%	260
2	--	4	24	20	Jan 1 - Apr 15	-49%	17%	260
2	--	3	24	20	Jan 1 - Apr 15	-49%	12%	260
--	--	2	24	20	Jan 1 - Mar 31	-47%	5%	275
--	--	2	24	20	Feb 1 - Apr 30	-49%	1%	276
--	--	3	22	20	Jan 1 - May 21	-45%	-5%	224
--	--	3	22	20	Feb 1 - Jun 15	-46%	-14%	230
3	--	5	22	20	Nov 1 - Apr 30	-48%	1%	184
3	--	4	22	20	Nov 1 - Apr 30	-48%	-6%	184
3	--	3	22	20	Nov 1 - Apr 30	-48%	-20%	184
3	--	5	22	20	Dec 15 - May 30	-50%	1%	197
3	--	4	22	20	Dec 15 - May 30	-50%	-6%	197
3	--	3	22	20	Dec 15 - May 30	-50%	-13%	197
3	--	5	24	20	Jan 14 - Apr 30	-47%	15%	258
3	--	4	24	20	Jan 14 - Apr 30	-47%	7%	258
3	--	3	24	20	Jan 14 - Apr 30	-47%	-1%	258
3	--	5	24	20	Dec 15 - Apr 15	-48%	15%	243
3	--	4	24	20	Dec 15 - Apr 15	-48%	7%	243
3	--	3	24	20	Dec 15 - Apr 15	-48%	-1%	243

Table 2.9.11. Estimated reductions in recreational gag harvest (to achieve F_{MAX}) and increases in recreational red grouper harvest for various management measure combinations.

Bag Limit			Size Limit		Closed Season	% change in harvest		Days
Gag	Red	Agg	Gag	Red	Shallow Water Grouper	Gag	Red	Open
1	--	5	22	20	Feb 15 to Mar 15	-32%	37%	337
1	--	4	22	20	Feb 15 to Mar 15	-32%	34%	337
1	--	3	22	20	Feb 15 to Mar 15	-32%	28%	337
1	5	5	22	20	Feb 15 to Mar 15	-32%	38%	337
1	4	5	22	20	Feb 15 to Mar 15	-32%	36%	337
1	3	5	22	20	Feb 15 to Mar 15	-32%	32%	337
1	2	5	22	20	Feb 15 to Mar 15	-32%	24%	337
2	--	5	22	20	Jan 15 - Mar 31	-29%	26%	289
2	--	4	22	20	Jan 15 - Mar 31	-29%	21%	289
2	--	3	22	20	Jan 15 - Mar 31	-29%	12%	289
2	3	5	22	20	Jan 15 - Mar 31	-29%	22%	289
2	2	4	22	20	Jan 15 - Mar 31	-29%	14%	289
2	--	5	22	20	Feb 1 - Apr 15	-30%	23%	291
2	--	4	22	20	Feb 1 - Apr 15	-30%	18%	291
2	--	3	22	20	Feb 1 - Apr 15	-30%	10%	291
2	3	5	22	20	Feb 1 - Apr 15	-30%	20%	291
2	2	4	22	20	Feb 1 - Apr 15	-30%	12%	291
2	--	5	22	20	Feb 15 - Apr 30	-32%	21%	290
2	--	4	22	20	Feb 15 - Apr 30	-32%	16%	290
2	--	3	22	20	Feb 15 - Apr 30	-32%	7%	290
2	3	5	22	20	Feb 15 - Apr 30	-32%	20%	290
2	2	4	22	20	Feb 15 - Apr 30	-32%	12%	290
2	--	5	24	20	Feb 15 to Mar 15	-34%	36%	337
2	--	4	24	20	Feb 15 to Mar 15	-34%	31%	337
2	--	3	24	20	Feb 15 to Mar 15	-34%	21%	337
2	3	5	24	20	Feb 15 to Mar 15	-34%	33%	337
2	2	4	24	20	Feb 15 to Mar 15	-34%	24%	337
3	--	5	22	20	Feb 1 - Apr 30	-30%	18%	276
3	--	4	22	20	Feb 1 - Apr 30	-30%	10%	276
3	--	3	22	20	Feb 1 - Apr 30	-30%	1%	276
3	--	5	24	20	Feb 15 to Mar 15	-29%	31%	337
3	--	4	24	20	Feb 15 to Mar 15	-29%	23%	337
3	--	3	24	20	Feb 15 to Mar 15	-29%	13%	337
--	--	3	22	20	Feb 15 - Apr 30	-29%	13%	290
--	--	2	22	20	Jan 1 - Mar 15	-29%	10%	291

During the January 2008 Council meeting, there was concern that the proposed grouper closed season would overlap other closed seasons and could restrict recreational fishing opportunities during some times of the year. Existing closed seasons in the reef fish fishery are shown in Table 2.9.12.

Table 2.9.12. Reef Fish Closed Seasons in the Gulf of Mexico EEZ

Species	Recreational	Commercial
Black grouper Gag Red Grouper	February 15 to March 15	February 15 to March 15 SWG fishery closed when red grouper or SWG quota reached.
Shallow water grouper aggregate	Does not close except for the February 15 to March 15 black grouper, gag, and red grouper closure	quota closure: November 15, 2004; October 10, 2005; no quota closures in 2006, 2007
Deep water grouper	Does not close	quota closure: July 15, 2004; June

aggregate		23, 2005; June 27, 2006; June 2, 2007; and May 10, 2008
Tilefishes	Does not close	quota closure: November 21, 2005; July 22, 2006; April 18, 2007, and May 10, 2008
Red snapper	October 1 – May 31 (August 5 – May 31 for 2008 to start of 2009 season only);	Operates under IFQ – does not close
Greater amberjack	Amendment 30A proposes in-season quota closure	March 1 – May 31; Amendment 30A would allow the fishery to be closed when the quota is met
Gray triggerfish	Amendment 30A proposes shortening recreational season in subsequent season if ACL exceeded	Amendment 30A proposes the fishery to be closed when the quota is met

Alternative 1. No action. Maintain the red grouper minimum size limit at 20 inches TL and the gag minimum size limit at 22 inches TL, maintain the February 15 to March 15 recreational closure for gag, red grouper, and black grouper, maintain the recreational bag limit for red grouper at 1 fish per person per day within the 5-grouper aggregate bag limit. (336 day season)

Alternative 2. Establish:

- **a gag bag limit of 1 fish per person per day within the aggregate bag limit**
- **no red grouper bag limit (catch up to the aggregate)**
- **aggregate grouper bag limit of 3 fish per person per day**
- **a January 15 through April 15 closed season on shallow-water grouper (45% reduction in gag, 14% increase in red grouper, 274 day season)**

Alternative 3. Establish:

- **a gag bag limit of 1 fish per person per day within the aggregate bag limit**
- **two red grouper bag limit**
- **aggregate grouper bag limit of 3 fish per person per day**
- **February 1 through April 30 closed season on shallow-water grouper (46% reduction in gag, 8% increase in red grouper, 276 day season)**

Alternative 4. Establish:

- **a gag bag limit of 2 fish per person per day within the aggregate bag limit**
- **no red grouper bag limit (catch up to the aggregate)**
- **aggregate grouper bag limit of 3 fish per person per day**
- **a Jan 1 through May 15 closed season on shallow-water grouper (45% reduction in gag, 21% reduction in red grouper, 230 day season)**

Alternative 5. Establish:

- **aggregate grouper bag limit of 3 fish per person per day**
- **no species-specific grouper bag limit**
- **gag recreational minimum size limit remains 22-inch TL**
- **red grouper recreational minimum size limit remains 20-inch TL**
- **January 1 through May 21 closed season on shallow-water grouper (45% reduction in gag, 5% reduction in red grouper, 224 day season)**

Alternative 6. Establish:

- **a gag bag limit of 1 fish per person per day within the aggregate bag limit**
- **no red grouper bag limit (catch up to the aggregate)**
- **aggregate grouper bag limit of 3 fish per person per day**
- **gag recreational minimum size limit is reduced to 20-inch TL**
- **red grouper recreational minimum size limit remains 20-inch TL**
- **December 1 through April 30 closed season on shallow water grouper (46 percent reduction in gag, 1 percent increase in red grouper, 214 day season)**

Preferred **Alternative 7. Establish a gag bag limit of 2 fish per person per day within the aggregate bag limit, a red grouper bag limit of 2 fish per person per day within the aggregate bag limit, an aggregate grouper bag limit of four fish per person per day, and a shallow-water grouper closed season from:**

Option a. **February 15-March 31 (320 day season, reduces gag 23%, increases red 19%)**

Option b. **June 1-July 31 (304 day season, reduces gag 26%, reduces red 6%)**

Option c. **September 15-November 25 (303 day season, reduces gag 25%, increases red 14%)**

Option d. **November 1-December 31 (304 day season, reduces gag 26%, increases red 19%)**

Preferred **Option e.** **February 1-March 31 closure (306 day season, reduces gag 26%, increases red 17%)**

Table 2.9.13. Summary of Action 9 Recreational Management Alternatives 1-6 and Preferred Alternative 7(e).

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Pref. Alt 7(e)
Red Grouper size limit	20”	20”	20”	20”	20”	20”	20”
Gag size limit	22”	22”	22”	22”	22”	20”	22"
Aggregate bag limit	5	3	3	3	3	3	4
Red Grouper bag limit	1	Up to agg.	2	Up to agg.	Up to agg.	Up to agg.	2
Gag bag limit	Up to agg.	1	1	2	Up to agg.	1	2
Closed season*	Feb. 15 – Mar. 15	Jan. 15 – Apr. 15	Feb. 1 – Apr. 30	Jan. 1 – 15-May	Jan. 1 – 21-May	Dec. 1 – Apr. 30	Feb 1 – Mar 31
Season length	336 days	274 days	276 days	230 days	224 days	214 days	306 days
Gag % change	0%	-45%	-46%	-45%	-45%	-46%	-26%
Red Grouper % change	0%	14%	8%	-21%	-5%	1%	17%
Rank by season length	1	4	3	5	6	7	2
Rank by % change in RG	5	2	3	7	6	4	1

* Under Alternative 1, closed season applies to gag, black grouper and red grouper. Under the other alternatives, closed season applies to all shallow-water grouper.

Discussion: Gag and red grouper were assessed through the Southeast Data, Assessment, and Review (SEDAR) process in 2006 and 2007. The SEDAR 12 panel concluded red grouper was not undergoing overfishing and was not overfished in 2005. Fishing mortality in 2005 was 73 percent of F_{MSY} and approximated the level of fishing mortality that produces OY. Spawning stock biomass was estimated to be 1.27 times greater than SSB_{MSY}, and well above the Council's MSST. In contrast, gag was determined to be undergoing overfishing. The Council has not formally adopted a definition for gag MSST, but under any of the definitions proposed in Action 1 gag would not be considered overfished based on the results of the SEDAR 10 stock assessment and 2007 Grouper Review.

Management **Alternatives 1-6** are based on reducing recreational gag harvest to F_{OY}. Reductions in gag harvest are relative to 2004-06 baseline recreational landings and assume Action 5, Alternative 3 is selected as the preferred allocation alternative. If the Council elects to reduce recreational gag harvest to F_{MAX}, then management alternatives summarized in Table 2.9.11 should be considered.

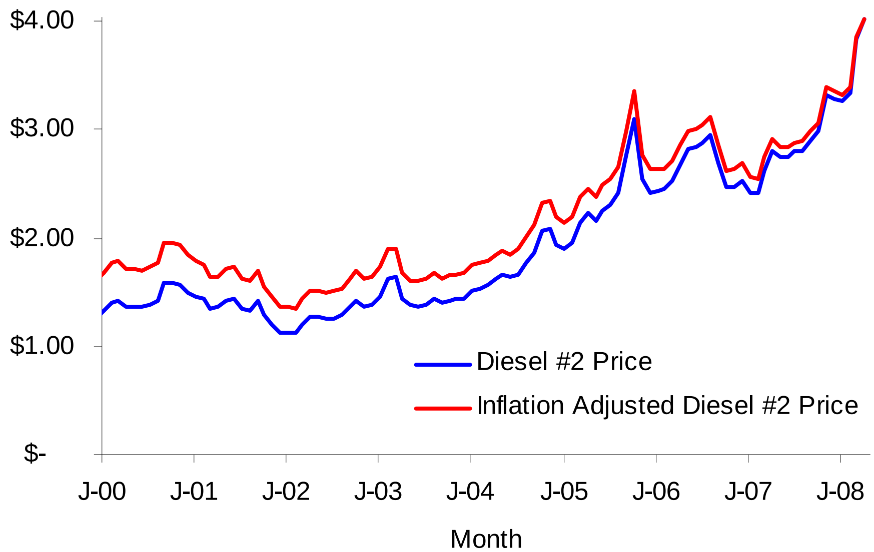
A minimum landings reduction of 25 percent (based on 2004-2006 baseline) is necessary to end overfishing of gag based on the 2004-2006 baseline. This reduction would reduce F to F_{MAX} and have a 50 percent probability of ending overfishing. A 41 percent reduction is necessary to achieve the yield at F_{OY}. This reduction would have a higher probability of ending gag overfishing than reducing landings to the yield associated with F_{MAX}. A 22 percent reduction in landings is necessary to achieve the yield at F_{OY} if landings during 2005-07 are used as a baseline for computing harvest reductions instead of 2004-06 landings. Regardless of the baseline used, approximately the same level of reduction in recreational gag harvest would be achieved (22-25 percent).

Alternatives 1-6 all reduce landings by 45 percent or more relative to 2004-2006 average landings. This reduction would reduce F to F_{OY} and would have a much greater than 50 percent chance of ending overfishing. This reduction assumes the allocation of gag between sectors is equivalent to average landings by sector during 1986-2005 (Table 2.9.1). If the Council selects a different preferred allocation, then the reduction and associated recreational management measures for this action would also change.

Preferred Alternative 7 includes 5 suboptions, which reduce gag harvest by 23 to 26 percent. These suboptions would also change red grouper harvest by -6 to 19 percent. **Preferred Alternative 7** provides the minimum reduction necessary to end overfishing of gag using the 2004-06 baseline and relies on reductions in effort to achieve optimal landings levels. The Council discussed shifting the 2004-06 baseline forward during their June 2008 meeting, but no formal motion or consensus was reached by the Council to use the 2005-07 baseline. The advantage of using the 2005-07 baseline is that it reflects the most recent trends in fishery landings. Under this baseline, a 22 percent reduction in harvest would be necessary to achieve the yield at Foy. However, this new baseline could potentially underestimate the reductions in harvest necessary if reductions in landings in recent years have been primarily the result of declines in stock biomass, rather than reductions in fishing effort. Regardless of the baseline chosen, **Preferred Alternative 7** would achieve at least the minimum reduction necessary to end overfishing.

In 2007, offshore fishing effort in the EEZ off West Florida had declined by 12 percent relative to the 2004-06 baseline and 25 percent relative to the 2004 West Florida EEZ effort level. Additionally, since August 2004, the price of #2 diesel fuel in the Southeast U.S. has doubled and since October-November 2007, the price of #2 diesel fuel has increased by more than 25 percent (Figure 2.9.3). The Council expects these large increases in fuel prices during 2004-2008, coupled with a weak U.S. economy in 2007/2008, to reduce fishing effort in the Gulf of Mexico EEZ over the short term. If effort increases in the future or remains higher than necessary to constrain recreational gag landings, then the Council's goal of managing gag harvest to achieve optimum yield may not be met. The Council will need to review annual landings in the future to determine if annual catch targets (= yield at Foy) are being achieved. Annual catch limits and accountability measures proposed in Action 6 are intended to reduce the likelihood that overfishing occurs if proposed gag harvest reductions are not sufficient or fishing effort is higher than expected in the future. If the gag recreational annual catch limit is exceeded, then accountability measures would be triggered that would shorten the recreational fishing season and prevent the recreational catch level from increasing in the year following an ACL overage.

Figure 2.9.3. Monthly diesel #2 prices for the Southeastern United States (January 2000- April 2008) adjusted and unadjusted for inflation.



Under the Action 4 Preferred Alternative red grouper TAC of 7.57 mp gutted weight, and the Action 5 Preferred Alternative red grouper allocation of 24 percent recreational and 76 percent commercial, the new recreational allocation will be 1.82 mp and the commercial red grouper quota will be 5.75 mp. Recreational landings of red grouper during 2001-05 averaged 1.77 mp per year, while commercial landings averaged 5.59 mp per year. (Table 2.5.2). Thus, the new TAC and allocation represents a 3 percent increase in actual landings allowed for both sectors. However, the Preferred Alternative for recreational management measures in Action 9 is projected to increase recreational red grouper harvest by 17 percent, exceeding the allowed increase. Increases in recreational red grouper harvest are based on estimated changes in harvest relative to existing regulations (1 fish bag limit, zero captain and crew bag limit, and February 15 to March 15 closed season). As mentioned previously, it is difficult to determine a baseline for increasing red grouper harvest. Because F in 2005 was at the target level, any increases in recreational red grouper harvest must not increase recreational F beyond the 2005 level, or must be offset by other management measures (e.g., shifts in allocation, elimination of commercial fish traps, etc.). If recreational harvest exceeds the target level, and furthermore exceeds the ACL specified in Action 6, mandatory action will be taken by the AA in the following season in the form of a shortened fishing season to constrain the sector to its allocation.

Landings data for 2001-05 indicate the recreational fishery accounted for 24 percent of the total red grouper landings or 1.77 mp gw. This landings amount is only 0.05 mp gw less than the preferred landings amount allowed by preferred alternatives in Actions 4 and 5. Therefore, any shift in allocation will likely approximate this time series of recreational:commercial landings; therefore, providing no change in F. If landings and recreational F have been reduced in more recent years (2006, 2007) due to implementation of more restrictive recreational management measures (i.e., one fish bag limit, one month closure), then lessoning restrictions may allow increases in red grouper harvest to occur. The extent of such an increase depends on several factors, including the actual reduction in landings resulting from actions implemented in 2005 and 2006 and the magnitude of future recruitment.

In February 2007, fish traps were prohibited in the Gulf of Mexico, thereby reducing F by this sector. During 2005, when F was estimated to be just below F_{OY}, fish traps accounted for 10 percent of the fishery wide F and total landings. Although some effort shifting to other commercial gear types has occurred, elimination of the trap fishery provides some flexibility for managers to increase harvest in the recreational fishery. This would occur if a portion of the F and landings previously associated with commercial traps is shifted to the recreational sector (Table 2.9.14). Any increase in allowable recreational F, however, would have to be offset by a corresponding decrease in commercial F (accomplished through lower quotas). It would also need to be consistent with current or future allocation levels between the commercial and recreational fisheries.

Table 2.9.14. Summary of 2005 red grouper landings and fishing mortality by mode. Fishing mortality in 2005 was just below F_{OY}.

	Fishing Mode			
Variable	**Comm LL**	**Comm HL**	**Comm Trap**	**Rec**
Landings	3,304,300	1,495,960	610,334	1,630,140
% Landings	47%	21%	9%	23%
F	0.090	0.025	0.016	0.025
% F	58%	16%	10%	16%

Alternatives 1-7 provides a wide range of potential increases or decreases in recreational red grouper harvest (-6 to +19 percent). Any increases in harvest would allow more yield to be landed by recreational anglers but would increase the potential for overfishing to occur. Decreases in harvest would increase the probability that F is equal to or below F_{OY} and overfishing does not occur, but may prevent anglers from harvesting OY (at least with respect to the recreational allocation of TAC).

All of the alternatives include a recreational closure for shallow-water grouper. Currently, the closure only applies to gag, black, and red grouper. The Council proposed expanding the seasonal closure to apply to all SWG in order to reduce bycatch since SWG are generally caught in the same geographic areas, depth, and habitat. Although regional differences in the distribution of gag, red grouper, and other SWG exist, there is still considerable overlap of these species. For this reason, seasonal closures that pertain to the entire recreational SWG fishery are proposed to minimize bycatch and prevent effort shifting. Otherwise, fishermen may target a particular SWG species if the season remains open for that species, but discard species that are closed to harvest. Shallow-water grouper, other than gag and red grouper, represent a very small portion (5 percent during 2004-06) of the overall recreational grouper landings. If the current closure is extended, then any increase in red grouper harvest associated with increasing or eliminating the red grouper bag limit will be partially or entirely offset by reductions resulting from the closure. For some alternatives considered in Action 9, this may result in decreases in red grouper harvest, which may affect the recreational fishery's ability to achieve their allocated TAC.

All of the alternatives include a three or four fish aggregate bag limit. Gag, red grouper, other SWG, and DWG account for 54, 33, 5, and 8 percent, respectively, of the annual recreational harvest reported to MRFSS during 2004-06. Lowering the aggregate grouper bag limit is intended to slow or prevent a shift in effort from gag to other SWG and DWG as a result of actions to constrain the harvest of gag. Although DWG and SWG other than gag and red grouper represent a small portion of the recreational harvest, they could be significantly affected by shifts in fishing effort resulting from changes to gag and red grouper regulations. During the October 2007 meeting, the Council voted to not consider any aggregate bag limits above three fish. However, in June 2008, the Council added **Alternative 7** to Action 9, which includes a four fish aggregate bag limit. Few recreational anglers (~5 percent) currently land on average more than three grouper per trip. Reducing the aggregate to three or four fish will slightly reduce the likelihood that AMs proposed in Action 6 will be triggered. Anecdotal information also suggests that some fishermen believe the existing aggregate bag limit is too high.

The following discussion summarizes the impacts to the physical, biological, social, economic, and administrative environments associated with each of the Action 9 alternatives. For a more detailed discussion of the environmental consequences associated with this action see Section 5.9.

None of the alternatives are expected to significantly impact the physical environment. Vertical line gear accounts for nearly all of the recreational grouper landings. Vertical-line gear has the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001). It can also entangle marine life if lost (Hamilton 2000; Barnette, 2001). Any benefits to the physical environment resulting from the proposed alternatives will be from reduced recreational fishing effort and less fishing gear interactions with the sea floor. Alternatives that close the fishery the longest (i.e., **Alternative 6**) are expected to benefit the physical environment the most, because effort during the closed season would be reduced more than reductions resulting from a lower size limit or lower bag limits. Additionally, few other species are available to target during the proposed closed seasons. Decreasing the gag bag limit and aggregate bag limit may benefit the physical environment if anglers stop fishing once the bag limit is met. However, because the red grouper bag limit may be increased or eliminated and few trips harvest more than three aggregate grouper per trip, effort is not likely to be greatly changed. Overall, all of the alternatives in this action are expected to provide small, unquantifiable benefits to the physical environment. Benefits to the physical environment would be greatest for **Alternative 6** (shortest fishing season), followed by Alternatives **5**, **4**, **2**, **3**, **7**, and **1** (longest fishing season), respectively.

Effects on the biological environment vary based on the combination of bag limits, size limits, and closed seasons proposed. **Alternative 1** would maintain status quo recreational regulations, allowing overfishing of gag to continue. If fishing mortality is not reduced, population abundance is estimated to decline and there would be less fish for anglers to catch and land. This may result in effort and fishing mortality shifting to other SWG and DWG species, thereby negatively affecting those species and fisheries. Overfishing will also reduce the size and age distribution of the gag population. In comparison, maintaining red grouper regulations would potentially result in forgone recreational yield, because current regulations may prevent anglers from harvesting the TAC necessary to achieve OY. This would provide a net biological benefit to the stock (more fish survive) and reduce the likelihood of overfishing, but recreational red grouper anglers would experience both social and economic losses.

Alternatives 2-4, 6, and **7** all modify the gag bag limit, eliminate or increase the red grouper bag limit, reduce the aggregate bag limit to three (**Alternatives 2-4, 6**) or four fish (**Alternative 7** only), and extend the length of the recreational closed season. **Alternative 6** would decrease the recreational minimum size limit for gag from 22 to 20 inches TL. Decreasing the recreational minimum size limit would reduce dead discards of gag, but would increase gag catch rates, especially in sectors that currently harvest less than the proposed gag bag limits. **Alternatives 2-6** are all estimated to reduce gag harvest by 45 percent or more, while **Alternative 7** would reduce gag harvest by 26 percent. The 45 percent reduction would be sufficient to not only end overfishing, but reduce harvest to the Council's target fishing mortality level of F_{OY} (only a 41 percent reduction is needed). This reduction would not take into account reductions in harvest or fishing effort that have occurred in recent years, thereby increasing the probability that overfishing of gag is ended. The reduction in fishing mortality would allow SSB to gradually increase over time from 22 mp in 2006 to 33 mp in 2018. Reducing fishing mortality would allow more gag to survive to older ages and larger sizes. The 26 percent reduction in harvest proposed in **Alternative 7** would be sufficient to end overfishing of gag immediately, but may or may not allow the Council to achieve its goal of reducing fishing mortality to F_{OY}. **Alternative 7** presumes reductions in high fuel prices and a weak economy will reduce effort at least in the short term and result in some reductions in harvest and fishing mortality. The extent of these reductions is contingent on how high fuel prices are and how long the weak U.S. economy will persist into the future. If recreational management measures are not sufficient to constrain harvest to target catch levels, than ACLs and AMs in Action 6 will be triggered to prevent or minimize the risk of overfishing. The 26 percent reduction in fishing mortality would allow SSB to gradually increase over time from 22 mp in 2006 to 27 mp in 2018. Changes in SSB may be greater or less than these amounts depending on future levels of recruitment and whether or not greater reductions in harvest are achieved through fall offs in fishing effort.

The proposed seasonal closures in **Alternatives 2-6, 7(a),** and **Preferred Alternative 7(e)** would include important spawning seasons for both gag and red grouper, as well as other shallow-water groupers. Gag spawn in the Gulf of Mexico from mid-January until mid-April, with a peak in spawning during March (SEDAR 10 2006). Red grouper spawn from February until mid-July, with peak spawning occurring in March, April and May (Fitzhugh et al. 2006). The closure would protect both red grouper and gag during spawning, as well as other shallow water groupers. Prohibiting fishing during the spawning season would allow more fish to successfully spawn and reproduce before being harvested. The longer the closure, the greater the protection afforded to grouper during spawning.

Because gag are part of a multispecies fishery, prohibiting the landing of all shallow-water grouper will reduce discard mortality during the closed months and prevent effort from shifting to other grouper species. The shallow-water grouper fishery includes eight species of grouper: gag, red grouper, black grouper, scamp, yellowmouth grouper, yellowfin grouper, red hind, and rock hind. Gag, red grouper, and black grouper are the most commonly targeted species in the shallow-water grouper unit, representing greater than 95 percent of the overall shallow-water grouper landings.

Alternatives 7(b), **7(c)**, and **7(d)** propose SWG closed seasons during summer or fall. The existing February 15 to March 15 closure for gag, red grouper, and black grouper would be replaced by either a June 1-July 31 closure, a September 15-November 15 closure, or a November 1-December 31 closure. Each of the closures would result in a 26 percent reduction in gag harvest. **Alternative 7(b)** would result in a decrease in red grouper harvest because summer is the peak fishing season for red grouper. **Alternatives 7(c)** and **7(d)** would increase red grouper harvest by 14 and 19 percent, respectively. None of the closures would provide protection to gag or red grouper during their spawning season. Black grouper spawning in south Florida peaks during December through March, so **Alternative 7(d)** would provide some protection of black grouper during their spawning season. There would be some regional differences in the impacts of these closures (see Figures 2.9.1 and 2.9.2). Landings of red grouper are highest during the summer in both the Florida Panhandle and along the West Florida Peninsula. More anglers would be affected by a summer SWG closure than a fall or winter closure. For gag, a summer closure would have greater impacts on fishermen in the Panhandle, while a winter or spring closure would have greater impacts on fishermen along the West Florida Peninsula.

Alternatives 2, 3, and **6** all propose a one gag bag limit. **Alternatives 4** and **7** propose a 2-gag bag limit and **Alternative 5** would not specify a gag bag limit. **Alternatives 2**, **4**, **5,** and **6** propose eliminating the red grouper bag limit (i.e., setting it equal to the aggregate bag limit), while **Alternatives 3** and **7** propose doubling the red grouper bag limit to two fish. All the alternatives propose reducing the aggregate bag limit for grouper from five to three or four fish. It is estimated a one-fish gag bag limit would reduce harvest by 26.3 percent. This bag limit would affect 14-17 percent of fishing trips, which reported landing on average greater than one gag per angler per trip (SERO 2007). The two gag bag limit (**Alternative 4**) would allow recreational anglers to retain on average more fish per trip, but would require a longer closed season to achieve the necessary reductions in harvest. Approximately 2-4 percent of trips that caught gag during 2003-05 landed on average more than 2 gag per angler (SERO 2007). A two-gag bag limit is estimated to reduce harvest by approximately 10 percent. Maintaining the 5-fish aggregate bag limit would have no effect on the biological environment relative to status quo, since this bag limit is currently in effect. Lowering the aggregate bag limit to 3 or 4-fish would constrain shallow water grouper fishing mortality more than a 5-fish aggregate bag limit, especially for those species without a species specific bag limit (i.e., black grouper, scamp, yellowfin grouper, rock hind, red hind, yellowmouth grouper, deep water groupers, and possibly red grouper). A 3-grouper aggregate bag limit is estimated to affect 4-7 percent of trips, while a 4-grouper aggregate bag limit is estimated to affect 2-4 percent of trips (SERO 2007).

Eliminating the red grouper bag limit will reduce bycatch for those trips that discard red grouper after the bag limit is met. Similarly, gag discards are expected to increase if anglers continue fishing after the gag or aggregate bag limits are met. Extending the closed season may also negatively affect bycatch if trips continue targeting other reef fishes co-occurring in similar areas as shallow-water grouper. Collectively, the measures proposed in **Alternative 2-5** are estimated to increase gag dead discards (relative to status quo) by as much as 9-10 percent, while **Alternative 6** is estimated to decrease gag discards by 4 percent, and **Alternatives 7(a-e)** are estimated to increase dead discards by 5-6 percent. **Alternatives 2-4** are estimated to decrease red grouper dead discards by as much as 3 percent (**Alternative 2**) or increase them by as much as 2 percent (**Alternative 4**). **Alternatives 5-7** are estimated to decrease red grouper dead discards by a minimum of 3-5 percent. Changes in gag and red grouper dead discards could be greater or less than presented above and are highly contingent on how angler behavior changes in response to regulations.

Alternative 6 proposes decreasing the gag minimum size limit by 2-inches TL. Ortiz (2007) estimated a 20-inch TL gag minimum size limit fishery wide would reduce gag dead discards per recruit landed by more than 50 percent. The 2-inch size limit decrease would also increase yield per recruit by 6 percent (from 2.80 to 2.97 pounds/recruit), while the gag spawning potential ratio would decrease by 2.6 percent (from 35.8 to 33.2 percent SPR; Ortiz 2007).

Overall, **Alternative 4** provides the greatest overall benefits to the biological environment, while **Alternative 1** would provide the least benefits to the biological environment. **Alternative 4** would end gag overfishing and further constrain red grouper harvest. The reduction in red grouper landings, however, may result in forgone yield and negative effects to the social and economic environments. **Alternative 5** would provide the second greatest benefits to the biological environment, followed in order from greatest to least benefits to the biological environment by **Alternative 6**, **Alternative 3**, **Alternative 2, and Alternatives 7(a-e)**.

Alternatives 1-7 are not expected to significantly affect the administrative environment. Size limits, bag limits, and closed seasons are currently used to manage the harvest of many recreational fish species and therefore changes to these regulations would not represent a significant burden on enforcement. Some of the proposed measures (closed seasons, lower bag limits) could make it easier and faster to determine compliance with regulations (less fish to count and measure; either you possess fish during the closure or you do not). However, more restrictive management measures could increase the rate of non-compliance, therefore resulting in an increased burden on enforcement. Also, if Gulf States elect to not comply with the proposed regulations then non-compliance could complicate enforcement and reduce the likelihood that necessary reductions in fishing mortality are achieved for gag.

In addition to the status quo, gag and red grouper recreational management measures under this action consider several adjustments to gag and red minimum size limits, species-specific and aggregate bag limit changes, season length and format modifications. Anticipated decreases in gag landings vary from 46 to 23 percent. For red grouper, fluctuations in landings range from a 19 percent increase to a 21 percent reduction. In selecting **Alternative 7 – option e** as the preferred alternative for this action, the Council considered several factors such as required reductions in gag harvest levels and associated socio-economic effects on the recreational sector, possible increases in red grouper harvests, expected recreational season length, and, the length and timing of the recreational shallow water grouper closure. **Preferred Alternative 7 – option e** would reduce gag landings by 26 percent and increase red grouper landings by 17 percent, yielding a 306 day recreational season. Within the 4 fish per person per day aggregate grouper limit, **Preferred Alternative 7 – option e** would implement a gag bag limit of 2 fish per person per day and a red grouper bag limit of 2 fish per person per day. **Preferred Alternative 7-option e,** which is expected to result in a $1.80 million decrease in short term economic value, would also establish a February 1 through March 31 closed season for shallow-water grouper.

In the short term **Alternative 1** would not have any impacts on the recreational fishermen who target gag and red grouper because it would not change the rules they are currently under. For **Alternatives 2-7**, there will be some recreational fishermen who support one alternative over another, depending on how often they fish, the season they fish, and what they target. During the closed season there may not be many other reef fish species to fish for. If recreational fishermen choose not to fish during the closed season there could be a negative impact on the businesses such as charter boats, bait and tackle shops, marinas, hotels, and other businesses that cater to recreational fishermen because they would not have as much business from recreational fishermen as they may if the season for gag, black, and red grouper were not closed.

During the June 2008 Council meeting, the Council requested NOAA Fisheries Service prepare an interim rule for 2009 to address gag overfishing. The Council requested the interim rule be based on the preferred management measures that address gag grouper contained in this Amendment. Section 305(c) of the MSFCMA provides NOAA Fisheries Service authority to implement interim regulations to address overfishing. Gag was declared undergoing overfishing in October 2006. Other stocks within the shallow-water grouper fishery are either not undergoing overfishing or there status is unknown; therefore, the interim rule is only intended to pertain to gag grouper. Recreational management measures included in the interim rule would be similar to those described above for **Preferred Alternative 7(e)**. A two fish gag bag limit and a seasonal closure from February 1 to March 31 would be implemented under the interim rule. The seasonal closure would only pertain to gag from February 1-14 and March 15-31. From February 15-March 14, the existing recreational seasonal closure for red grouper, black grouper, and gag would remain in place. The interim rule would also not include measures for adjusting the red grouper bag limit or the aggregate bag limit.

Benefits and impacts to the physical, biological, economic, and administrative environments resulting from interim regulations would be similar to those described above for **Preferred Alternative 7(e)**. Interim recreational management measures for 2009 would assist the Council and NOAA Fisheries Service in addressing overfishing of gag. The recreational gag bag limit and two month seasonal closure are estimated to reduce gag harvest by approximately 26 percent. However, because interim regulations would only pertain to gag for approximately half of the seasonal closure, bycatch of gag may be higher if fishermen choose to fish for red grouper, black grouper, or other shallow water grouper during early February or late March when gag is closed. The effects of not increasing the red grouper bag limit, or decreasing the aggregate bag limit would be the same as **Alternative 1** (no action).

2.10 Action 10. Alternatives to Reduce Discard Mortality of Grouper

National Standard 9 requires management measures minimize bycatch to the extent practicable, and if bycatch cannot be avoided, minimize the mortality of such bycatch. Grouper may be released after being caught because they are below the minimum legal size or because the fisherman has reached his bag or trip limit for a species. Mortality of released grouper depends on several factors such as hooking impacts, surface interval, handling, and capture depth. Groupers have slow growth and a long life span rendering their populations more susceptible to the effects of discard mortality.

The most recent stock assessment (SEDAR 10 2006) determined the distribution of depth at capture of gag for both the commercial and recreational sectors. For the commercial sector, size distribution data collected on gag by the Trip Interview Program were combined with catch-at-depth information to estimate dead discards by depth. For the recreational sector, average depths at capture for both state and federal waters were estimated by geographic region. Discard estimates from recreational survey data and the release mortality rate for average depths within each area and region were then used to estimate recreational dead discards. As a result, the gag stock assessment adopted variable release mortalities with depth and a depth distribution of capture for each sector. The release mortalities ranged from 6 percent near the surface to 95 percent for gag caught at depths of 312 feet (52 fathoms) or deeper. The depth of 50 percent mortality was 150 feet (25 fathoms) (Ortiz 2006).

The depth data are less complete for red grouper, so the SEDAR 12 (2007) stock assessment did not partition release mortality by depth for this species. Commercial discards were assumed to be zero before size limits were established in 1990. During 1990-2005, annual commercial dead discards averaged 705,779 pounds per year, approximately 11.9 percent of the total catch. The discard rate was higher for the longline fishery than for the hook-and-line or trap fisheries (no longer allowed in the Gulf). Recreational dead discards averaged 263,186 pounds during this same time period, approximately 14.2 percent of the total catch. The amount of dead discards is dependent on mortality after release and release rate. Discard mortality is hard to quantify, but is assumed to be higher for longlines than for other types of gear because longlines generally fish at a greater depth and fish remain hooked for a longer time. The stock assessment established a mortality rate of 45 percent for longlines and 10 percent for all other gear (SEDAR 12 2007). Because the recreational sector catches more small fish, discard rates are higher than for the commercial sector. Overall, the commercial sector has a lower discard rate but higher mortality, while the recreational sector has a higher discard rate but lower mortality. The result is a similar proportion of dead discards in each sector (see Section 5.5.2).

Dead discards are based on estimated mortality rates before passage of Amendment 27 to the Reef Fish FMP. Effective June 1, 2008, Amendment 27 requires the use of non-stainless steel circle hooks when using natural baits, and the use of venting tools and dehooking devices when harvesting and releasing reef fish in the recreational and commercial reef fish fisheries. Based on published studies to-date, the effects of the new regulations may differ among grouper species. Additionally, it is unclear what proportion of fishermen already uses this gear.

Alternative 1: No action. Do not require any new equipment or implement any new regulations to reduce bycatch, and retain the current commercial minimum size limits of 24 inches for gag and black grouper, 20 inches for red and yellowfin grouper, and 16 inches for scamp.

Alternative 2: Require pamphlets or prominently displayed placards that provide instructions on venting and proper handling and release methods on board reef fish fishing vessels.

Preferred Alternative 3: Reduce the minimum size limit for commercial shallow water grouper species that currently have a size limit to:

> **Option a: 18-inches TL for black, gag, red, and yellowfin grouper (scamp remains at 16 inches)**
> **Option b: 16-inches TL for black, gag, red, yellowfin and scamp**
> **Option c: 14-inches TL for black, gag, red, yellowfin and scamp**
> **Option d: no minimum size limit on any shallow-water grouper species**
> **Preferred Option e: 18-inches TL for red grouper only**
>
> **This lower minimum size limit would apply to the:**
>> **Preferred Suboption i: Shallow-water grouper commercial fishery**
>> **Suboption ii: Shallow-water grouper commercial longline fishery (Note: Existing size limits would continue to apply to other gear)**

Discussion: **Alternative 1**, No Action, does not impose any new measures to reduce discards or discard mortality. Amendment 27 will require the use of circle hooks, venting tools, and dehooking devices when harvesting and releasing reef fish in the recreational and commercial reef fish fisheries. These measures are intended to reduce mortality of released fish. On June 1, circle hooks, venting tools, and dehooking devices become mandatory in the grouper fisheries along with all other reef fish fisheries.

The status quo minimum size limits will not reduce bycatch in the directed fishery and could result in forgone yield. However, lower minimum size limits may reduce spawning potential because smaller, less productive fish would be harvested. Current commercial size limits for gag and red grouper are above the size at 50 percent maturity (Collins et al. 2002; SEDAR 10 2006).

Alternative 2 is purely educational in nature. Many fishermen, even if their intent is to improve the survival of released fish, do not know or use proper venting and handling techniques. For example, many fishermen improperly attempt to vent a fish by puncturing the inverted stomach which sometimes protrudes from a fish raised from deep waters. This action not only fails to relieve pressure in the body cavity, but introduces a new injury to the fish. By requiring pamphlets or placards on board that provide instructions on venting and proper handling and release methods, fishermen may become better informed about the procedures and correctly apply those procedures. However, fishermen are not required to read or abide by the instructions.

Commercial bycatch logbook records indicate greater than 99 percent of all commercially caught red grouper and gag that are discarded, are discarded due to regulations. **Preferred Alternative 3** would reduce or eliminate the commercial minimum size limit for all shallow-water grouper or just red grouper, either of which should decrease the number of discarded fish. However, more small fish would be removed that could no longer contribute to the reproductive output of the population or grow to be larger fish. This trade-off between bycatch reduction and spawning potential reduction must be balanced when determining the optimal minimum size limit (see Section 5.10.2). Reductions in spawning potential may be partially or fully offset by quota closure measures proposed in Action 8, especially if a gag quota triggers closure of the entire commercial shallow-water grouper fishery. Net benefits would result to the stock if lower size limits result in less fish being killed than under current size limits.

Most data on discard rates, release mortality, and increases in yield pertain to gag and red grouper. Recent stock assessments (SEDAR 10 2006, SEDAR 12 2007) indicate the majority of commercially discarded red and gag grouper are below the current minimum size limit. Reef fish observer data collected during 2006 and 2007 indicate reducing the minimum size limit to 18-inches TL would reduce red grouper discards by 34-38 percent and gag discards by 91-100 percent, reducing the minimum size limit to 16-inches TL would reduce red grouper discards by 77 percent and gag discards by 98-100 percent, and eliminating size limits would eliminate nearly all open-season commercial discards. A size limit change to the commercial sector would have a greater effect than a change to the recreational sector because most commercially landed grouper are red grouper, and the commercial sector experiences higher release mortality of red grouper than the recreational sector. In particular, longline fishing accounts for 61 percent of the shallow water grouper commercial landings and has an estimated 45 percent release mortality, so reducing the size limit for the longline portion of the commercial sector should result in the greatest reduction in dead discards. For the same reasons, reducing the size limit for red grouper would result in a greater reduction in dead discards than other species.

The alternatives in this action would not have any direct effect on the physical environment. Indirect effects on the physical environment could occur if fishing effort changes because the minimum size limit changes (**Preferred Alternative 3**). For example, if lower minimum size limits result in quotas being met faster or fishermen harvesting grouper in different areas, then habitat-gear interactions may increase or decrease.

Proper handling and release of discarded fish would have a direct effect on the biological environment. The decrease in stress and injuries would increase survival rates for fish released after capture. The correct use of venting tools and dehooking devices (**Alternative 2**), could contribute to increased survival of groupers (see Section 5.10.2).

Lower size limits (**Preferred Alternative 3**) 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 if the model regulated harvest with a quota, with SPR reductions less than those estimated by these analyses. It is unknown how lower minimum size limits would affect YPR and SPR of scamp, black grouper, and yellowmouth grouper.

Preferred Alternative 3, Suboption i would lower minimum size limits for all sectors of the commercial shallow-water grouper fishery. **Alternative 3, Suboption ii** addresses only the longline sector, which accounts for the greatest portion of commercial dead discards. **Alternatives 2 and 3** are not mutually exclusive, and each could contribute to minimizing bycatch (National Standard 9).

Alternative 1 would not require any new administrative action. **Alternative 2** would require creating, producing, and distributing informational materials. Because minimum size limits are already in place for gag, black, red, scamp, and yellowfin grouper, no new administrative action would be needed for **Preferred Alternative 3**. **Alternative 2** would require increased law enforcement and **Alternative 3, Option d** would result in decreased law enforcement. The alternatives in order of lowest to highest impact on the administrative environment would be **Alternative 3, Option d; Alternative 3, Options b-c; Alternative 3, Option e; Alternative 1; Alternative 3, Option a**; and **Alternative 2**.

The Council chose **Alternative 3, Option e, Suboption i** as their preferred alternative because red grouper experience the highest discard mortality and a reduction in the minimum size for this species would have the greatest positive impact. They felt that reducing the minimum size for other species would result in filling the quota earlier, especially for gag. Because other actions in this amendment may impose restrictions on gag, Council members thought that the minimum size limit should stay in place until they see how the stock responds. Further, the preferred option would set the minimum size limit for red grouper above the size of sexual maturity; all other options would reduce the minimum size limit to below the size of sexual maturity for black grouper, gag, and yellowfin grouper. The Council chose to apply the size limit change for red grouper to all types of gear to maintain consistency across the commercial sector. If the size limit changed only for longlines, confusion might result from having different size fish landed at the same dock by different fishermen.

2.11 Action 11. Creation of Time/Area Closures

The primary objectives in establishing area fishing restrictions is to 1) protect part of the male gag population in response to a reduction in the male:female gag ratio over time and 2) to protect spawning aggregations of reef fish, primarily gag.

Under 50 CFR 303(b)(2)(C), the Magnuson-Stevens Act requires that when a fishery management plan designates zones where all fishing is prohibited or restricted to types of vessels of fishing gear, the following provisions apply:

(i) is based on the best scientific information available;
(ii) includes criteria to assess the conservation benefit of the closed area;
(iii) establishes a timetable for review of the closed area's performance that is consistent with the purposes of the closed area; and
(iv) is based on an assessment of the benefits and impacts of the closure, including its size, in relation to other management measures (either alone or in combination with such measures), including the benefits and impacts of limiting access to: users of the area, overall fishing activity, fishery science, and fishery and marine conservation;

The available scientific information pertinent to the alternatives in this section is summarized below. The conservation benefits of restricted fishing areas created in this FMP are assessed through monitoring of the areas by the SEFSC and by university research institutes, emphasizing, available habitat and any observed changes in species abundance diversity, or average size. Such monitoring occurs on an ongoing basis with periodic presentations to the

Council by the principle investigators. The goals and expected impacts of these area restrictions are clearly stated, i.e., protections of spawning aggregations of gag, protection of spawning habitat, and protection of a portion of the offshore male population of gag. In addition, incidental benefits are expected to accrue to other reef fish that occupy the same habitat.

Gag Sex Ratio

Summary of previous information

Gag, like many of the groupers, are protogynous hermaphrodites, i.e., they begin their adult life as females and later transition to males. Since males constitute the older age classes in a population, male gag may be particularly susceptible to declines due to juvenescence in a heavily exploited population. In addition, gag are haremic spawners, and it has been suggested that in a spawning aggregation, males are more aggressive than females and hook and line fishing tends to select 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.

The Reef Fish Stock Assessment Panel (RFSAP) (1999b) addressed the question of what effect the sex ratio has on stock recruitment produced two schools of thought, explained in detail by Koenig (1999) and Kenchington (1999). If the primary mechanism for sex change is age or size, then it is possible to reduce the male gag population to levels where sperm limitation, or maximum harem size, might be a limiting factor in reproductive success. If sex change is primarily socially induced, then the male population size is less likely to be a limiting factor in the long run, but might be an issue for an individual year since transition will not complete until after that spawning season. In addition, socially induced sex change in a stock where the male population is depleted could result in transition occurring at younger ages, resulting in a loss of egg production in favor of sperm production.

In the late 1970's, males comprised 17% (Hood and Schlieder, 1992) of the commercial harvest of gag in the northeast Gulf of Mexico. By the 1990’s they comprised from 2-10% of the harvest. Coleman et al. (1996) found only 2% males in the northeastern Gulf handline commercial catch, while a NMFS analyses of samples comprised of 40% handline and 60% longline caught gag from the southeastern Gulf contained 10% males (June 8, 1998 memo from Fitzhugh, Collins, and White).

A similar trend was reported in the South Atlantic, where McGovern et al. (1998) found the percentage of males falling from nearly 20% in 1978-82 to 5.5% in 1995. By contrast, gag examined from the Campeche Bank, Yucatan, Mexico during 1996-2001, were found to have a population of 23% males (Brule et al. 2003).

In its report on the 1998 gag stock assessment, the RFSAP stated that this sex ratio reduction may have a potentially negative consequence on population reproductive potential, especially if the proportion of males has been reduced to the point that females in the population are unable to find a mate. The RFSAP attributed the decline in male:female sex ratio to increased fishing mortality, especially fishing directly on spawning aggregations (GMFMC 1998).

Traditional fishery management measures were developed for gonochoristic fish, those that do not change sex. For such fish, typical management measures such as minimum size limits provide equal protection to both sexes, or only small differences due to different growth rates between the sexes. However, with gag, such measures may serve to concentrate fishing mortality on the older, i.e. male, portion of the population. Kenchington (2001) wrote that it would be fully possible to manage gag in such a way that egg production (and hence SPR) was very high and yet far too few males survived to fertilize all those eggs, and that the management approaches to be used should be designed to conserve the resource without depleting the males.

Two hypotheses on the triggering mechanism for sex change are that it is growth induced or that it is socially induced. The RFSAP reported (GMFMC 1999b,c) that if the sex change from females to males is related solely to length, then high fishing mortality rates could have caused the classic loss of large, older individuals. Because males tend to be larger and perhaps more aggressive than females, the loss of these individuals could result in a disproportionate loss of males relative to females. In addition, high fishing mortality rates would remove females before they had a chance to transition to females, which could also cause or maintain the disproportionate loss of males.

The alternative hypothesis is that sex change is predominately determined by social cues during the spawning aggregation. Under this hypothesis, disruption of the spawning aggregations, along with high fishing mortality rates of males outside the spawning aggregations, has been the cause of the decline in the males (GMFMC 1999b,c).

While the RFSAP could not reach a conclusion as to which of these hypotheses were accurate, it agreed that fishing on spawning aggregations is very disruptive to reproductive biology of gag, and should be avoided (GMFMC 1999b,c).

Recent Developments

In response to the recommendation of the RFSAP, the Council established the Madison-Swanson and Steamboat Lumps restricted fishing areas in 2000 with a four year sunset provision to evaluate the efficacy of area closures to protect gag spawning aggregations and male gag (GMFMC 1999d). The original fishing restrictions in the areas were to close the areas to all fishing under the Council's jurisdiction year round. In 2004, Amendment 21 extended the areas until June 16, 2010 so that the evaluation could continue for a full ten years. As part of the extension, the fishing restrictions were eased to allow surface trolling fishing methods during May through October with a total closure to all fishing in the remaining months (GMFMC 2003).

During the existence of the Madison-Swanson and Steamboat Lumps restricted fishing areas, research has been ongoing by NMFS and by universities.

The NMFS SEFSC has been conducting an underwater video survey in Madison-Swanson and Steamboat Lumps since 2004 to evaluate the number and distribution of fish in the areas. However, the video data through 2006 does not contain enough observations of gag to provide a statistically significant sample size (personal communication, Alex Chester).

A Florida State University study monitored size and sex data for gag and other species (red snapper, red grouper and scamp) from 15 gag spawning aggregations inside and 15 aggregations outside the Madison Swanson restricted fishing area for three years (2003, 2004, and 2005). For red snapper, red grouper and scamp the results showed significantly larger and older fish within the area relative to outside. However, gag showed no significant difference in age and size inside relative to outside. Gag sex ratio initially showed a significantly higher percentage of males (8%) inside the area at the start of the study, but the proportion of males inside the area declined over the next two years to background levels of about 2% (personal communication, Chris Koenig).

A University of Miami study (Smith and Zurcher 2007) has been conducting an aerial survey since 2005 of fishing activity within and adjacent to the Madison-Swanson and Steamboat Lumps restricted fishing areas, as well as within the 30 to 75 fathom corridor comprising the shelf break in a 20 nm x 160 nm from Sarasota to Panama City (Figure 2.12.2). One objective was to note the level of noncompliance, i.e., fishing within the restricted fishing areas. Data from 2005 show that, during Jan-Apr 2005 (all fishing prohibited in the areas), 1.9% of commercial vessels engaged in fishing activities were observed inside MPAs, whereas 5.3% of recreational vessels engaged in fishing activities were observed in MPAs. The data indicated that 1.7% of commercial vessels and 3.1% of recreational vessels engaged in fishing activities inside MPAs during May-Sep (surface trolling allowed).

Questions to NMFS About Marine Protected Areas

Prior to the October 2007 Council meeting, the Gulf Council posed several questions to NMFS scientists monitoring the Madison-Swanson and Steamboat Lumps restricted fishing areas concerning the effectiveness of seasonal/area restrictions as a fishery management tool. The questions asked, and the responses, are as follows:

1) *How do you define a successful MPA, and what criteria do you use to measure success?*

   A successful MPA is one which achieves its goals. In this case, the goals were "to protect gag spawning aggregations and provide locations to assess the efficacy of restricted fishing areas to protect (spawning) aggregations." (From: Gulf of Mexico Gag Grouper, SEDAR 10, 2006). Using these criteria, the Madison-Swanson MPA has had mixed results. [Note: an additional objective was to evaluate the effectiveness of areal closures.] After several years of increase, gag abundance within Madison-Swanson has declined since 2005. A similar decline from 2004-2006 has also been observed along the west Florida shelf. The two MPAs have not provided consistent protection to gag.

2) *Have you seen any change in the male to female gag ratio, both within the restricted fishing areas and within the general gag population that might be attributable to the restricted areas? How do you attribute the change to any areas outside the restricted fishing area?*

   Our survey uses non-destructive sampling and therefore we do not have reliable estimates of gag sex ratios. Sex determination based upon underwater visual observations are notoriously unreliable and therefore, we cannot address this question. However, it should be noted gag populations are driven by episodically high year classes which can skew sex ratios.

3) *Have you seen any changes in abundance, size or distribution of gag outside the restricted fishing areas that can be attributed to the area restrictions? If so, how is it attributed to the area restrictions and not other regulatory actions that have changed over the past 7 years?*

The index of abundance for gag along the west Florida shelf has decreased since 2004. We have no evidence of a spillover effect. However, the aerial survey of fishing boats shows a concentration of fishing activity just outside the Madison-Swanson border.

4) *Are there any measurable impacts of area restrictions that can be incorporated into stock assessments? If so, how do you measure the impacts?*
5) *Do you feel that area restrictions are an effective way to control fishing mortality on a stock?*
6) *Is there any evidence that restricted fishing areas increase yields? Outside the restricted area and for the total stock?*

These questions are beyond the scope of our research. However, they have been addressed by several authors. See Halpern (2003) for a review. The general consensus is MPAs can be effective management tools provided the protected areas are large enough and enforcement levels prevent significant poaching.

7) *Do you feel that MPAs can have large scale (i.e., stock-wide) benefits, or are the benefits primarily localized to the immediate area in and near the MPA location?*

MPAs can have large scale benefits, particularly for species with strong site fidelity to well defined habitat types. Coupling these characteristics with a hermaphroditic life history which exposes individuals to fishing pressure for several years before sufficient numbers of both sexes are present in the population and preference for depths at which release mortality is very high due to barotraumas adds to the potential benefits of areal closures. There are caveats however, and the strongest one assumes the closed areas are of sufficient size to protect enough individuals to maintain genetic diversity and produce enough propagules to populate the stock's range.

8) *Do you think poaching in Madison-Swanson adversely affected the results and, if so in which years was that a big problem?*

Yes. The aerial survey indicated 2% of commercial fishing vessels and 3%-5% of recreational boats were fishing within MPAs. We have spent >100 days at sea since January 2001 in and near the northeast Gulf of Mexico MPAs. During this time we saw gradual increases in poaching during the first three years then a sharp decline after some high profile enforcement actions. In the last two years, poaching has again been on the increase. During 2007, we witnessed more poaching than in any previous year. It should be pointed out that fishing on a spawning aggregation can quickly remove a large number of gag from the MPAs and as aggressive males are often the first fish caught, even minor levels of poaching, can preclude spawning activity in a large number of grouper. [Note: surface trolling for species other than reef fish is allowed May 1 through October 31.]

In the following alternatives, it is the intent that, if a seasonal area closure is implemented to protect gag spawning aggregations, the commercial February 15 to March 15 closed season on gag, black grouper and red grouper will be repealed.

In the following 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".

Alternative 1. No Action. Do not create any additional time/area closures that prohibit fishing for grouper and other reef fishes.

Preferred **Alternative 2. Establish a new time/area closure within the gag spawning area:**

Option a. Snyder Ridge (appr. 127 sq. nm)
Boundaries: NW = 28º 32'N, 84º 57'W NE = 28º 32'N, 84º 46'W
SW = 28º 19'N, 84º 57'W SE = 28º 19'N, 84º 46'W

Preferred **Option b. The Edges 40 fathom contour area (appr. 390 sq. nm)**
Boundaries: NW = 28º 51'N, 85º 16'W NE = 28º 51'N, 85º 04'W
SW = 28º 14'N, 84º 54'W SE = 28º 14'N, 84º 42'W

Within the time/area closure established by this alternative, fishing regulations will consist of

Option i. In accordance with Madison-Swanson and Steamboat Lumps regulations (50 CFR 622.34(k)) – all fishing prohibited November through April, surface trolling allowed May through October.

Option ii. All fishing prohibited November through April, all fishing allowed May through October.

Preferred **Option iii. All fishing prohibited January through April, all fishing allowed May through December.**

Option iv. All fishing prohibited March through April, all fishing allowed May through February.

Alternative 3. Expand the Madison-Swanson Restricted Fishing Area to the north and west (appr. 70 sq. nm additional) – fishing regulations will be in accordance with existing time/area regulations (50 CFR 622.34(k)) – all fishing prohibited November through April, surface trolling allowed May through October.

Boundaries for additional area:

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

Alternative 4. Expand Madison-Swanson and Steamboat Lumps Restricted Fishing Areas into a network of cross-shelf restricted fishing areas to protect gag and other species from fishing suffered during life-cycle offshore movement.

a. The Madison-Swanson cross-shelf restricted fishing area would be bounded on the west by 85^{o} 50' W. long., on the east by 85^{o}, 38' W. long., to the south by 29^{o} 06' N lat., and to the north by the state-federal jurisdictional boundary (appr. 523 sq. nm additional).

b. The Steamboat Lumps cross-shelf restricted fishing area would be bounded on the north by 28^{o} 14' N. lat., on the south by 28^{o}, 03' N. lat., to the west by 84^{o} 48' W long., and to the east by the state-federal jurisdictional boundary (appr. 1037 sq. nm additional).

The areas proposed as additional time/area closures are illustrated in Figure 2.12.1. A number of potential time/area closure sites have been identified on the Florida West Shelf (Figure 2.12.2), but not all of these areas fall within the dominant area for gag spawning (Figure 2.12.3). Spawning of gag occurs on offshore reefs from southeast of Apalachicola to west of Tampa, and possibly further to the south. (Koenig et al. 1996). Spawning depths range from 27 to 66 fathoms, but are concentrated around 44 fathoms (Koenig at al. 1996). All of the above alternatives, including the existing Madison-Swanson and Steamboat Lumps restricted fishing areas, are located within the dominant spawning grounds for gag (Figure 2.12.3).

Existing restricted fishing areas to protect gag spawning aggregations were established in 1996 at the Madison-Swanson and Steamboat Lumps sites (areas 5 and 9 in Figure 2.12.2). Within the Madison-Swanson and Steamboat Lumps restricted fishing areas the current regulations prohibit all fishing during November through April, which encompasses most of the gag spawning season, and allow only surface trolling during the remainder of the year. Closed areas do not necessarily reduce overall fishing effort, but may redirect the effort into the remaining open areas. In areas of known spawning, they can reduce localized fishing mortality on spawning aggregations, and may help to increase spawning success within the area by eliminating disruption to spawning behavior from fishing activities.

The Madison-Swanson and Steamboat Lumps restricted fishing areas have been monitored by the NMFS Panama City and Pascagoula Laboratories, and presentations on the status of the areas have been given periodically to the Council. These areas were established primarily to protect spawning aggregations of gag and to protect a portion of the male gag population, which has declined relative to the female population in recent years. In a presentation given in 2003, NMFS reported that spawning aggregations of gag and/or scamp were confirmed at several sites within Madison-Swanson during February-March in 2001 and 2002. Some changes in abundance estimates between years were noted, with a general trend of more reef fish seen in 2001 than in 2002. Within Madison-Swanson, the abundance of red grouper, gag, and scamp increased. Within Steamboat Lumps, an increase in abundance was noted for red grouper and scamp. However, NMFS also reported that fishing activity was a significant problem, and that enforcement is difficult due to remote location.

In May 2007, the Ecosystem SSC conducted a 3-day workshop to evaluate the feasibility of using an ecosystem modeling approach to addressing fishery issues. Preliminary ecosystem models developed by two of the SSC members (Walters and Mahmoudi) were used to investigate several fishery issues including the impact of the Madison-Swanson and Steamboat Lumps restricted fishing areas on the resource. Since the evaluation of the ecosystem models and their data inputs is still in the preliminary stages, the results should be viewed as tentative. Nevertheless, the basic conclusion from the simulation trials was that the offshore MPAs are likely to have almost no impact on abundance or fishing rates, since effort displaced from the protected areas will simply target younger fish inshore of them, and the fish protected during spawning times will be caught at other times of year during seasonal migrations. Only the very large cross shelf onshore-offshore areas that protect a range of species from fishing throughout their life-cycle offshore movement had impacts on fishing rates comparable to those achievable through extensive seasonal closures and/or larger size limits.

Alternative 1 takes no action to establish new time/area closures. Monitoring of the existing Madison-Swanson and Steamboat Lumps restricted fishing areas by the NMFS Panama City laboratory suggests that the abundance of red grouper, gag and scamp inside the areas may have increased with time, it may take many years of protecting males before significant changes are seen at the population level.

Preferred **Alternative 2** contains two options for establishing a new time/area closure. The two areas, Snyder Ridge (**Option a**) and The Edges 40 fathom contour (***Preferred*** **Option b**) both fall within the dominant spawning grounds for gag (Figure 2.12.1 and Figure 2.12.3). The areas overlap but differ by size and latitude-longitude orientation.

Snyder Ridge (**Option a**) is a rectangular area about 127 square nautical miles (9.75 nm wide and 13 nm long), approximately the same size as the Madison-Swanson (115 nm^2) and

Steamboat Lumps (104 nm^2) areas. It is about 50 nm southeast of Madison-Swanson and about 18 nm northwest of Steamboat Lumps, directly west of the Florida Middle Grounds along the 40 fathom depth contour. At least one spawning aggregation of gag has been directly observed, and it likely includes many gag spawning sites (personal communication, Chris Koenig). The habitat is the same as for The Edges 40 Fathom Contour, described below.

The Edges 40 Fathom Contour (***Preferred* Option b**) is a parallelogram shaped area of about 390 square nautical miles (37 nm long and 10-12 nm wide) that straddles the 40 fathom contour west of the Florida Middle Grounds. The southern boundary of this area is contiguous with the northern boundary of Steamboat Lumps, and thus it could be considered an extension of Steamboat Lumps. It is a low relief area scattered with high relief rocky outcrops, and is an area where gag and scamp spawning aggregations have been directly observed by scientists in submersibles (personal communication, Chris Koenig). This has been described as an active region of commercial grouper fishing (personal communication, Chris Koenig).

Four sub-options are included to a new area closure. **Option (i**) uses the same time area regulations as for Madison-Swanson and Steamboat Lumps; all fishing prohibited November through April, open to surface trolling only May through October. This would create consistent regulations for all time/area closures along the Florida west shelf, which would aid in enforceability and compliance. This option closes the area for essentially the entire gag spawning season (December through May) as well as part of the peak red grouper spawning season (April through May). During May through October, surface trolling for non-reef fish species would be allowed, which should not impact reef fish at the depths found in the area. However, this would complicate enforcement by requiring Coast Guard officers to determine whether a vessel was surface trolling or bottom fishing. A study conducted by NMFS in 2003 on enforceability of a surface trolling requirement found that, under ideal conditions, observers need to be within 30 meters of a vessel to determine if fishing lines are in the water. Reef fish were most susceptible to live baits fished from vessels at speeds of less than 4 knots on monofilament line without downriggers (GMFMC 2003). However, if a fishing vessel is moving at a speed of at least 12 to 15 knots and is not using downriggers, the line and lure will be on or near the surface. The surface trolling allowance implemented for the Madison-Swanson and Steamboat Lumps restricted fishing areas under 50 CFR 622.34(k)(5) requires that vessels be in constant motion at speeds in excess of four knots with a visible wake, and that such trolling may not involve the use of down riggers, wire lines, planers, or similar devices.

Option (ii) is similar to **Option (i)** except that it allows all legal fishing within the area during May through October. This would ease enforcement, but would provide less protection for the male component of the gag populations, which tends to stay offshore year round. It would also provide less protection for reef fish that utilize the areas for spawning during May through October such as red grouper (December through May) and scamp (March through May).

***Preferred* Option (iii**) closes the area to all fishing for a shorter period of time (January through April) than **Options (i) and (ii)**. During the remainder of the year all legal fishing is allowed. While this time/area closure does not encompass the entire gag spawning season, it does include the peak gag spawning season (February though March) and a portion of the peak red grouper spawning season (April-May). Compared to the previous two options, this option provides slightly less protection for gag spawners, and less protection for the male component of the gag populations, which tends to stay offshore year round. It would also provide less protection for reef fish that utilize the areas for spawning during May through October such as red grouper (December through May) and scamp (March through May). However, this option would provide more protection than **Option (iv)**.

Option (iv) provides a time/area closure for the shortest period of time, March through April, and allows all lawful fishing during the remainder of the year. This option would provide area closure protection for spawning gag for only half of the peak spawning season (March through April). As with the other options, it would provide protection during part of the peak red grouper spawning season (April through May) and part of the scamp spawning season (March through May). However, this option would provide the least protection for spawning gag and the year-round offshore male population of gag.

The area encompassed by the Edges 40 fathom contour (***Preferred*** **Option b**) encompasses less than half the area identified as the dominant gag spawning grounds (Figures 2.12.1 and 2.12.3). The entire area runs along the 40 fathom contour approximately from west of Long Key, Florida (appr. 27º65' N latitude) north to the southern edge of the Steamboat Lumps Marine restricted fishing area, and from the northern edge of the Steamboat Lumps restricted fishing area northwest to the eastern edge of the Madison-Swanson restricted fishing area (The two restricted fishing areas are also part of the dominant spawning grounds but are already protected). Thus, only a portion of the offshore spawning aggregations would be protected by ***Preferred*** **Alternative 2(b)(iii)**. In addition, female gag are believed to form many pre-spawning aggregations in January (some in December) in waters shallower than 30 fathoms (personal communication, Chris Koenig). The Preferred Alternative would provide no protection for these pre-spawning aggregations.

Repeal of the existing February 15 to March 15 commercial closed season on gag, black grouper and red grouper is intended to be implemented under **Preferred Alternative 2** and any of the time/area options, as it is intended that the time/area closure replaces rather than supplements the management actions for gag. This would allow commercial fishermen to continue fishing for grouper, including gag, year round, which would minimize market disruptions. The closed season was implemented in 2001 to protect spawning aggregations of gag during a portion of their peak spawning season, and to reduce fishing mortality of gag and red grouper. It was projected that the closed season would reduce gag/black grouper harvest by 10 percent and red grouper by 8 percent. However, a comparison of 1999-2000 (when there was no closed season) with 2001 (closed season in effect) showed that the February-March contribution to the annual gag/black grouper and red grouper harvest was only 2 percent less in the year when the closed season was in effect. This likely reflected the impact of effort shifting to the weeks that were open at the beginning of February and end of March (NMFS 2004a). **Preferred Alternative 2** in combination with one of the time/area options replaces the Gulf-wide seasonal closure with a time/area closure. Since the area defined in Preferred Alternative 2 is only a percentage of the total gag spawning area, it's effectiveness in protecting gag spawning aggregations will also be limited, but since all fishing (except for HMS species) within the area will be prohibited during the closed period rather than just grouper fishing, the protection given to that portion of the gag spawning aggregations within the defined area may be greater with the area closure than with the peak spawning season closure.

Alternative 3 is a proposal to expand the existing Madison-Swanson restricted fishing area (Figure 2.12.1), with the existing fishing restrictions to apply in the expanded area. The expansion is to the north and west of the existing area to create an "L" shaped area that generally follows along the 40 fathom contour. The existing Madison-Swanson restricted fishing area is 115 square nautical miles. The proposed expansion adds an additional 70 square nautical miles, extending the northern boundary approximately 3 nm closer to shore, and extending the northernmost 6 miles of the area an additional 5 miles to the west. The habitat would be similar to that for Madison-Swanson, which is described as an area having rocky ledges with relief up to 5 fathoms. The area is characterized by outcrops of limestone and pinnacles, and derives its name from two such pinnacles in the area, Madison and Swanson's Rocks (personal communication, Chris Koenig). Arial surveys conducted by University of Miami researchers (Smith and Zurcher 2007) show that this is an area used by both commercial and recreational fishing vessels (Figure 2.12.4).

Alternative 4 creates cross-sectional onshore-offshore closed areas (Figure 2.12.3) as suggested by the Ecosystem Modeling Workshop Report (GMFMC 2007a), with the existing fishing restrictions to apply in the expanded area. The cross-sectional areas in this alternative consist of extending the existing Madison-Swanson and Steamboat Lumps restricted fishing areas shoreward to the state-Federal jurisdictional boundary. These would add an additional 523 square nautical miles to the Madison-Swanson area, and 1,037 square nautical miles to the Steamboat Lumps area. The Ecosystem SSC noted that protection of fish during spawning does not protect them from harvest during seasonal migrations at other times of the year, since effort displaced from the protected areas will simply target younger fish inshore of them, and the fish protected during spawning times will be caught at other times of year during seasonal migrations (GMFMC 2007b). However, such actions can help to avoid fishing at a time of very high vulnerability (GMFMC 2007a). MPAs extending from shore to the continental shelf break would protect fish throughout their offshore ontogenetic migrations from nursery areas and seasonal onshore-offshore movements (GMFMC 2007a). Ecosystem modeling runs during the second ecosystem modeling workshop (GMFMC 2007b) failed to show any observed impacts from the cross-sectional shelf areas in this alternative. However, the ecosystem model is still under development and was hindered by a lack of detailed habitat information within the proposed restricted fishing areas.

Other than **Alternative 1**, all alternatives in this section would have direct economic effects in terms of increasing short-run cost and potential future benefits. The potential costs and benefits of any of the measures that would expand existing MPAs may be contended to magnify, but not necessarily in a linear fashion, the corresponding effects of existing MPAs. On the basis of research done on the two existing restricted fishing areas, economic benefits from the alternatives in this section could come from potentially higher yields for red snapper, red grouper, and scamp. The effects on gag productivity appear to be uncertain.

The primary effect of the various alternatives to expand area restrictions on the fishing sectors would be the displacement of fishers that historically utilized the fishery resource in those areas.

This would tend to reduce commercial and recreational harvests and thus also commercial and for-hire revenues and benefits to anglers. If vessels attempt to offset their losses by fishing in other areas, they could partly offset revenues and benefits but at the expense of higher costs. The net effects are relatively uncertain.

Alternative 1 would have the least negative impacts on the social environment in the short term because it would not create any additional time/area closures that restrict fishing within it. **Alternatives 2, 3,** and **4** would each create additional areas or add to existing restricted fishing areas, and would reduce the areas available to fish either on a seasonal or year-round basis. **Alternative 2** contains options for either a small (127 sq. nm) or large (390 sq. nm) area, both of which encompass a portion of the gag spawning grounds. **Alternative 2** also contains options to protect spawning aggregations of gag and possibly other spawning reef fish by prohibiting all fishing for between 2 months and 6 months, with fishing allowed either partially (surface trolling only) or entirely allowed the remainder of the year. Commercial and recreational fishermen may prefer one alternative over another, depending on which port they fish from and where the fish. The impact to any particular fishermen will depend on if they can find other places to fish, or if the creation of time/area closures causes a reduction in harvest and a loss of income for commercial fishermen. Since **Alternative 2** includes an intent to repeal the commercial February 15 to March 15 closed season and replace it with a seasonal closed area, some fishermen may consider the additional closed area to be an acceptable trade-off for the restoration of year-round grouper fishing. If the closed season is not repealed in this amendment, it will likely be repealed as part of a grouper IFQ program being developed in Amendment 29.

Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure. Recreational fishermen may also feel that they are being treated unfairly if the commercial closed season is repealed while the recreational closed season is maintained or extended, even though the management strategies for commercial and recreational fishing are intended to implement proportional reductions consistent with the TACs and allocations implemented in Actions 3, 4 and 5 of this amendment.

Although any of these actions may not have a major impact on the commercial and recreational fisheries, cumulatively there is an added impact when considered with other closures and regulations that restrict fishing.

In the long term, if the creation of a new time/area closure helps to protect the spawning aggregations for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

Other than **Alternative 1**, all alternatives in this section would have direct economic effects in terms of increasing short-run cost and potential future benefits. The potential costs and benefits of any of the measures that would expand existing MPAs may be contended to magnify, but not necessarily in a linear fashion, the corresponding effects of existing MPAs. On the basis of research done on the two existing restricted fishing areas, economic benefits from the alternatives in this section could come from potentially higher yields for red snapper, red grouper, and scamp. The effects on gag productivity appear to be uncertain.

2.12 Action 12. Duration of Time/Area Closures

The first three alternatives in this section affect any new time/area closures created in Action 11, while the fourth alternative affects the existing Madison-Swanson and Steamboat Lumps restricted fishing areas. If no new time/area closures are created, it is still possible to extend the duration of the existing Madison-Swanson and Steamboat Lumps restricted fishing areas by selecting the appropriate alternatives and sub-options. These areas were last reauthorized in 2003 in Amendment 21, and will expire June 16, 2010 unless action is taken before then to extend their duration.

***Preferred* Alternative 1. No action. Time/area closures created under Action 11 will be monitored for effectiveness, and will remain in effect unless terminated in a subsequent amendment.**

Alternative 2. Time/area closures created under Action 11 will be monitored for effectiveness, and will expire after June 16, 2010 (to coincide with existing restricted fishing areas), unless reauthorized in a subsequent amendment.

Alternative 3. Time/area closures created under Action 11 will be monitored for effectiveness, and will expire 10 years after implementation (approximately 2019), unless reauthorized in a subsequent amendment.

***Preferred* Alternative 4. The Madison-Swanson and Steamboat Lumps restricted fishing areas will remain in effect:**

a. No action – until the existing expiration date of June 16, 2010.

b. [*Preferred*] Indefinitely, unless terminated in a subsequent amendment.

c. For an additional 10 years after implementation (approximately 2019), unless reauthorized in a subsequent amendment.

***Preferred* Alternative 1** is the no action alternative for any new time/area closures created in Action 11. In the absence of action to create a sunset provision, new area closures created in the previous section will remain in effect indefinitely, although they will be monitored for effectiveness. Unlike the other alternatives, which require future amendments to keep the area restrictions in place, this alternative allows the area restrictions to remain in place without any action, and requires an amendment to discontinue them.

Alternative 2 establishes a requirement that new time/area closures be monitored for effectiveness and will sunset after June 16, 2010, unless reauthorized in a subsequent amendment. These provisions are identical to the monitoring and sunset provisions applied to the Madison-Swanson and Steamboat Lumps restricted fishing areas. The Madison-Swanson and Steamboat Lumps areas were established to evaluate the effectiveness of such time/area closures, thus the monitoring requirement and sunset provision. The areas were originally established in 2000 under a regulatory amendment with a June 16, 2004, sunset date. Amendment 21 reauthorized the restricted fishing areas and extended the sunset date to June 16, 2010, in order to allow a full ten years for evaluation. This is the minimum time period that NMFS scientists have recommended to evaluate the effectiveness of time/area closures. Under this alternative, new time/area closures created in this amendment would only be authorized for approximately two years. Given the time needed to develop and implement plan amendments, a reauthorization amendment would need to begin almost immediately, before an evaluation could be conducted. The primary benefit of this alternative is to place any new area restrictions on the same reauthorization schedule as the existing restricted fishing areas.

Reopening areas that were closed will benefit recreational and commercial fishermen in the short term because they would only be restricted from fishing these areas for two years. Fishermen may be more willing to comply with a closure if it is for a short period of time and would aid in the protection of spawning aggregations. In the long term, if monitoring the time/area closures created in Action 11 with respect to success in increasing the protection of male gag and/or protecting spawning aggregations due to an insufficient time frame, a new amendment will need to be written to continue these area restrictions past 2010.

Alternative 3 establishes a requirement that new time/area closures be monitored for effectiveness for a period of ten years after implementation, which would create a sunset date some time on 2019. This is the minimum time period that NMFS scientists have recommended to evaluate the effectiveness of time/area closures. In addition, this would reduce the administrative overhead of having to create a new reauthorization amendment very shortly after any new time/area closure is implemented. This alternative could have negative impacts on commercial and recreational fishermen who now fish in these areas because it will keep time/area fishing restrictions within these areas for a minimum of ten years.

Preferred **Alternative 4** deals with the existing Madison-Swanson and Steamboat Lumps restricted fishing areas, and can be implemented either by itself or concurrently with one of the above alternatives. The Madison-Swanson and Steamboat Lumps restricted fishing areas are currently scheduled to expire on June 16, 2010. **Option (a)** is the no action option for the existing areas. It would leave the Madison-Swanson and Steamboat Lumps sunset date as is, June 16, 2010. Given the time needed to develop and implement plan amendments, a reauthorization amendment for the Madison-Swanson and Steamboat Lumps restricted fishing areas would need to begin shortly after completion of this amendment if the current sunset date is retained. ***Preferred*** **Option (b)** would remove the sunset date for the existing Madison-Swanson and Steamboat Lumps restricted fishing areas, so that they would remain in place indefinitely, unless discontinued by a subsequent amendment. **Option (c)** would authorize the Madison-Swanson and Steamboat Lumps restricted fishing areas for an additional ten years after implementation of this amendment, or until sometime in 2019.

One major economic consideration here is that costs to fishery participants would directly vary with the duration of the time/area closures. For time/ area closures created under Action 11, **Preferred Alternative 1** may be considered to result in the largest costs while the lowest costs would accrue to **Alternative 2.** For the two existing restricted fishing areas, the largest cost would accrue to **Preferred Sub-option (b)**, and the lowest to **Sub-option (a)**. For determination of benefits, however, there appears the need to allow time/area closures to exist for an extended period of time. For newly created time/area closures under Action 11, **Preferred Alternative 1** would offer the best option for evaluating such areas while **Alternative 2** would be worst. For evaluation of the two existing restricted fishing areas, **Preferred Sub-option (b)** would provide the best scenario, and **Sub-option (a)** would be worst. To strike a balance between costs and proper evaluation of time/area closures, a 10-year horizon would appear to be the best choice. This could be achieved under **Alternative 3** for the newly created time/area closures and **Sub-option (c)** of **Alternative 4** for the two existing restricted fishing areas.

Within ***Preferred*** **Alternative 4, Option (a)** would be no action, and the Madison-Swanson and Steamboat Lumps restricted fishing areas would only remain in effect until the expiration date of June 16, 2010. Commercial and recreational fishermen may support the creation of time/area closures if they think the areas will once again be open to them for fishing once the stock is rebuilt. A sunset of June 16, 2010 would benefit fishermen who would once again be able to fish these areas after that date. ***Preferred*** **Option (b)** would keep the Madison-Swanson and Steamboat Lumps restricted fishing areas under the current regulations unless terminated in a subsequent amendment. **Option (c)** would continue the Madison-Swanson and Steamboat Lumps restricted fishing areas under the current regulations for an additional ten years from implementation of this amendment, until 2019. From a social stand point, commercial and recreational fishermen may be less in favor of the creation of time/area closures if their dishing activities in these areas are restricted indefinitely. Fishermen may be more willing to favor the indefinite continuation of time/area closures if they think that there are benefits that outweigh the loss of fishing area. These areas have not, to date, been shown to have any impact on the gag stock, and given their relatively small size, they are not expected to have any observable impact on the stock as a whole (RFSAP 1999). However these areas have provided a site for numerous scientific studies into the habitat, biology, and behavior of reef fish which will improve future fisheries management. In addition, some fishermen feel that fishing immediately on the edge of the restricted areas has improved due to a spillover effect.

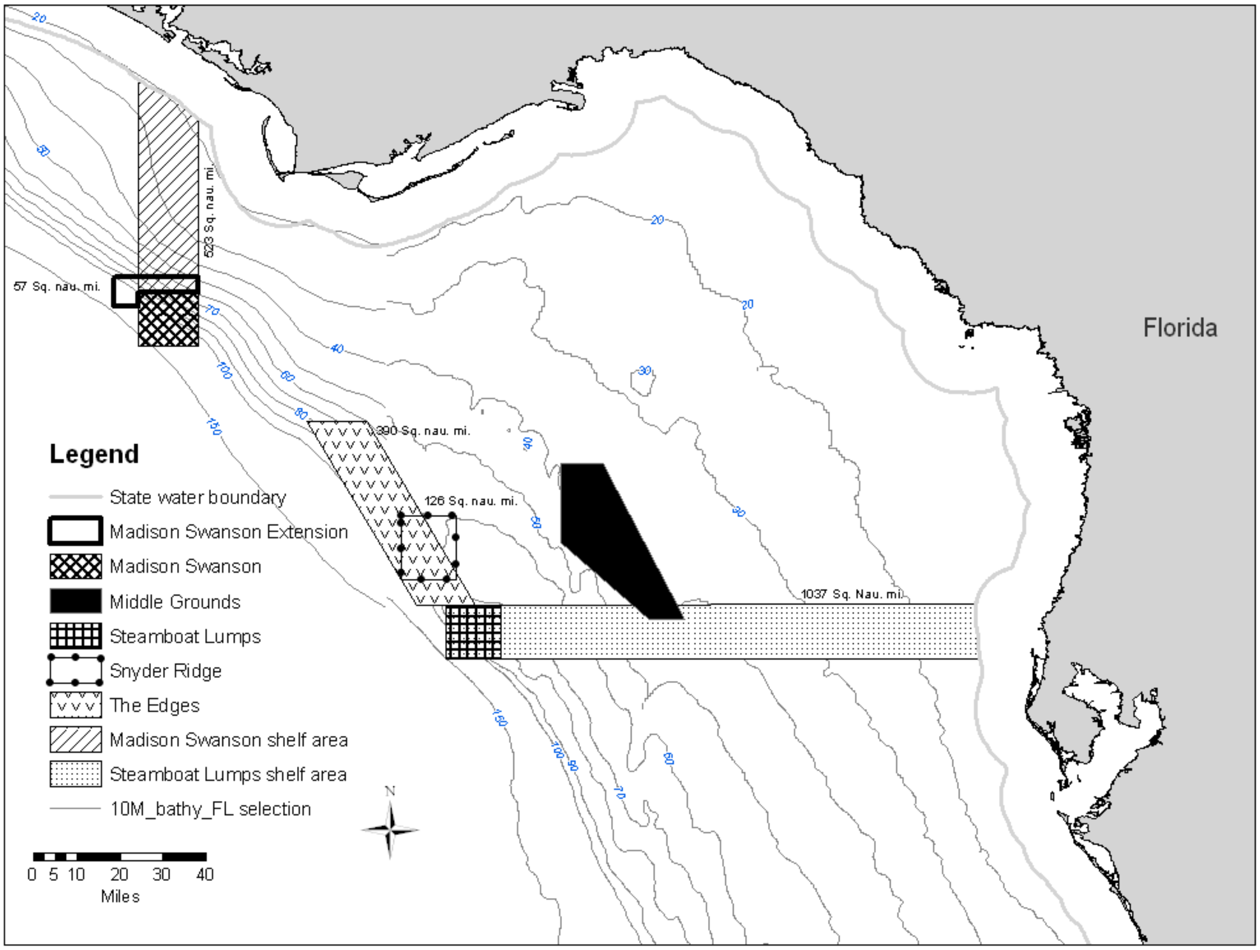


Figure 2.12.1. Alternatives for potential time/area sites on west Florida shelf coast (Florida Middle Grounds is included for reference only).

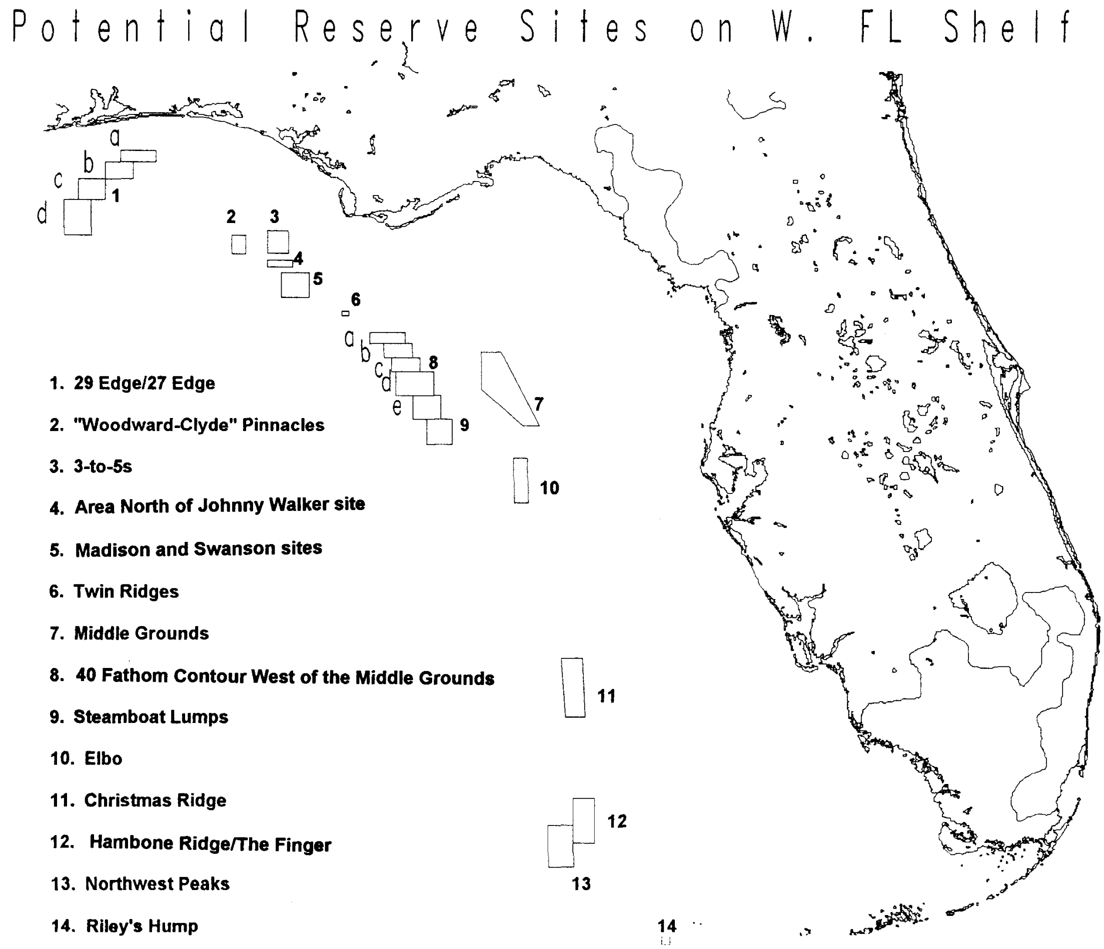


Figure 2.12.2. Potential time/area sites on west Florida shelf coast (source: Chris Koenig and Gary Fitzhugh)

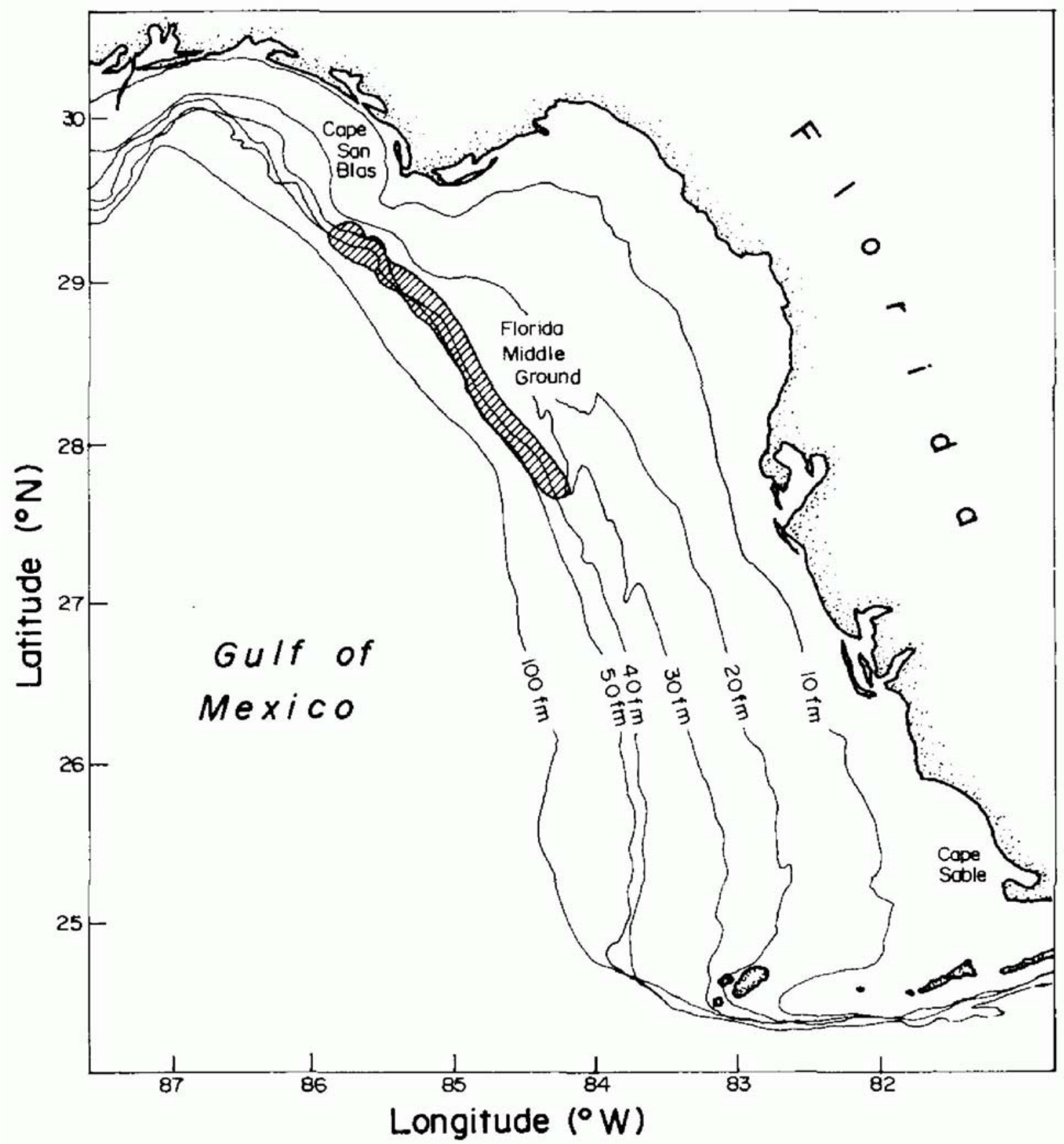


Figure 2.12.3. Dominant spawning grounds for gag off the Gulf coast of Florida (source: Koenig et al. 1996)

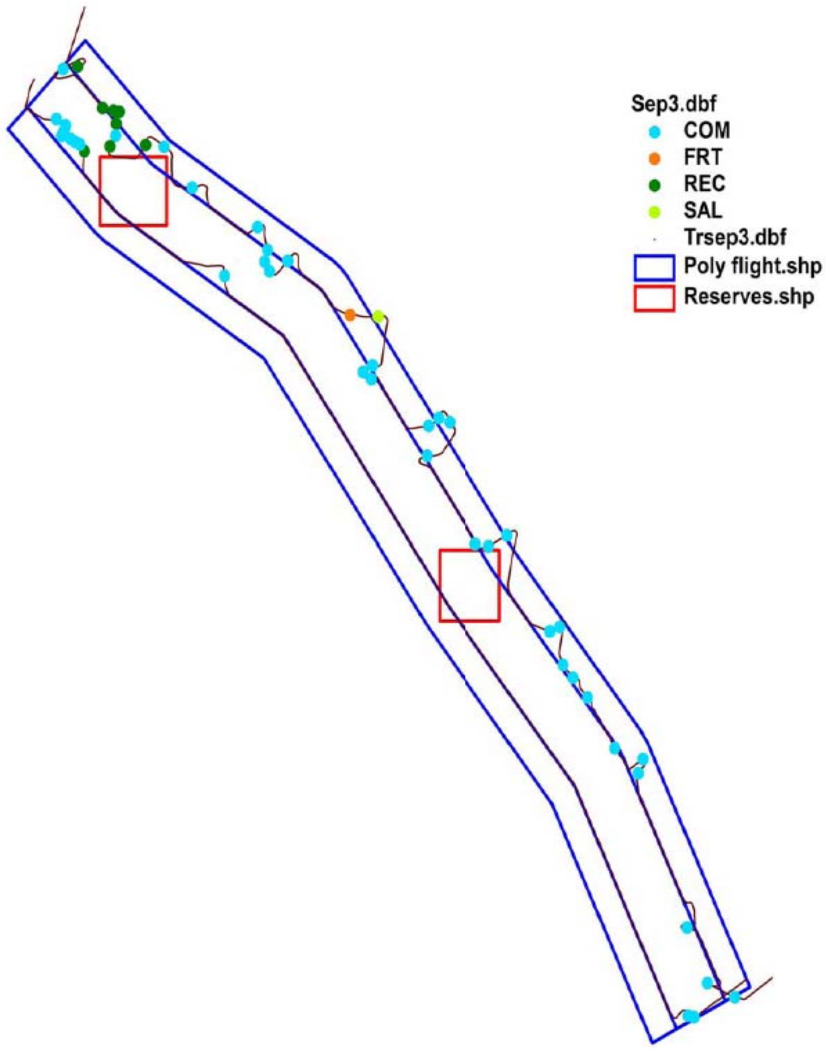


Figure 2.12.4. Aerial survey sampling domain and flight track for September 3, 2005 in the west Florida shelf region. MPAs within the domain are shown as solid pink boxes; blue lines are boundaries of statistical fishing areas. Brown lines denote specific flight route. Vessel type codes: COM, commercial workboat; REC, recreational motorboat; FRT, freighter/cargo vessel; SAL, sailboat; OTH, other. (Smith and Zurcher 2007)

2.13 Action 13. Federal Regulatory Compliance

Alternative 1. No action. All vessels with federal commercial or charter reef fish permits are subject to applicable federal reef fish regulations when fishing in the EEZ, and are subject to applicable state reef fish regulations when fishing in state waters.

Preferred **Alternative 2. All vessels with federal commercial or charter reef fish permits must comply with the more restrictive of state or federal reef fish regulations when fishing in state waters.**

Discussion: NOAA Fisheries Service has implemented several fishery regulations through either interim measures or amendments to FMPs during the past several years that were not adopted and implemented by some Gulf States. These measures included recreational red grouper interim regulations in 2005, a recreational grouper closure in 2007, and recreational red snapper regulations in 2007 and 2008. In developing regulations, analyses for Council amendments and FMPs assume that Gulf States will comply with proposed federal regulations. If states do not comply, then projected reductions in harvest and fishing mortality may not occur, compromising the Council's ability to end overfishing and rebuild overfished stocks. The net result is that landings may exceed target levels and future determinations of stock status may indicate overfishing is still occurring, or that rebuilding progress has not occurred at the rate projected. Although most federally managed reef fishes predominantly occur outside of state territorial waters, catch in state waters can still be significant for some species (see Tables 2.13.1 – 2.13.3). Additionally, more liberal regulations in state waters complicate law enforcement and may provide fishermen an incentive to harvest greater amounts of fish, regardless of where the fish are caught.

Table 2.13.1 – Total estimated MRFSS landings of red snapper, red grouper, and gag reported in state and federal waters of the Gulf of Mexico.

Species	Mode	2007 Landings (lbs)	Pct Landings by Area Fished	
			State	Federal
Red Snapper	Charter	1,574,384	33.0%	67.0%
	Private	2,125,673	38.6%	61.4%
Gag	Charter	414,657	19.5%	80.5%
	Private	2,020,536	28.6%	71.4%
Red Grouper	Charter	187,556	11.8%	88.2%
	Private	827,971	21.0%	79.0%

Table 2.13.2 – Total estimated Texas Parks and Wildlife red snapper landings reported in state and federal waters of the Gulf of Mexico. Landings are reported in numbers and were converted to pounds using mean TPWD length data for 2006 and SEDAR 7 length-weight conversion formula (SEDAR 7 2005).

Species	Mode	2006 Landings (#)	Pct Landings by Area Fished	
			State	Federal
Red Snapper	Charter	49,512	6.2%	93.8%
	Private	208,844	40.6%	59.4%

Table 2.13.3 – Total estimated Headboat landings of red snapper, red grouper, and gag reported in state and federal waters of the Gulf of Mexico.

Species	2006 Landings (lbs)	Pct Landings by Area Fished	
		State	Federal
Red Snapper	576,243	5.5%	94.5%
Gag	49,236	11.6%	88.4%
Red Grouper	26,703	6.1%	93.9%

In 2007, NOAA Fisheries Service reduced the red snapper recreational quota from 4.47 mp to 3.18 mp. NOAA Fisheries Service also implemented regulations that reduced the red snapper bag limit to two fish. No change was made to the fishing season length. Despite these regulatory changes, an estimated 3.77 mp of red snapper were harvested by the charter and private fisheries off west Florida through Louisiana during 2007. If estimated headboat and Texas recreational landings are included then recreational anglers may have landed greater than 4.1 mp of red snapper. The overage is partially due to non-compatible state versus federal regulations, which allowed recreational anglers to legally harvest more red snapper in state waters than federal waters off Florida, Alabama, and Texas. The states of Mississippi and Louisiana adopted regulations that were consistent with interim federal regulations.

Similarly, in November 2006 NOAA Fisheries Service implemented a February 15 to March 15 recreational closed season for gag, red grouper, and black grouper. Nearly all landings of grouper occur off Florida and Alabama. The closure was estimated to reduce gag harvest by approximately 8 percent and red grouper harvest by slightly more than 4 percent. These reductions were based on Gulf States also implementing consistent regulations. To date, neither Florida or Alabama have implemented consistent regulations. Given that 19 percent of charter and private gag landings and 8 percent of red grouper landings annually occur in state waters off these two Gulf states, inconsistent regulations could significantly diminish the effectiveness of the closure. Given that this amendment proposes lengthening the recreational closure (see Action 9), estimated changes in grouper harvest could be further diminished, reducing the likelihood that the Council will end overfishing of gag and achieve their management objectives.

In February 2008, NOAA Fisheries Service published new regulations for the recreational and commercial red snapper fisheries. New recreational regulations included reducing the bag limit from 4 to 2 fish, prohibiting captain and crew from retaining red snapper bag limits while under charter, and shortening the fishing season from April 21-October 31 to June 1-September 30. Several states elected not to adopt consistent state water regulations for red snapper. To ensure the 2008 recreational quota was not exceeded, NOAA Fisheries Service shortened the recreational fishing season. The shorter fishing season was based on projections that indicated the quota would be met sooner than previously estimated. The closure date was also based on a 75 percent probability that the quota would not be exceeded. NOAA Fisheries Service shortened the fishing season to June 1 – August 4; a 57-day reduction from the originally proposed fishing season. If charter reef fish vessels were required to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters, then the 2008 season could have been lengthened to June 1 – August 15. The season is not lengthened further because private anglers would be able to catch red snapper before June 1 and after August 15 in state waters (~10-15 percent of the overall quota). If a 50 percent probability of not exceeding the quota was instead used for estimating the 2008 recreational red snapper season, then the season would have been June 1-August 24 without charter consistency,. If charter reef fish vessels were required to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters, then this season could have been lengthened from June 1 – September 7.

In order to prevent overages and shorter fishing seasons from occurring in the future, Action 13 proposes measures to improve federal regulatory compliance. These measures would apply to both commercial and for-hire reef fish vessels in the Gulf of Mexico. **Alternative 1** would maintain status quo conditions and would not require commercial or for-hire vessels from abiding by the more restrictive of state or federal reef fish regulations when fishing in state waters. As a result, the likelihood of quota overages would be increased, resulting in a higher likelihood of overfishing occurring or continuing, and possibly requiring more restrictive federal regulations. **Preferred Alternative 2** would require federally permitted vessels to abide by the more restrictive of state or federal reef fish regulations when fishing in state waters. This alternative would not affect private anglers, because NOAA Fisheries Service does not currently require a recreational fishing permit and therefore does not have jurisdiction to establish permit conditions. NOAA Fisheries Service does have the authority to establish permit requirements and conditions for federal for-hire and commercial permit holders who choose to have a federal fishing permit and engage in the privilege of fishing. Table 2.13.1 provides a list of examples where federal fishing regulations apply to Gulf reef fish regardless of where harvesting, landing, or operating. By requiring federal permit holders to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters, the probability of overages occurring would be reduced and there would be an increased likelihood that overfishing is prevented or ended. This is especially important given the new mandates of the Magnuson-Act Reauthorization, which will require federal regulators to set annual catch limits and accountability measures for Council managed species by 2010 or 2011 (see Action 6).

During the June 2008 Council meeting, the Council requested NOAA Fisheries Service prepare an interim rule for 2009 based on the preferred gag management measures specified in Amendment 30B. Section 305(c) of the MSFCMA provides NOAA Fisheries Service authority to implement interim regulations to address overfishing. Gag was declared undergoing overfishing in October 2006. Other stocks within the reef fish complex undergoing overfishing include: red snapper, greater amberjack, and gray triggerfish. All of these species are also overfished and under rebuilding plans. The interim rule would pertain to all four species undergoing overfishing. Federally permitted reef fish commercial and for-hire vessels would have to abide by the more restrictive of state or federal reef fish regulations when fishing in state waters. Benefits to the biological environment would be similar to those described above. The likelihood of overfishing ending for these species would be increased and the likelihood that annual catch limits would be exceeded would be reduced. Recreational anglers would not be directly affected by this interim regulation because there is currently no requirement for a federal permit when fishing in the Gulf EEZ.

Neither alternative is expected to significantly affect the physical environment. **Alternative 1** may allow slightly greater fishing effort in state waters (relative to **Preferred Alternative 2)**, which would result in slightly more habitat-gear interactions. **Alternative 1** would negatively affect both the biological and administrative environments. As mentioned above, incompatible state and federal regulations will increase the likelihood of harvest overages and overfishing occurring and reduce the likelihood that the Council will achieve reductions in harvest to end overfishing or rebuild overfished stocks. This may require federal regulators to implement more restrictive federal regulations to achieve harvest reductions. Additionally, incompatible regulations will make it more difficult for managers to constrain landings to annual catch limits, thereby resulting in accountability measures being triggered more often. In contrast, **Preferred Alternative 2** would increase the likelihood that harvest overages do not occur and would reduce the likelihood of overfishing. However, there would still be potential for harvest overages and overfishing to occur since private anglers would not have to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters.

In principle, the no action alternative (**Alternative 1**) has no direct economic impacts on fishery participants. To the extent, however, that incompatible regulations between state and federal waters compromises the effectiveness of federal fishing rules, this alternative could eventually result in the adoption of more restrictive regulations and therefore reduced net benefits to fishing participants.

Preferred Alternative 2 has the potential to address some issues that currently exist with respect to differing state and federal fishing regulations. But this may also give rise to certain complications regarding the ability of some vessels to compete with other vessels fishing in state waters. For-hire vessels may be disadvantaged against private vessels which would not be affected by **Preferred Alternative 2**. Federally permitted commercial vessels would also be placed at a disadvantage against non-federally permitted vessels when fishing in state waters.

Alternative 1 would not have any direct impacts on the commercial or charter boat fishermen, businesses, or communities that depend on the reef fish fishery. **Preferred Alternative 2** would have direct impacts on commercial and charter boat fishermen who have reef fish permits because it would force fishermen to be under whichever rules were the most restrictive. Some fishermen who have reef fish permits fish in state waters when federal waters are closed. This amendment would make it easier for the federal government to enforce rules for people with reef fish permits fishing in state waters and would bring both state and federal areas under the same restrictions such as closures, bag limits, etc. Under the regulations now, fishermen can continue to fish in state waters when the federal waters are closed, if the state waters are still open. This is a benefit to commercial and charter reef fish fishermen, but makes it more difficult to monitor fishing if the states and federal regulations are different. By requiring that fishermen comply with which ever regulations are the more restrictive, fishermen will be more limited by regulations than they are now.

Table 2.13.1 Examples of federal Gulf reef fish regulations that apply regardless of where harvesting, landing, or operating.

Fishery	Regulation	Citation
Commercial Red Snapper	For a person aboard a vessel, for which a commercial vessel permit for Gulf reef fish has been issued, to fish for, possess, or land Gulf red snapper, regardless of where harvested or possessed, a Gulf red snapper IFQ vessel endorsement must have been issued to the vessel and must be on board. As a condition of the IFQ vessel endorsement issued under this paragraph (a)(2)(ix), a person aboard such vessel must comply with the requirements of § 622.16 regardless of where	50 CFR 622.4(a)(2)(ix)
Commercial Red Snapper	... In addition, the bag and possession limits for red snapper, when applicable, apply on board a vessel for which a commercial permit for Gulf reef fish has been issued, as required under § 622.4(a)(2)(v), without regard to where such red snapper were harvested.	50 CFR 622.43(a)(1)(i)(A)
Commercial Grouper	Seasonal closure of the commercial fishery for gag, red grouper, and black grouper. From February 15 to March 15, each year, no person aboard a vessel for which a valid Federal commercial permit for Gulf reef fish has been issued may possess gag, red grouper, or black grouper in the Gulf, regardless of where harvested.	50 CFR 622.34(o)
Commercial Greater Amberjack	During March, April, and May, each year, the possession of greater amberjack in or from the Gulf EEZ and in the Gulf on board a vessel for which a commercial permit for Gulf reef fish has been issued, as required under § 622.4(a)(2)(v), without regard to where such greater amberjack were harvested, is limited to the bag and possession limits, as specified in § 622.39(b)(1)(i) and (b)(2), respectively, ...	50 CFR 622.36(a)
Reef Fish - VMS	The VMS requirements of this paragraph (a)(2) apply throughout the Gulf of Mexico and adjacent states. (i) General VMS requirement. An owner or operator of a vessel that has been issued a commercial vessel permit for Gulf reef fish, including a charter vessel/headboat issued such a permit even when under charter, must ensure that such vessel has an operating VMS approved by NMFS for use in the Gulf reef fish fishery on board at all times whether or not the vessel is underway, ...	50 CFR 622.9(a)(2)

3 Description of the Fishery and Affected Environment

3.1 Description of Gear Types Used in the Commercial and Recreational Fisheries

The primary gear types used in the commercial grouper fishery are bottom longlines and bandit rigs. Recreational fishermen predominately use rod and reel. Spearfishing also constitutes a small part of both recreational and commercial grouper fishing. Fish traps were used in the commercial fishery until February 7, 2007, when their use became prohibited in the Gulf of Mexico EEZ. A brief description and potential environmental impacts of each of these gears that is currently used is provided below.

Longlines

Reef fish longlines were initially used in the late 1970s and early 1980s, and by 1982 longline gear was well established in the snapper-grouper fleet. Reef fish bottom longline gear used in the eastern Gulf of Mexico uses mainlines composed of cable or monofilament, with the test strength of the mainline ranging from 900 to 2,000 pounds. The amount of mainline set varied from 0.9 to 9.0 nm, with 2.4 nm the average. Gangion material was monofilament with length ranging from 0.46 to 1.92 m, and an average of 0.79 m. Barbed circle hooks were used for all sets, with both offset and straight hooks being used. Hooks averaged 2.2 inches in shaft length and 0.9 inches from the point to the shaft. The average number of hooks set at a location was 731.9 (± 378.0 s.d.), varying from 75 to 2,100 hooks. Prytherch (1983) reported that the spacing of the gangions varied; if a good catch was anticipated hooks would be set about 10-12 feet apart but if an unknown area was being sampled the hooks would be set from 20-50 feet apart. The average depth for the 311 sets was 26.6 m (± 14.9 s.d.), with a range of 10 to 70 m. Sets targeting red grouper averaged 18.6 m. Fishing time varied from 0.3 to 24.7 hours with 3.0 hours the average (± 2.7 s.d.). The majority of fishing occurred during daylight hours; however, lines were set at all hours. The majority of the sets occurred over rock bottom (41%), with shell (21%), coral (21%), unknown (14%), pothole depression (3%), and mud (<1%) comprising the remaining (NMFS 1995, 2005b).

Recent anecdotal gear information indicates longline fishers use mainlines consisting of 1/8, 7 by 7 (refers to wrapped strands of wire, 49 wires total) galvanized or stainless steel or 3.2 to 4.0 mm monofilament line (Dunzier, pers. comm. 2004; Bergmann, pers. comm. 2004). For frame of reference, the 3.5 mm monofilament is equivalent in size to the 1/8 cable. Some boats in the northwest GOM may occasionally fish with used larger cable (3/16 and 1/4) purchased cheaply from the oil industry (Bergmann, pers. comm. 2004). The leaders used are typically made of 200-lb to 400-lb test monofilament. For hooks, longline fishers use Mustad #39960, 13/0 and 14/0 circle hooks, with 100 to 200 hooks per mile (Dunzier, pers. comm. 2004). (NMFS 2005a)

Direct underwater observations of longline gear in the Pacific halibut fishery noted that the gear could sweep across the bottom, and its location could be affected by currents, snags, and even the efforts of hooked fish. While 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 (High 1998). However, another direct underwater observation study of longline gear in the 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).

Bandit Gear

Bandit gear is a vertical line with one or more hooks attached at the end (generally 3 to 20 hooks, but can be more, depending upon the species targeted). The line is deployed and retrieved from a large reel fixed to the side of a boat. The early bandit gear was hand-cranked, but nowadays electric or hydraulic reels are common. Bandit gear was first reported used in Fort Pierce, Florida in 1945. By 1950 it was in extensive use in both the Atlantic and the Gulf of Mexico, and was considered to out-fish handlines by a factor of about 3 to 1 (Siebenaler and Brady 1952). NMFS catch data indicates that for the period 1998-2000 bandit gear was 1.7 times as productive as handline gear.

Bandit rigs used for grouper fishing generally are rigged with fewer hooks than those used for snapper fishing. Schirripa et al. (1999) noted that the number of hooks per handline increased from about two in 1990 to reach nearly nine in 1994, and then declined to three in 1997.

Vertical gear fishers rely on finding concentrations of fish within the range of attraction of the few hooks on vertical gear. Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus fishing generally occurs over hard bottom areas (GMFMC 2004a). In their use, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). Thus, 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).

Spear and Powerhead

Spearguns and slings are devices that use pneumatic pressure or rubber bands to hurl a spear shaft at the fish. Sometimes a spearfisherman will employ a shotgun or pistol shell known as a powerhead at the shaft tip, which efficiently delivers a lethal charge to their quarry. This method is commonly used to harvest large species such as amberjack (NMFS 2005a). Barnette (2001) cited a study by Gomez et al. (1987) that concluded that spearfishing on reef habitat may result in some coral breakage, but damage is probably negligible. In 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.

Recreational Rod and Reel

Recreational fishers (other than spearfishermen) typically use rod and reel gear. Anglers fishing in deep water typically use 30-lb test monofilament line with 10 to 15 feet long 40- to 60-lb test monofilament line leaders, and 7/0 hooks (e.g. Mustad #92677) (Poveromo 1998). Anglers fishing in more shallow water typically 20-lb test, with 4 to 8 feet long 30-lb test leaders and 4/0 hooks (e.g., Eagle Claw L256). Many anglers in recent years have switched from using J-hooks to circle hooks, and circle hooks (NMFS 2005a). Circle hooks became mandatory when fishing for reef fish effective June 1, 2008 under a provision in Amendment 27.

3.2 Description of 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 2004a). The Gulf has a total area of approximately 600,000 square miles (1.5 million km2), 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 water temperatures range from 12º C to 29º C (54º F to 84º F) depending on time of year and depth of water.

Most harvests of recreational red grouper and other shallow-water grouper occur off of Florida over hard-bottom habitat. In the western Gulf, deep-water grouper are harvested over rocky ridges or flat bottom, near banks or ‘lumps’ (Cass-Calay and Bahnick 2002). Deep-water grouper also occur near the shelf-edge over sand, mud, and shell bottom (Cass-Calay and Bahnick 2002).

Environmental Sites of Special Interest Relevant to Red and Gag Grouper (Figure 3.1)

Longline/Buoy Gear Area Closure - Permanent closure to use of these gears for reef fish harvest inshore of 20 fathoms off the Florida shelf and inshore of 50 fathoms for the remainder of the Gulf (72,300 square nautical miles).

Madison/Swanson and Steamboat Lumps Marine Restricted Fishing Areas - areas sited on gag spawning aggregation areas where all fishing except for surface trolling during May through October is prohibited (219 square nautical miles).

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 EFH requirements, Habitat Areas of Particular Concern (HAPC), and adverse effects of fishing in the following 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 (GMFMC 2005a) prohibited the use of anchors in these HAPCs.

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 (SMZ) - In the Alabama SMZ, fishing by a vessel operating as a charter vessel or headboat, 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 3 hooks. Nonconforming gear is restricted to bag limits, or for reef fish without a bag limit, to 5 percent by weight of all fish aboard.

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

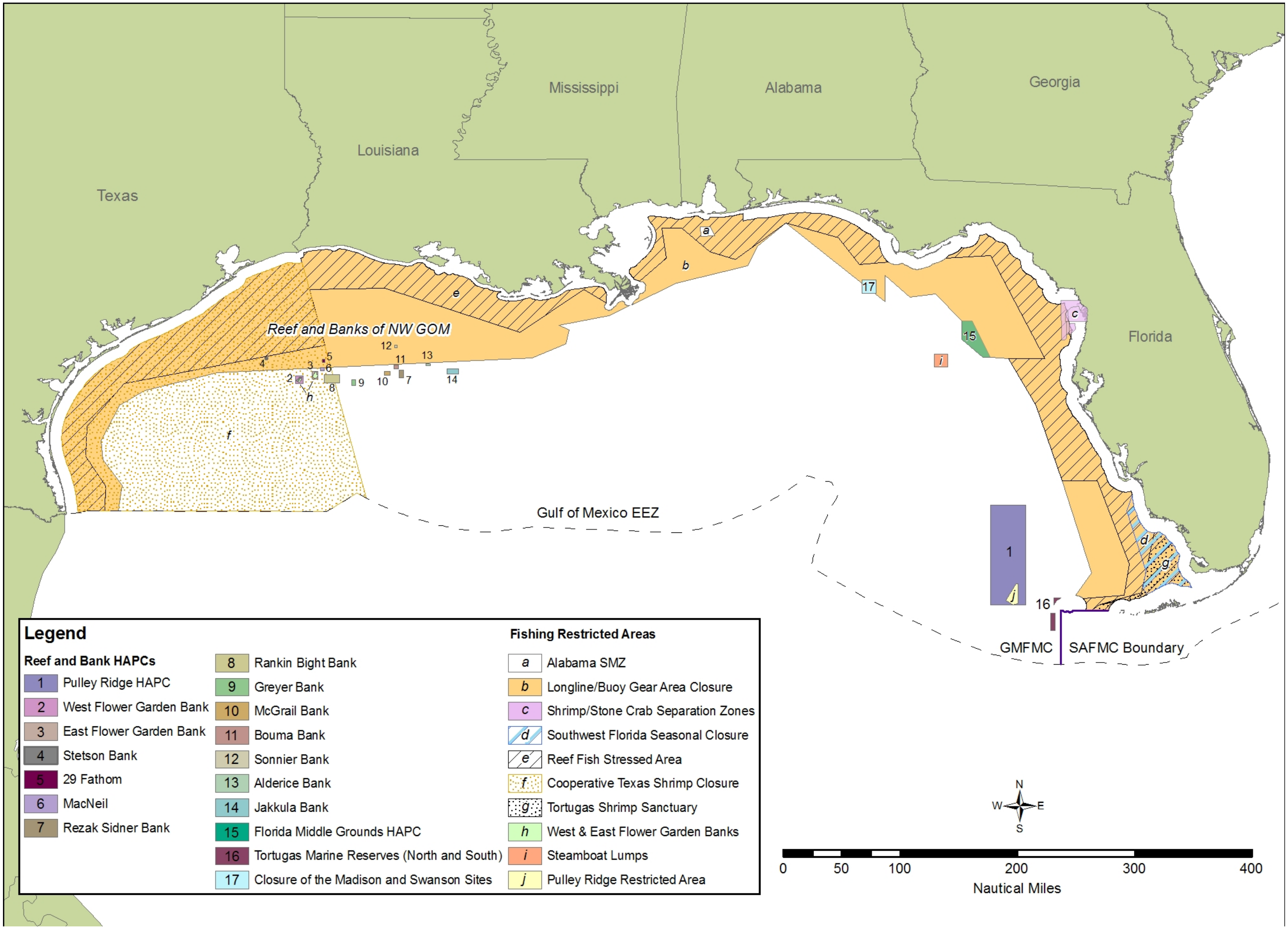


Figure 3.1 Map of most fishery management closed areas in the Gulf of Mexico

3.3 Description of Affected Biological Environment

The biological environment of the Gulf, 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 2004a).

<u>Reef Fish Including Red and Gag Grouper</u>

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 SEFSC's Headboat Survey, and 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 TL) and 50.7 lbs. (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 2006a and references cited therein). Fitzhugh et al (2006a) determined the size and age at 50% maturity was approximately 11 inches (28 cm TL) at age 2. While previous estimates indicated that red grouper were 50% mature by 5 years of age and 15-20 inches TL (40-50 cm TL) (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 TL (76.5 cm TL) (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. 2006b). 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).

Status of the Red Grouper Stock
See Section 1.2.

Gag Grouper Life History and Biology

Gag are primarily caught on the west coast of Florida from Tampa Bay to the northern extent of the state (Goodyear and Schirripa 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 are protogynous hermaphrodites, transitioning from females to males at older ages. Age and size at 50% sexual transition is approximately 11 years and 42-43 inches TL (108.5 - 110 cm TL) (SEDAR 10

2006). Maximum age is 31 years (Lombardi-Carlson et al 2006b) and females are mature by 3.7 years of age and 23 inches TL (58.5 cm TL) (Fitzhugh et al 2006b). They form spawning aggregations at depths ranging from 160-400 feet (Coleman et al. 1996). In the eastern Gulf of Mexico 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 and weight of 54 inches (138 cm TL) and 68 lbs. (31 kg) (Lombardi et al 2006b).

Status of the Gag Grouper Stock
See Section 1.2.

General Information on Reef Fish Species

The National Ocean Service (NOS) of NOAA collaborated with NMFS 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.

In general, reef fish are widely distributed in the Gulf, occupying both pelagic and benthic habitats during their life cycle. Habitat types and life history stages are summarized in Table 3.2.1 and can be found in more detail in GMFMC (2004c). 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 (SAV). 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).

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

Common name	Eggs	Larvae	Post-larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Red snapper	Pelagic	Pelagic		Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Sand/ shell bottoms, Soft bottoms	Hard bottoms, Reefs	Sand/ shell bottoms
Queen snapper	Pelagic	Pelagic				Hard bottoms	
Mutton snapper	Reefs	Reefs	Reefs	Mangroves, Reefs, SAV, Emergent marshes	Mangroves, Reefs, SAV, Emergent marshes	Reefs, SAV	Shoals/ Banks, Shelf edge/slope
Schoolmaster	Pelagic	Pelagic		Mangroves, SAV	Hard bottoms, Mangroves, Reefs, SAV, Emergent marshes	Hard bottoms, Reefs, SAV	Reefs
Blackfin snapper	Pelagic			Hard bottoms	Hard bottoms	Hard bottoms, Shelf edge/slope	Hard bottoms, Shelf edge/slope
Cubera snapper	Pelagic			Mangroves, Emergent marshes, SAV	Mangroves, Emergent marshes, SAV	Mangroves, Reefs	Reefs
Gray (mangrove) snapper	Pelagic, Reefs	Pelagic, Reefs	SAV	Mangroves, Emergent marshes, Seagrasses	Mangroves, Emergent marshes, SAV	Emergent marshes, Hard bottoms, Reefs, Sand/ shell bottoms, Soft bottoms	
Dog snapper	Pelagic	Pelagic		SAV	Mangroves, SAV	Reefs, SAV	Reefs
Mahogany snapper	Pelagic	Pelagic		Reefs, Sand/ shell bottoms	Reefs, Sand/ shell bottoms	Hard bottoms, Reefs, Sand/ shell bottoms, SAV	
Lane snapper	Pelagic		Reefs, SAV	Mangroves, Reefs, Sand/ shell bottoms, SAV, Soft bottoms	Mangroves, Reefs, Sand/ shell bottoms, SAV, Soft bottoms	Reefs, Sand/ shell bottoms, Shoals/ Banks	Shelf edge/slope
Silk snapper						Shelf edge	

Common name	Eggs	Larvae	Post-larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Yellowtail snapper	Pelagic			Mangroves, SAV, Soft bottoms	Reefs	Hard bottoms, Reefs, Shoals/ Banks	
Wenchman	Pelagic	Pelagic				Hard bottoms, Shelf edge/slope	Shelf edge/slope
Vermilion snapper	Pelagic			Hard bottoms, Reefs	Hard bottoms, Reefs	Hard bottoms, Reefs	
Gray triggerfish	Reefs	Drift algae	Drift algae	Drift algae, Mangroves	Drift algae, Mangroves, Reefs	Reefs, Sand/ shell bottoms	Reefs, Sand/ shell bottoms
Greater amberjack	Pelagic	Pelagic	Pelagic	Drift algae	Drift algae	Pelagic, Reefs	Pelagic
Lesser amberjack				Drift algae	Drift algae	Hard bottoms	Hard bottoms
Almaco jack	Pelagic			Drift algae	Drift algae	Pelagic	Pelagic
Banded rudderfish		Pelagic		Drift algae	Drift algae	Pelagic	Pelagic
Hogfish				SAV	SAV	Hard bottoms, Reefs	Reefs
Blueline tilefish	Pelagic	Pelagic				Hard bottoms, Sand/ shell bottoms, Shelf edge/slope, Soft bottoms	
Tilefish	Pelagic, Shelf edge/ slope	Pelagic		Hard bottoms, Shelf edge/slope, Soft bottoms	Hard bottoms, Shelf edge/slope, Soft bottoms	Hard bottoms, Shelf edge/slope, Soft bottoms	
Dwarf sand perch					Hard bottoms	Hard bottoms, Soft bottoms	
Sand perch						Reefs, SAV, Shoals/ Banks, Soft bottoms	
Rock hind	Pelagic	Pelagic				Hard bottoms, Reefs	Hard bottoms, Reefs
Speckled hind	Pelagic	Pelagic				Hard bottoms, Reefs	Shelf edge/slope
Yellowedge grouper	Pelagic	Pelagic			Hard bottoms	Hard bottoms	
Red hind	Pelagic	Pelagic		Reefs	Reefs	Hard bottoms, Reefs, Sand/ shell bottoms	Hard bottoms

Common name	Eggs	Larvae	Post-larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Goliath grouper	Pelagic	Pelagic	Man-groves	Mangroves, Reefs, SAV	Hard bottoms, Mangroves, Reefs, SAV	Hard bottoms, Shoals/ Banks, Reefs	Reefs, Hard bottoms
Red grouper	Pelagic	Pelagic		Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	Hard bottoms, Reefs	
Misty grouper	Pelagic	Pelagic				Hard bottoms, Shelf edge/slope	Hard bottoms
Warsaw grouper	Pelagic	Pelagic			Reefs	Hard bottoms, Shelf edge/slope	
Snowy grouper	Pelagic	Pelagic		Reefs	Reefs	Hard bottoms, Reefs, Shelf edge/slope	
Nassau grouper		Pelagic		Reefs, SAV		Hard bottoms, Reefs, Sand/ shell bottoms	Hard bottoms, Reefs, Sand/ shell bottoms
Black grouper	Pelagic	Pelagic		SAV	Hard bottoms, Reefs	Hard bottoms, Mangroves, Reefs	
Yellowmouth grouper	Pelagic	Pelagic		Mangroves	Mangroves, Reefs	Hard bottoms, Reefs	
Gag	Pelagic	Pelagic		SAV	Hard bottoms, Reefs, SAV	Hard bottoms, Reefs	
Scamp	Pelagic	Pelagic		Hard bottoms, Mangroves, Reefs	Hard bottoms, Mangroves, Reefs	Hard bottoms, Reefs	Reefs, Shelf edge/slope
Yellowfin grouper				SAV	Hard bottoms, SAV	Hard bottoms, Reefs	Hard bottoms

Status of Reef Fish Stocks

The Reef Fish FMP currently encompasses 42 species (Table 3.3.2). Stock assessments have been conducted on 11 species: red snapper (SEDAR 7, 2005), 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 (NMFS, 2002a; SEDAR 12 2007), gag (Turner et al., 2001; SEDAR 10, 2006), 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 second quarter report of the 2007 Status of U.S. Fisheries (http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm) classifies two as overfished (greater amberjack and red snapper), and four as undergoing overfishing (red snapper, gag, gray triggerfish and greater amberjack). The recent assessment for vermilion snapper (SEDAR 9, 2006a) indicates this species is not overfished or undergoing overfishing. Recent assessments for gray triggerfish and gag (SEDAR 9, 2006b and SEDAR 10, 2006, respectively) suggest these two species are experiencing overfishing, and stock recovery for greater amberjack is occurring slower than anticipated. This amendment addresses overfishing for gag grouper. 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.

Table 3.3.2 Species of the reef fish FMP. Species in bold have had stock assessments. *Deep-water groupers (Note: if the shallow-water grouper quota is filled, then scamp are considered a deep-water grouper) **Protected groupers

Common Name	Scientific Name	Stock Status
Balistidae--Triggerfishes		
Gray triggerfish	Balistes capriscus	Overfishing, overfished unknown
Carangidae--Jacks		
Greater amberjack	Seriola dumerili	Overfished overfishing
Lesser amberjack	Seriola fasciata	Unknown
Almaco jack	Seriola rivoliana	Unknown
Banded rudderfish	Seriola zonata	Unknown
Labridae--Wrasses		
Hogfish	Lachnolaimus maximus	Unknown
Lutjanidae--Snappers		
Queen snapper	Etelis oculatus	Unknown
Mutton snapper	Lutjanus analis	Unknown
Schoolmaster	Lutjanus apodus	Unknown
Blackfin snapper	Lutjanus buccanella	Unknown
Red snapper	Lutjanus campechanus	Overfished overfishing
Cubera snapper	Lutjanus cyanopterus	Unknown
Gray (mangrove) snapper	Lutjanus griseus	Unknown
Dog snapper	Lutjanus jocu	Unknown
Mahogany snapper	Lutjanus mahogoni	Unknown
Lane snapper	Lutjanus synagris	Unknown
Silk snapper	Lutjanus vivanus	Unknown
Yellowtail snapper	Ocyurus chrysurus	Not overfishing, not overfished
Wenchman	Pristipomoides aquilonaris	Unknown
Vermilion snapper	Rhomboplites aurorubens	Not overfished, not overfishing
Malacanthidae--Tilefishes		
Goldface tilefish	Caulolatilus chrysops	Unknown
Blackline tilefish	Caulolatilus cyanops	Unknown
Anchor tilefish	Caulolatilus intermedius	Unknown
Blueline tilefish	Caulolatilus microps	Unknown
(Golden) Tilefish	Lopholatilus chamaeleonticeps	Unknown
Serranidae--Groupers		
Dwarf sand perch	Diplectrum bivittatum	Unknown
Sand perch	Diplectrum formosum	Unknown
Rock hind	Epinephelus adscensionis	Unknown
Yellowfin grouper	Mycteroperca venenosa	Unknown
Scamp	Mycteroperca phenax	Unknown
Red hind	Epinephelus guttatus	Unknown
****Goliath grouper**	Epinephelus itajara	Unknown not overfishing

****Nassau grouper**	Epinephelus striatus	Unknown not overfishing
Red grouper	Epinephelus morio	Not overfished, not overfishing
Gag	Mycteroperca microlepis	Overfishing, overfished unknown
Yellowmouth grouper	Mycteroperca interstitialis	Unknown
Black grouper	Mycteroperca bonaci	Unknown
***Yellowedge grouper**	Epinephelus flavolimbatus	Unknown
*Snowy grouper	Epinephelus niveatus	Unknown
*Warsaw grouper	Epinephelus nigritus	Unknown
*Misty grouper	Epinephelus mystacinus	Unknown
*Speckled hind	Epinephelus drummondhayi	Unknown

Protected Species

There are 28 different species of marine mammals that may occur in the Gulf. All 28 species are protected under the MMPA and six are also listed as endangered under the 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 EFH amendment (GMFMC, 2004a), the February 2005 ESA biological opinion on the reef fish fishery (NMFS 2005a) and Acropora Status Review (Acropora Biological Review Team 2005). Marine Mammal Stock Assessment Reports and additional information are also available on the NMFS Office of Protected Species website: http://www.nmfs.noaa.gov/pr/species/.

The Gulf reef fish fishery is classified in the 2007 Marine Mammal Protection Act List of Fisheries as Category III fishery (71 FR 247). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1 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. 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 are adversely affected by the Gulf reef fish fishery. Incidental captures are relatively infrequent, but occur in all commercial and recreational hook-and-line components of the reef fishery. Captured sea turtles can be released alive or can be found dead upon retrieval of the gear as a result of forced submergence. Sea turtles released alive may later succumb to injuries sustained at the time of capture or from exacerbated trauma from fishing hooks or lines that were ingested, entangling, or otherwise still attached when they were released. Sea turtle release gear and handling protocols are required to minimize post-release mortality.

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

3.4 Description of the Economic and Social Environment

3.4.1 Commercial Sector

Introduction

This section describes the commercial and recreational sectors of the grouper fishery in the Gulf of Mexico. Both sectors are major participants in the fishery. The description of the commercial fishery focuses on the harvesters and dealers while that of the recreational fishery, on private anglers and the for-hire operations. There is some overlap in the commercial and for-hire operations in the sense that some vessels operate as commercial harvesters some parts of the years and as for-hire operations other parts of the year. Commercial operations of these dual-permitted vessels are included in the commercial fishery description while their for-hire operations are included in the recreational fishery description.

The major sources of data are the Federal Logbook System (FLS) and Accumulated Landings System for the commercial fishery and the Marine Recreational Fishery Statistics Survey and Headboat Logbook Survey for the recreational fishery. Specialized studies, either as add-ons to existing data collection programs or as periodic surveys, supplement information from the major data sources. Primarily because of the limitations of the FLS, the years 1993 through 2006 are chosen as the period for the descriptive analysis. The initial year is the first year FLS covered 100 percent of commercial reef fish vessels in the Gulf while the terminal year is the last year with complete FLS information. Basic data for the commercial and recreational fisheries were provided by Waters (2007, pers. comm.) and Holiman (2007, pers. comm.), respectively.

In the following discussion, four groups of species are presented, namely, reef fish, shallow-water grouper, red grouper, and gag. The shallow-water grouper information includes red grouper and gag plus all other shallow-water grouper, and the one for reef fish includes information for shallow-water grouper plus all other reef fish. Gag and red grouper are presented separately because they are the major species this amendment focuses on.

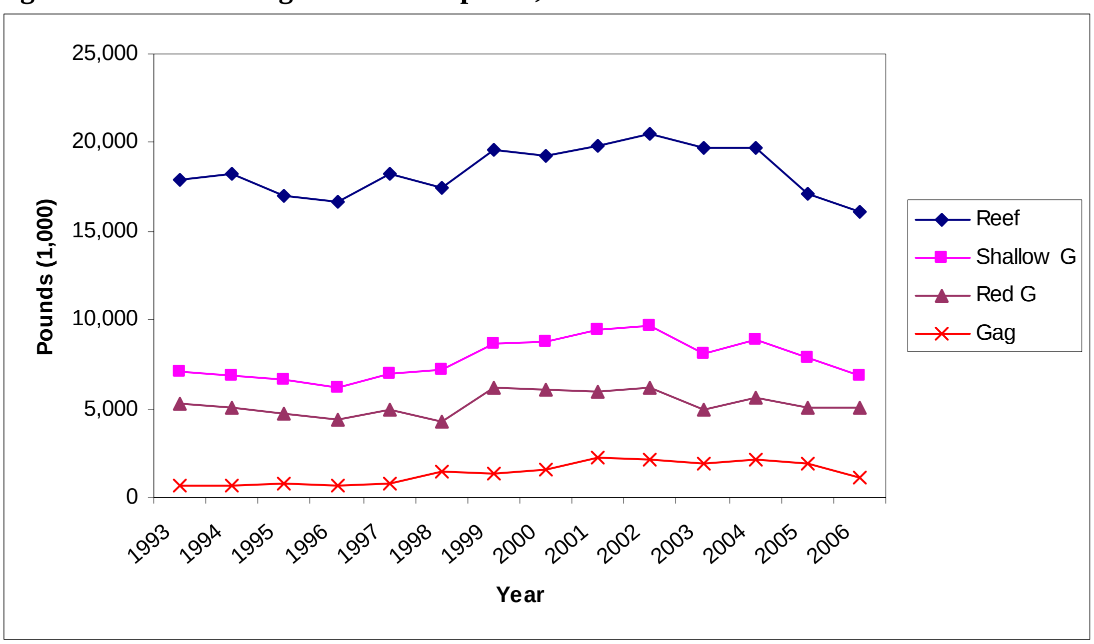
Annual Landings, Ex-vessel Values, and Effort

The commercial reef fish fishing fleet in the Gulf of Mexico is composed of vessels using different gear types and catching a variety of species. A license limitation program has now been in place in the reef fish fishery, and to harvest commercial amounts of reef fish a vessel is required to have an active permit on board. Commercial reef fish permits are renewable every year, although an owner is granted a grace period of one year to renew his permit. Non-renewal of a permit within this grace period results in permanent loss of that particular permit. Currently, there are 1,118 active permits and 91 which may be renewed within a year.

Over the period 1993-2006, landings of all reef fish averaged 18.4 million pounds (MP) annually, with an average ex-vessel value of $40.3 million in current terms or $45.8 million after adjusting for inflation. The shallow-water grouper fishery has accounted for 43 percent of all reef fish landings and 47 percent of ex-vessel values for all reef fish. Red grouper and gag are the two major components of the shallow-water grouper fishery accounting for 85 percent of shallow-water grouper landings and 84 percent of corresponding ex-vessel values.

Landing configurations of reef fish, shallow-water grouper, red grouper and gag during 1993-2006 are depicted in Figure 3.4.1.1. Reef fish landings show a slight down trend from 1993 through 1996, a slight upward trend in the next three years, remain relatively flat thereafter until 2004, and fell in the last two years. About similar pattern can be observed for shallow-water grouper, red grouper, and gag landings, with two possible exceptions. First, the 2006 reef landings are below the range of prior landings, and second, gag does not show a downward trend in the early years. Peak landings occurred in 2002 for all reef fish and shallow-water groupers; they occurred in 1999 for red grouper and 2001 for gag.

Figure 3.4.1.1. Landings of selected species, 1993-2006



The corresponding ex-vessel values are depicted in the next two figures. Figure 3.4.1.2 refers to ex-vessel values in current terms while Figure 3.4.1.3 refers to ex-vessel values after adjusting for inflation. Ex-vessel values in current terms show an upward trend during 1993-2006 (Figure 3.4.1.2), and this is particularly visible for reef fish as a whole. The landings decline in the last two years is quite visible for shallow-water groupers and gag, but not for reef fish and red grouper. Ex-vessel values for red grouper ex-vessel in fact rose in the last two years and those for reef fish, in the last year. Both shallow-water grouper and gag show declines in ex-vessel values in the last two years, although they remain above the levels set in the 1990's. Peak ex-vessel values occurred in 2004 for reef fish, 2001 for shallow-water grouper and gag, and 2006 for red grouper.

When adjusted for inflation, ex-vessel values follow a relatively similar pattern earlier shown for landings, except that ex-vessel values for reef fish and red grouper either remain flat or slightly increase in the last two years. The general similarity of landings and real-vessel values trend suggest the relatively important effect of inflation on ex-vessel values.

Figure 3.4.1.2. Current ex-vessel values for selected species, 1993-2006.

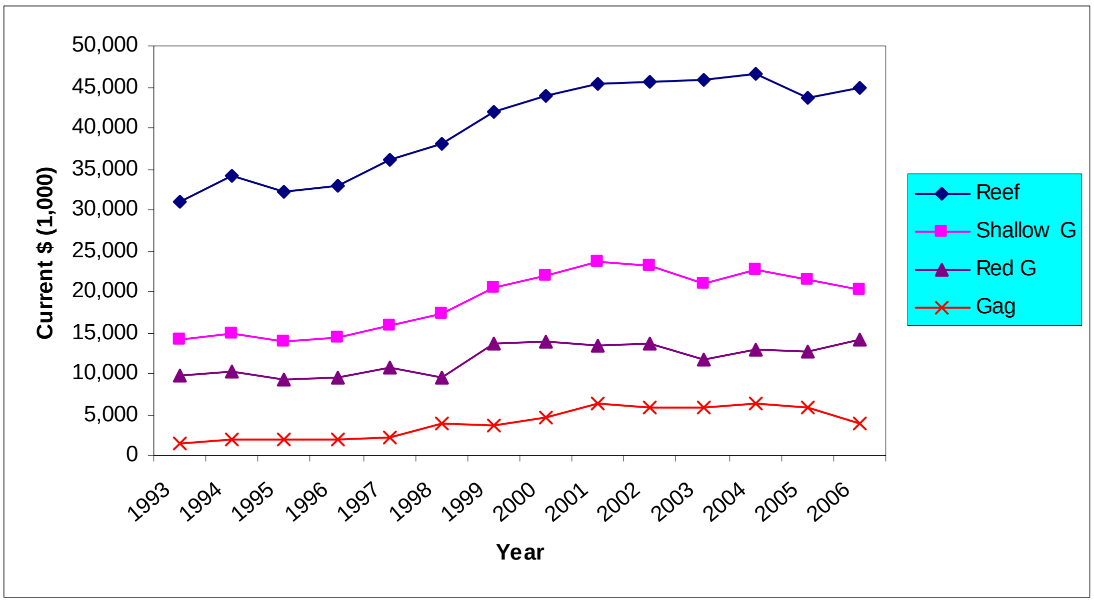
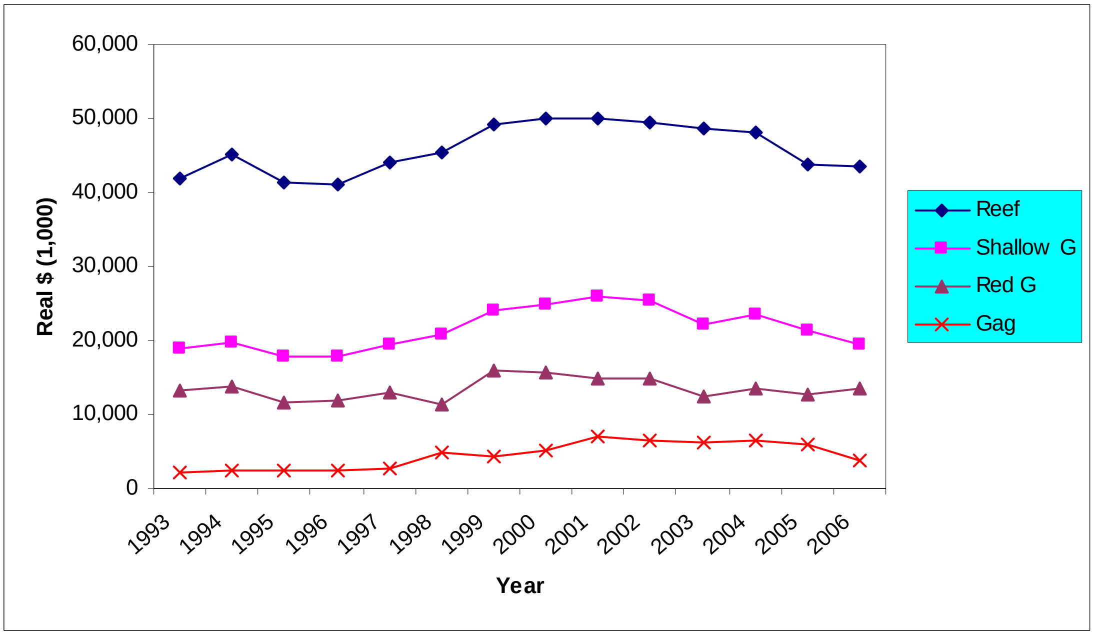
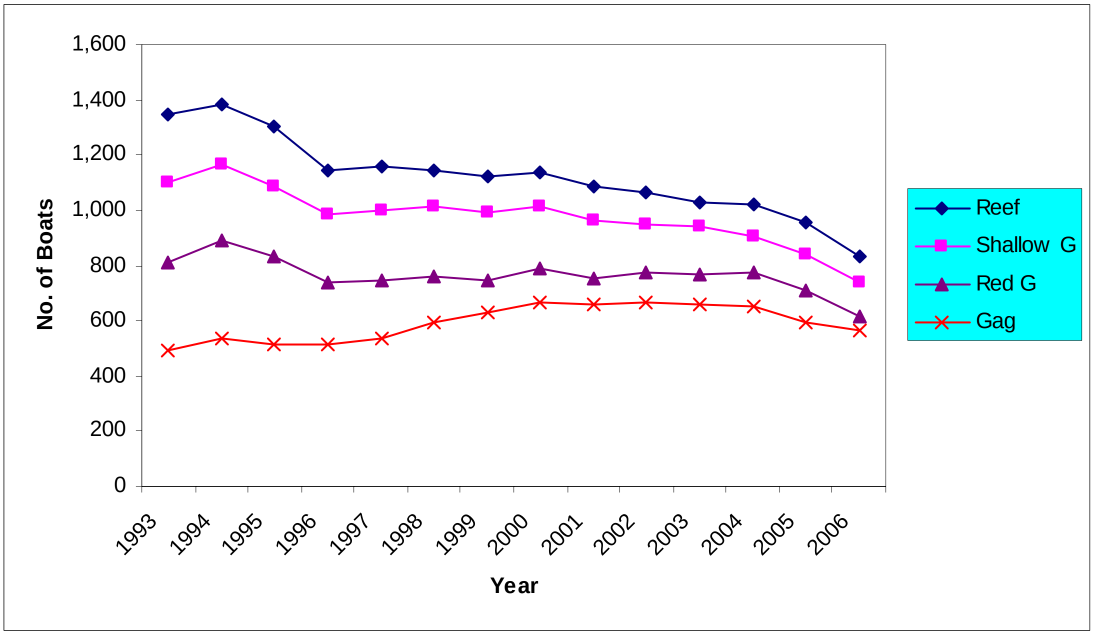


Figure 3.4.1.3. Real ex-vessel values for selected species, 1993-2006.



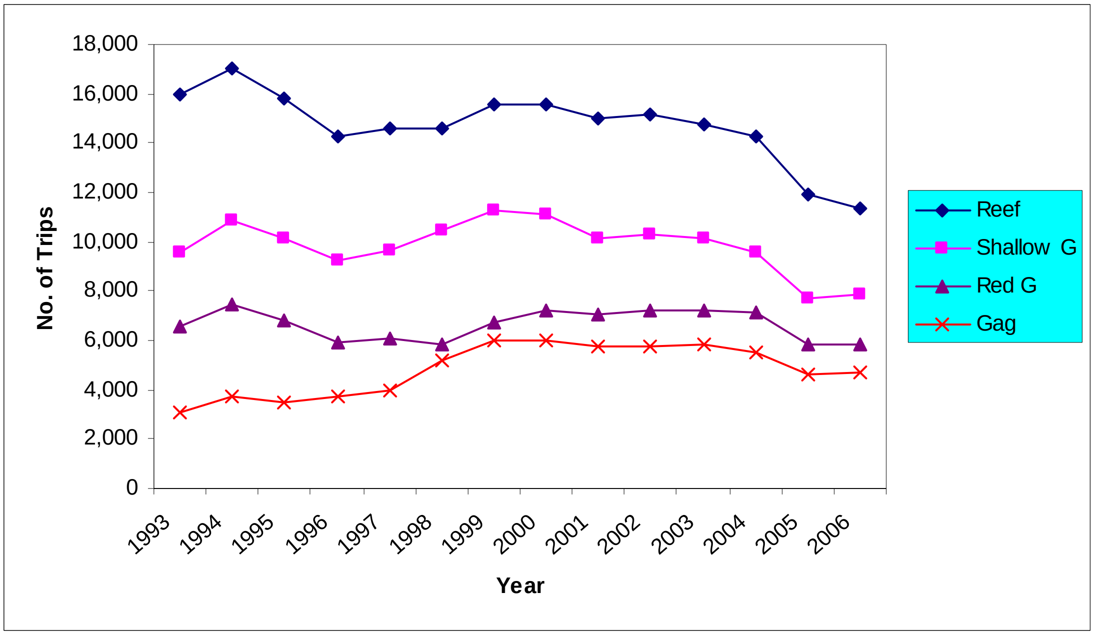
While landings in the reef fish fishery have shown patterns of increases and decreases, the number of boats actively participating in the fishery (except for gag) shows a pattern of decline over time. This pattern is depicted in Figure 3.4.1.4. Each curve refers to the number of boats landing at least one pound of reef fish, shallow-water grouper, red grouper, or gag in a given year. For reef fish as a whole, the number of boats in the fishery fell from high of 1,386 in 1994 to its lowest of 830 in 2006. The years 1994 and 2006 were also the highest and lowest points for shallow-water grouper and red grouper. For shallow-water grouper, the number of boats fell from 1,164 to 740 and for red grouper, from 889 to 619. Only in the gag fishery did the number of participating boats steadily increase over time, although it did fall in the last two years. Although the number of boats actively participating in the reef fish fishery has declined to a low of 830 in 2006, the number of permits at present is higher. This has led to the issue of latent permits where permits exist but not actively employed in the fishery. These are permits which may be used in the event noticeable improvements in the fishery arise.

Figure 3.4.1.4. Number of boats landing at least one pound of selected species, 1993-2006.



The downward trend in the number of boats landing reef fish is partly reflected in the number of trips taken by the remaining boats, but the decline in trips is not as dramatic as that for boats (see Figure 3.4.1.5). Many exiting trips may have come from boats with relatively little participation in the fishery. Trips landing any reef fish averaged 14,698 annually and ranged from 11,358 to 17,003; trips with any shallow-water grouper averaged 9,860 and ranged from 7,691 to 11,308; trips with red grouper averaged 6,627 and ranged from 5,803 to 7,485; and, trips with gag averaged 4,825 and ranged from 3,118 to 6,025. The highest and lowest trips, respectively, occurred in 1994 and 2006 for reef fish, 1999 and 2005 for shallow-water grouper, 1994 and 2006 for red grouper, and 2000 and 1993 for gag. General patterns observable from Figure 3.4.1.5 are the decline in trips for reef fish and shallow-water grouper, relatively flat to slight decline in trips for red grouper, and slightly steady increase in trips for gag.

Figure 3.4.1.5. Number of trips by boats landing at least one pound of selected species, 1993-2006.



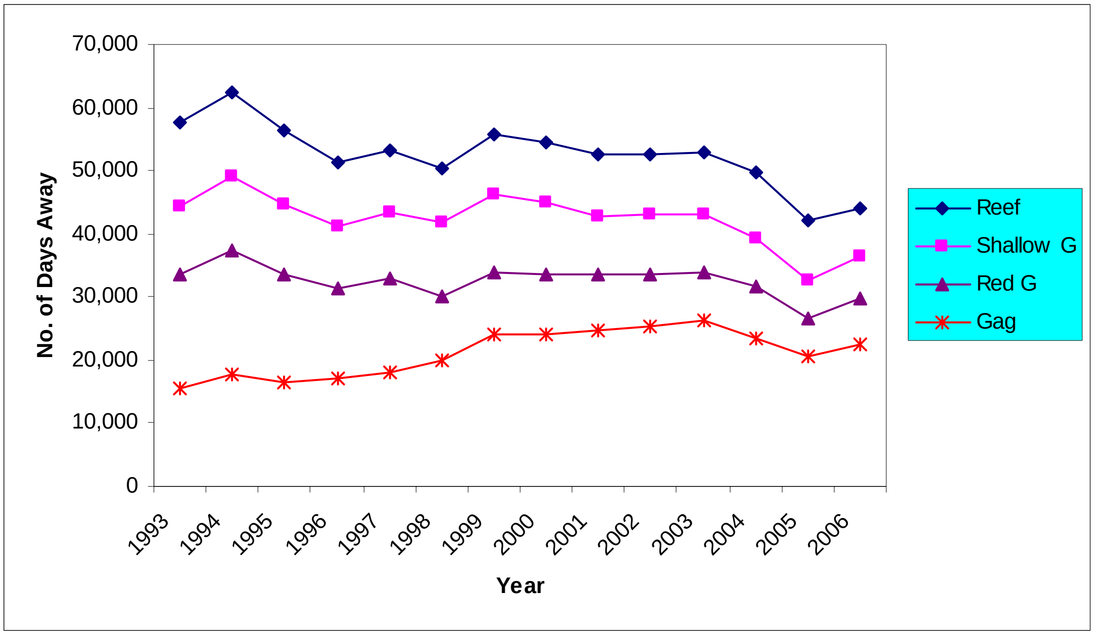
Days away from port may be considered another indicator of fishing effort in the fishery. This indicator, however, may not exactly reflect the time spent for fishing since boats have to travel to fishing areas before they actually fish. This is true even with vessels that move around while fishing, such as those employing longline and troll gear types. At any rate, the general pattern over time can provide some broad indications of the movement of fishing days over time.

Shown in Figure 3.4.1.6 is the trend in days away from port for vessels landing at least one pound of selected species. While the correspondence is not perfect, the pattern over time of days away from port mimics that of trips. What can be gleaned from Figure 3.4.1.6 are patterns of general decline of days away from port for reef fish and shallow-water grouper, a flat to slight decline for red grouper, and a slight increase for gag. Days away from port reached their highest in 1994 and lowest in 2005 for reef fish, shallow-water grouper and red grouper. The peak for gag occurred in 2003 while the trough occurred in 1993. For the period 1993-2006, the annual average days away from port were 52,498 for reef fish, 42,333 for shallow-water grouper, 32,531 for red grouper, and 21,133 for gag.

One conclusion that can be drawn from the three indicators of fishing effort pertains to the kind of effort movement over time. With certain limitations, the general conclusion is that effort declined for reef fish and shallow-water grouper. Within the shallow-water grouper complex, effort remained flat or slightly declined for red grouper and slightly increased for gag. Effort shifting between species is a possibility but it cannot be inferred from the given information.

There are several potential reasons for the decline in effort for reef fish, shallow-water grouper, and red grouper. Such for example as the increase in fishing cost, increase in harvesting efficiency, more restrictive regulations particularly for the grouper fishery, and even improvements in the stock status of certain species in other fisheries may contribute to the decline in fishing effort. However, more research is needed to determine which factors did contribute to such decline in fishing effort for reef fish, shallow-water grouper, and red grouper. Further research is also needed to determine the apparent increase in fishing effort for gag.

Figure 3.4.1.6. Days away from port for boats landing at least one pound of selected species, 1993-2006.



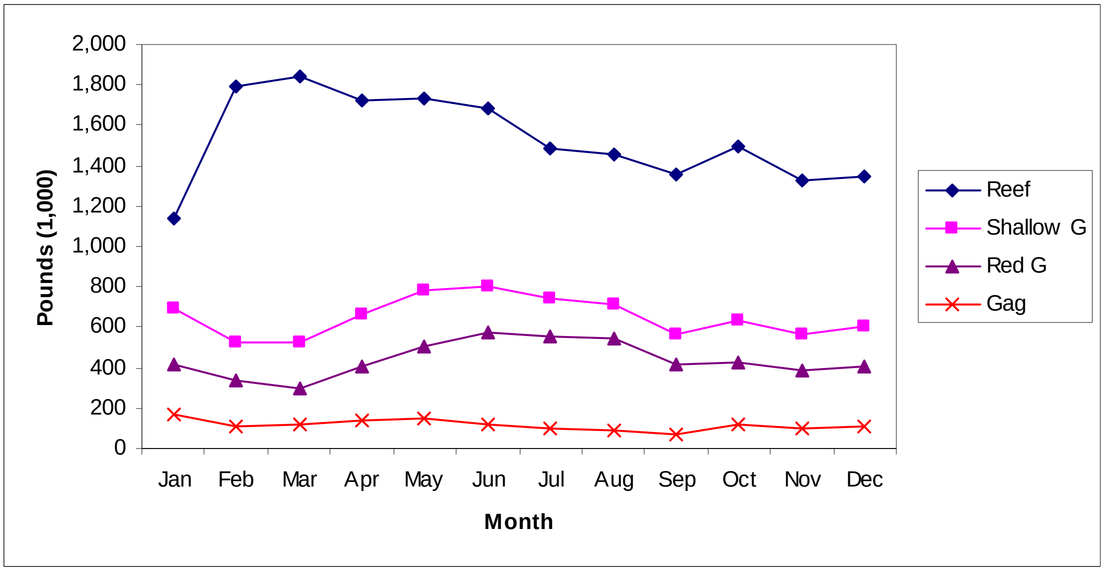
Seasonal Characteristics

Fish stock, market, and harvesting conditions in addition to the regulatory regime are some of the factors that shape the seasonal characteristics of the reef fish fishery in general and grouper fishery in particular. How these factors affect seasonal behavior of the fishery will not be explored here.

The pattern for monthly landings of reef fish as a whole is rather straightforward: landings increase in February and March, then fall in a steady fashion the rest of the year. The monthly patterns for shallow-water grouper and red grouper are about the same: landings fall from January through March, rise and fall like a flat inverted cup the next two quarters, and remain relatively flat in the last three months. Gag landings are relatively high in January, slowly decline thereafter, but rise a little in October and remain flat thereat the entire last quarter. For all groups, there is a perceptible landings uptick in October.

For the period 1993-2006, reef landings averaged 1.5 million pounds a month and ranged from 1.1 million pounds to 1.8 million pounds. Shallow-water grouper landings averaged 652 thousand pounds and ranged from 520 thousand pounds to 800 thousand pounds. Red grouper landings averaged 440 thousand pounds, with a range of 301 to 572 thousand pounds. The average for gag was 116 thousand pounds, with a range of 73 to 170 thousand pounds.

Figure 3.4.1.7. Average monthly landings (thousand pounds) of selected species, 1993-2006.

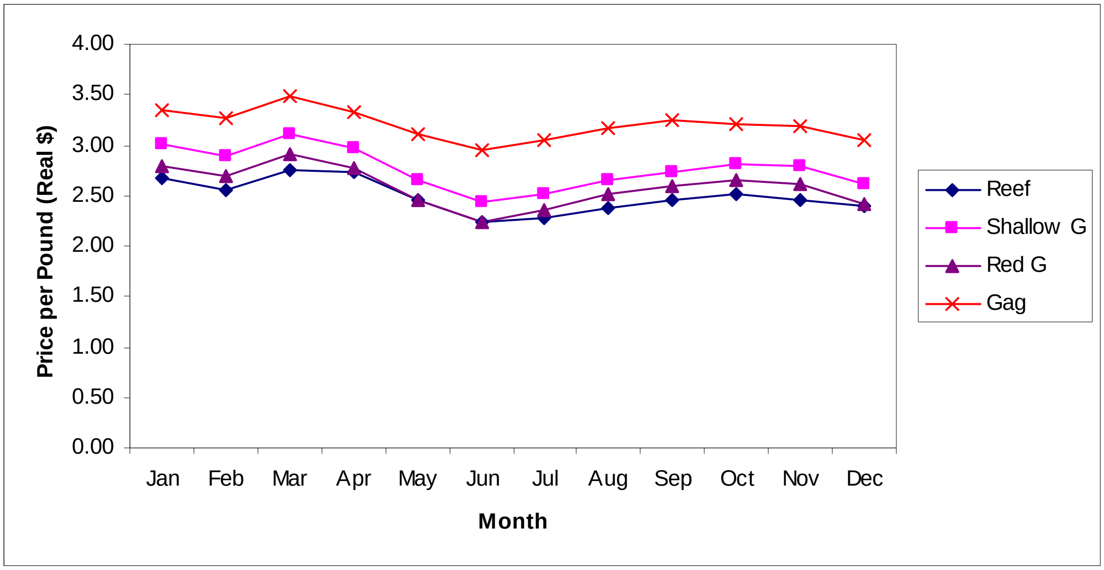


Monthly real prices (i.e., after adjusting for inflation) for reef fish, shallow-water grouper, red grouper, and gag follow a similar pattern (see Figure 3.4.1.8). They reached a peak in March, steadily fell until their trough in June, and then gradually rose but only to fall off slightly in the last two months of the year. Gag commanded the highest prices in all months, followed by shallow-water grouper, and then by red grouper and reef fish. The clear difference in prices for gag and red grouper could indicate certain level of product differentiation between the two species.

As can be expected, prices for shallow-water grouper fell in between the high gag prices and low red grouper prices. The landings dominance of red grouper in the shallow-water grouper complex brought down the prices for shallow-water grouper nearer to the red grouper prices than to those of gag. Lower prices for other reef fish also brought down the prices for reef fish further below the red grouper prices.

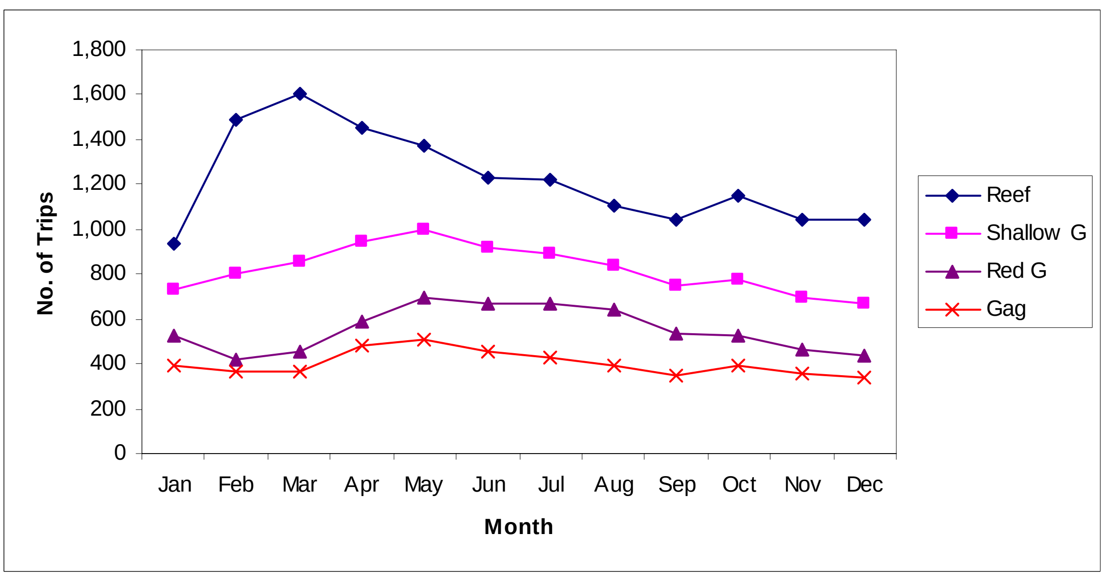
Monthly prices for gag averaged at $3.20 a pound and ranged from $2.96 to $3.49 a pound. Red grouper monthly prices averaged at $2.58 a pound and ranged from $2.25 to $2.90 a pound. For the shallow-water grouper complex, monthly prices averaged at $2.77 a pound and ranged from $2.44 to $3.11 a pound. Prices for all reef fish averaged at $2.49 a pound and ranged from $2.23 to $2.76 a pound.

Figure 3.4.1.8. Average monthly price per pound (real) of selected species, 1993-2006.



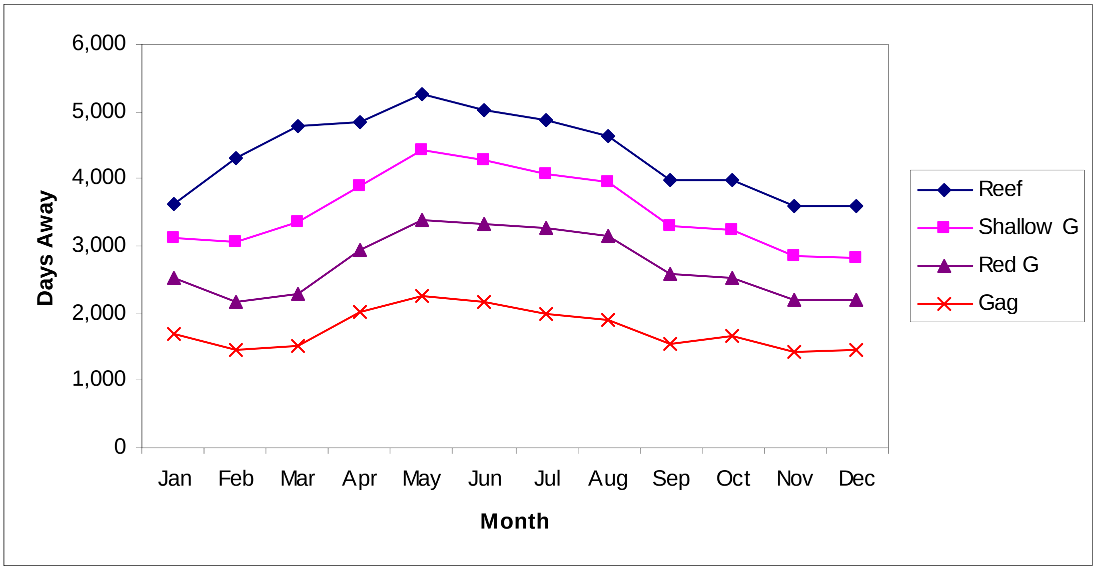
The number of trips taken by boats landing at least one pound of reef fish, shallow-water grouper, red grouper, or gag also followed a seasonal pattern as shown in Figure 3.4.1.9. All trips generally rose in the first few months and then gradually taper off throughout the remainder of the year. All species, except reef fish as a whole, reached their peak trips in May. For reef fish, the peak month for trips was March. The average trips per month were 1,045 for reef fish, 669 for shallow-water grouper, 440 for red grouper, and 342 for gag.

Figure 3.4.1.9. Average monthly trips by boats landing at least one pound of selected species, 1993-2006.



Seasonality also characterizes the number of days spent by boats away from port. They all rose in the first few months, peaked in May, and gradually fall off throughout the remainder of the year. For gag, red grouper, and shallow-water grouper, seasonality in the number of days away from port closely followed that of the number of trips. For reef fish as a whole, the number of trips peaked earlier (March) than the number of days away from port (May). The average days away from port were 4,375 days, 3,528 days, 2,711 days, and 1,761 days for reef fish, shallow-water grouper, red grouper, and gag, respectively.

Figure 3.4.1.10. Average days away from port of boats landing at least one pound of selected species, 1993-2006.

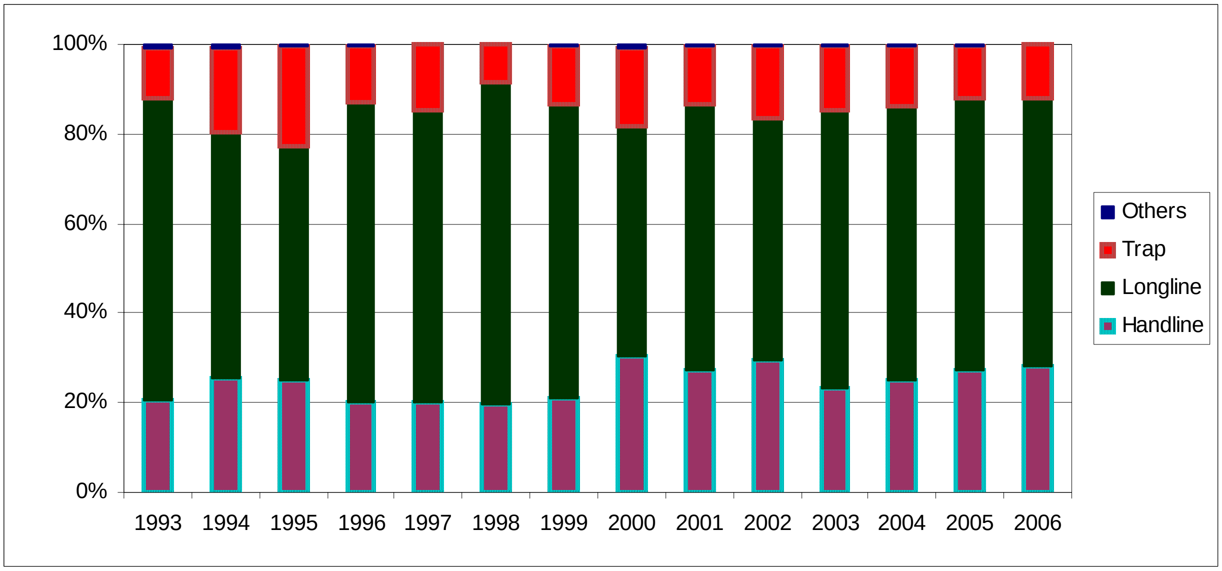


Distribution by Gear Type

Various gear types are used in the harvest of reef fish. In the particular case of the shallow-water fishery, handline and longlines are the two dominant gear types, with traps comprising a distant third gear type. There are, however, variations in gear dominance depending on the species caught. One should note, however, that since February 2007, traps have been prohibited for use in harvesting reef fish. How landings from traps would be distributed among the remaining gear types cannot be determined. The performance of the fishery in 2007 may yield some information, but this is not pursued here.

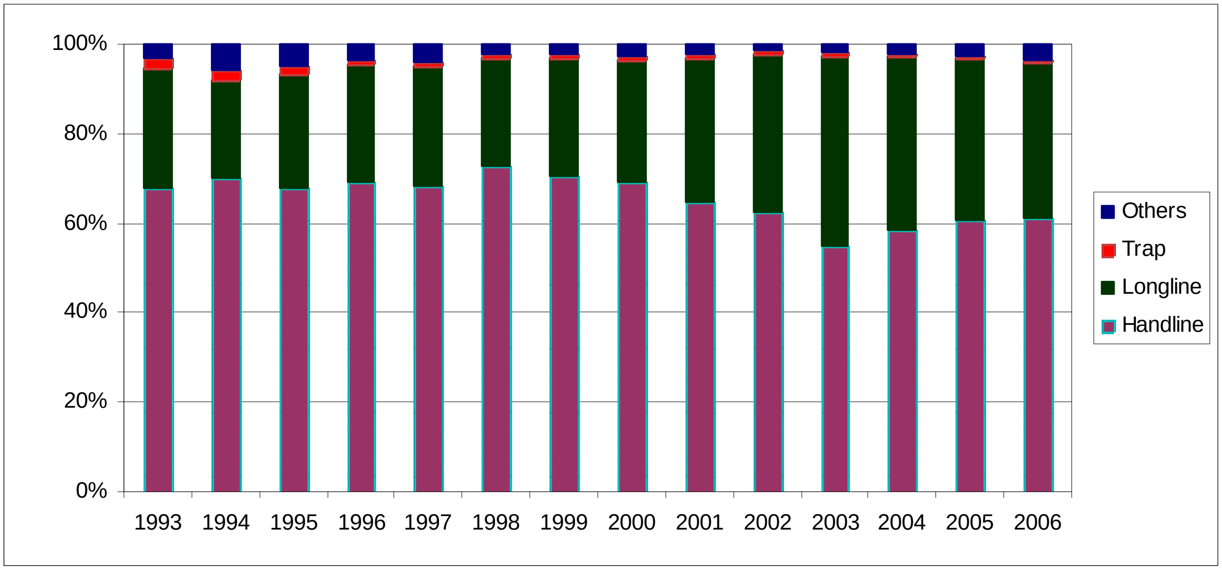
As can be gleaned from Figure 3.4.1.11, longlines caught a majority of red grouper landings each year for the period 1993-2006. On average, longlines accounted for 60.7 percent of red grouper landings, handlines caught 24.6 percent, traps caught 14.3 percent, and other gear types such as trolling and diving caught the rest (0.4 percent and not visible in the graph). The longline share of landings ranged from 51.3 percent in 2000 to 72 percent in 1998; handline share ranged from 19.7 percent in 1998 to 30.2 percent in 2000. While the landings share of traps remained low, it actually reached a peak of 22.5 percent in 1995. These ranges indicate share fluctuations from year to year.

Figure 3.4.1.11. Percent distribution of red grouper landings by gear type, 1993-2006.



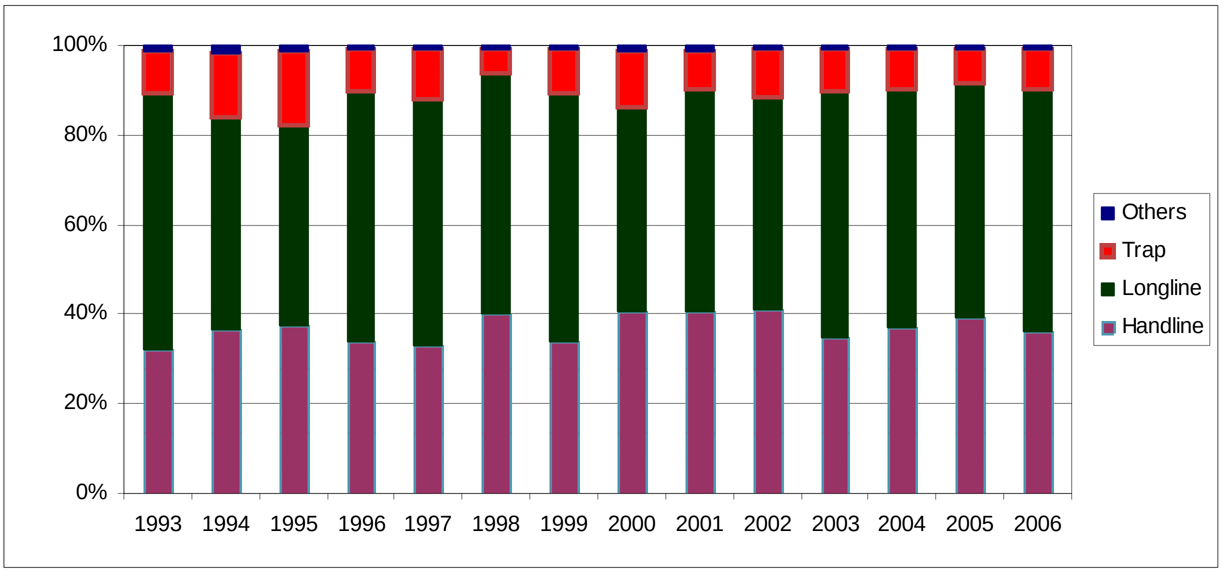
In the gag fishery, handlines accounted for the largest share, with an annual average of 64.3 percent (see Figure 3.4.1.12). Longlines accounted for an average of 32.2 percent and traps, 0.8 percent. As in the red grouper fishery, gag landings share by each gear type fluctuated from year to year. The ranges are 54.8 to 72.8 percent for handlines, 22 to 42.6 percent for longlines, and 0.4 to 2.2 percent for traps. Unlike in the red grouper fishery, traps played a relatively minor role in the gag fishery.

Figure 3.4.1.12. Percent distribution of gag landings by gear type, 1993-2006.



Since red grouper landings accounted for most of the shallow-water grouper landings, it is not surprising that longlines accounted for the largest share of shallow-water grouper landings (see Figure 3.4.1.13). On average, longlines accounted for 51.7 percent of all shallow-water landings, handlines 37.2 percent, traps 10.2 percent, and other gear types 1.0 percent. The peak share for longlines occurred in 1993 at 57.3 percent, indicating that the gear type's share has fallen down over the period 1993-2006. The peak share for handlines occurred in 2002 at 41.1 percent. After 2002, the share fluctuated around a downward trend. With the shares of traps and other gear types remaining at relatively low levels, the downtrend in the handline sector means the longline sector started to recoup shares it lost in the past 10 years.

Figure 3.4.1.13. Percent distribution of shallow-water grouper landings by gear types, 1993-2006.

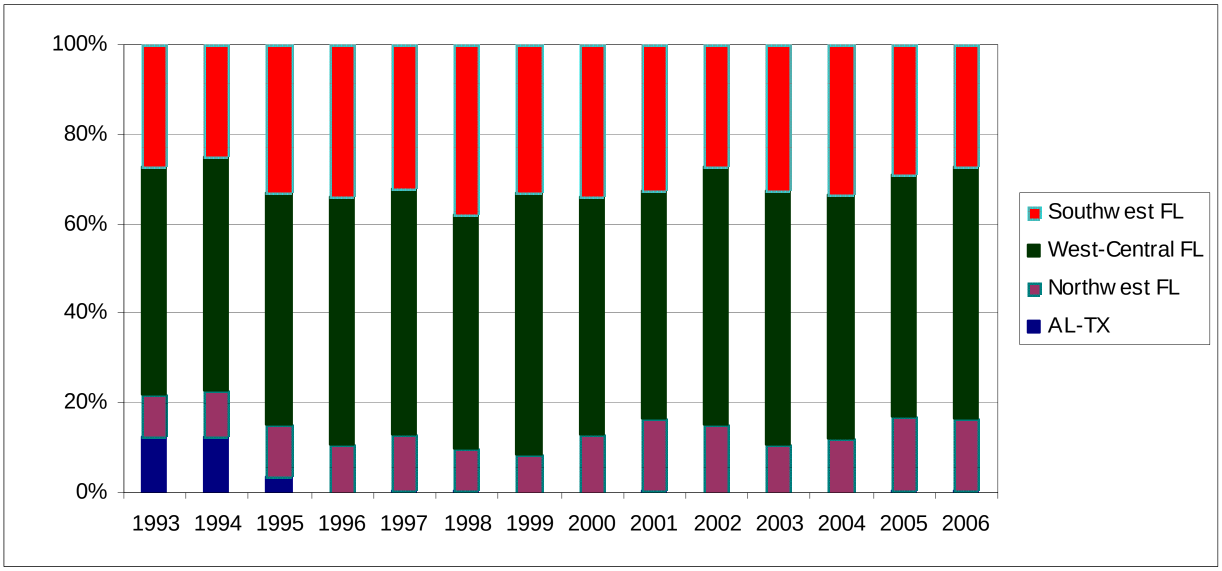


Distribution by Area

Since groupers caught in the Gulf are landed mostly in Florida, distribution of landings by area is presented by combining Alabama through Texas (areas 11-21) as one area and separating Florida into three areas—Southwest FL (areas 1-4), West-Central FL (areas 5-6), and Northwest FL (areas 7-10). Gulf grouper landings in areas outside the Gulf are inconsequential.

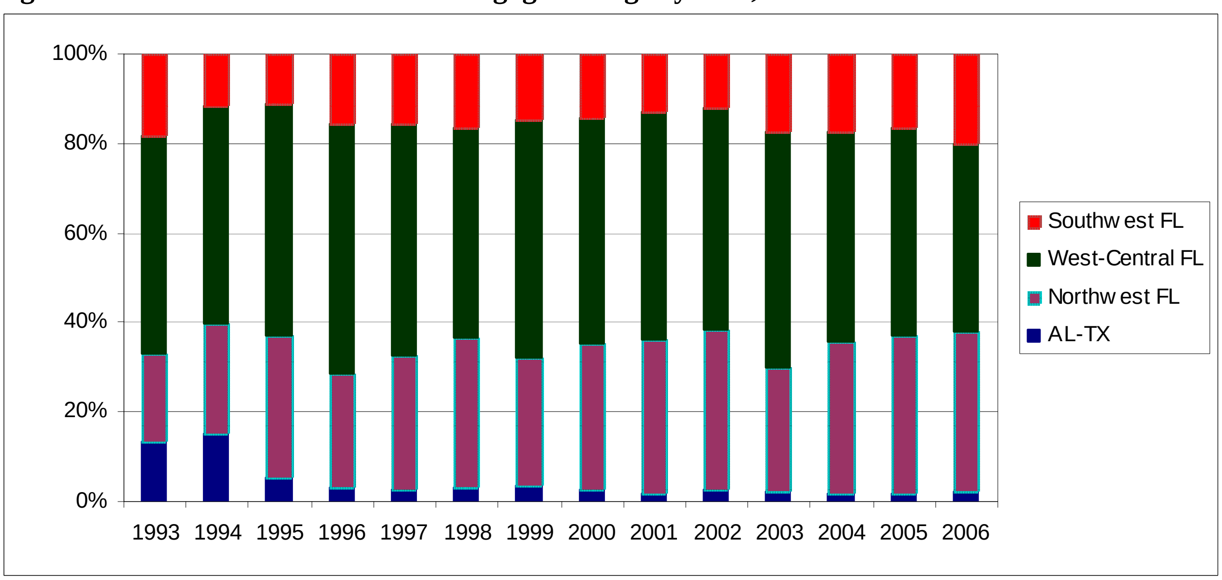
For the period 1993-2006, Florida accounted for 97.8 percent of all red grouper landings (see Figure 3.4.1.14). Within Florida, the West-Central region accounted for most of the landings. This region landed an annual average of 54.3 percent of all (not just Florida) red grouper landings, followed by Southwest FL at 31.3 percent, and by Northwest FL at 12.3 percent. Peak shares occurred in 1998 at 37.8 percent for Southwest FL, in 1999 at 58.3 percent for West-Central FL, in 2001 at 16.1 percent for Northwest FL, and in 1994 at 12.5 percent for the rest of the Gulf. Shares of various areas fluctuated over the entire period.

Figure 3.4.1.14. Percent distribution of red grouper landings by area, 1993-2006.



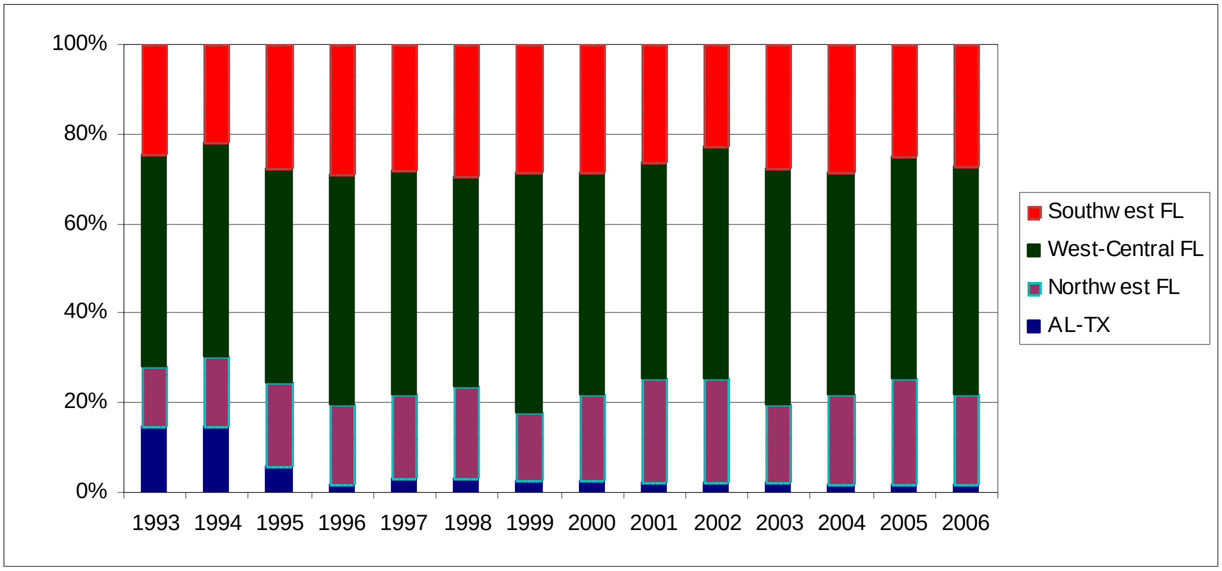
The share distribution of gag landings almost mimicked that of red grouper. On average, Florida accounted for 96.7 percent of all gag landings (see Figure 3.3.1.15). West-Central FL is the top region, accounting for an average of 49.4 percent, followed by Northwest FL at 31.9 percent, and then by Southwest FL at 15.4 percent. Peak shares occurred in 2005 for Southwest FL at 19.9 percent, in 1996 for West-Central FL at 55.6 percent, in 2002 for Northwest FL at 35.7 percent, and in 1994 for the rest of the Gulf at 15.4 percent. Again, share distributions of each area fluctuated throughout the entire period.

Figure 3.4.1.15. Percent distribution of gag landings by area, 1993-2006.



For all shallow-water grouper, 95.9 percent of all landings went to Florida, again with West-Central FL as the dominant region in Florida and throughout the Gulf (see Figure 3.3.1.16). Peak shares occurred in 1998 for Southwest FL at 29.6 percent, in 1999 for West-Central FL at 53.7 percent, in 2001 in Northwest FL at 23.5 percent, and in 1993-1994 for the rest of Gulf at 14.9 percent.

Figure 3.4.1.16. Percent distribution of shallow-water grouper landings by area, 1993-2006.



Species Composition

As a multi-species fishery, a fishing trip in the reef fish fishery in general and grouper fishery in particular catches a variety of species. The next two tables present species composition of trips that landed at least one pound of either red grouper or gag for the period 2001-2006.

As shown in Table 3.4.1.1, trips that caught at least one pound of red grouper also caught many other species, such as other shallow-water groupers, deepwater groupers, tilefishes, snappers, and jacks, etc. The number of trips catching red grouper ranged from 5,803 in 2006 to 7,214 in 2002. In these trips, shallow-water groupers were the dominant species, and within the shallow-water grouper complex, red grouper came in first. Shallow-water grouper accounted for as low as 69 percent in 2003 and as high as 80 percent in 2001. Red grouper comprised as low as 44.7 percent in 2003 and as high as 53 percent in 2006 of all the species caught in these trips.

Table 3.4.1.1. Species composition of trips with at least one pound of red grouper (1,000 lbs).

	2001		2002		2003		2004		2005		2006	
	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%
Shallow-water Groupers	9,024	80.1	9,303	78.8	7735	69.3	8597	74.7	7678	75.7	6617	69.5
Red	5,922	52.6	6,245	52.9	4,990	44.7	5,627	48.9	5,106	50.3	5,042	53.0
Gag	2,026	18.0	1,941	16.4	1,800	16.1	1,989	17.3	1,788	17.6	1,059	11.1
Black	833	7.4	893	7.6	699	6.3	729	6.3	530	5.2	351	3.7
Scamp	215	1.9	204	1.7	234	2.1	239	2.1	242	2.4	155	1.6
Deepwater Groupers	340	3.0	265	2.2	389	3.5	328	2.9	244	2.4	192	2.0
Tilefishes	78	0.7	70	0.6	74	0.7	64	0.6	66	0.6	65	0.7
Shallow-water Snappers	412	3.7	445	3.8	381	3.4	449	3.9	322	3.2	461	4.8
Mid-shelf Snappers	321	2.8	554	4.7	1,147	10.3	982	8.5	943	9.3	1,084	11.4
Triggerfish	47	0.4	79	0.7	131	1.2	93	0.8	73	0.7	46	0.5
Jacks	210	1.9	257	2.2	294	2.6	236	2.1	238	2.3	243	2.6
Grunts/porgies	300	2.7	326	2.8	468	4.2	351	3.1	253	2.5	255	2.7
Sea Bass	43	0.4	21	0.2	22	0.2	21	0.2	5	0.0	0	0.0
Coastal Pelagics	111	1.0	104	0.9	85	0.8	75	0.6	49	0.5	92	1.0
Sharks	338	3.0	346	2.9	394	3.5	292	2.5	257	2.5	438	4.6
Tunas	7	0.1	5	0.0	3	0.0	2	0.0	3	0.0	2	0.0
Other Species	33	0.3	33	0.3	32	0.3	19	0.2	17	0.2	19	0.2
No. of Trips	7,029		7,214		7,185		7,096		5,845		5,803	

On trips landing at least one pound of gag, shallow-water groupers were also the dominant species (see Table 3.4.1.2). And even in these trips, red grouper still comprised most of the shallow-water grouper catches. It should be pointed out, however, that these trips do not reflect trips that primarily targeted gag. The trips considered here include many of the trips also included in the previous table which showed that trips catching red grouper also caught gag.

Table 3.4.1.2. Species composition of trips with at least one pound of gag (1,000 lbs).

	2001		2002		2003		2004		2005		2006	
	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%	lbs	%
Shallow-water Groupers	6,460	70.8	6,694	67.4	5,681	61.7	6,261	69.5	5,952	72.6	4,980	64.6
Red	3,986	43.7	4,288	43.2	3,434	37.3	3,819	42.4	3,780	46.1	3,608	46.8
Gag	2,208	24.2	2,118	21.3	1937	21.0	2,134	23.7	1,890	23.1	1,160	15.0
Black	71	0.8	79	0.8	91	1.0	83	0.9	41	0.5	53	0.7
Scamp	184	2.0	194	1.9	211	2.3	215	2.4	222	2.7	150	1.9
Deepwater Groupers	363	4.0	414	4.2	584	6.3	401	4.5	331	4.0	340	4.4
Tilefishes	71	0.8	75	0.8	85	0.9	74	0.8	52	0.6	80	1.0
Shallow-water Snappers	204	2.2	220	2.2	205	2.2	240	2.7	177	2.2	229	3.0
Mid-shelf Snappers	1,122	12.3	1,466	14.8	1,497	16.2	1,117	12.4	947	11.6	1,225	15.9
Triggerfish	60	0.7	92	0.9	95	1.0	71	0.8	62	0.8	38	0.5
Jacks	352	3.9	390	3.9	366	4.0	293	3.2	263	3.2	281	3.6
Grunts/porgies	215	2.4	249	2.5	355	3.9	265	2.9	198	2.4	190	2.5
Sea Bass	27	0.3	13	0.1	20	0.2	18	0.2	4	0.0	0	0.0
Coastal Pelagics	82	0.9	96	1.0	70	0.8	68	0.8	75	0.9	87	1.1
Sharks	129	1.4	178	1.8	218	2.4	174	1.9	119	1.5	236	3.1
Tunas	11	0.1	7	0.1	4	0.0	3	0.0	3	0.0	4	0.0
Other Species	30	0.3	32	0.3	33	0.4	27	0.3	15	0.2	17	0.2
No. of Trips	5,762		5,785		5,839		5,486		4,649		4,679	

Vessels by Landing Categories

Vessels in the reef fish fishery caught not only several species but also varying amounts of the species. Table 3.4.1.3 presents landing categories of vessels landing gag, red grouper, shallow-water grouper, or reef fish. On average from 2001 to 2006, most vessels landing gag were concentrated on the lower end of the distribution; slightly more than half of all vessels landing gag had 1,000 pounds or less of gag, and more than 80 percent landed 5,000 pounds or less of gag. There were over 100 vessels landing more than 5,000 pounds but less than 50,000 pounds. Some vessels did land more than 50,000 pounds of gag, but were too few to warrant inclusion in the table.

There were more vessels landing red grouper than gag which probably would be the expectation since the commercial fishery has historically been the major participant in the red grouper than in the gag fishery. A fairly good number of vessels would appear to populate the entire landings distribution. There were on average 69 vessels landing between 5,000 and 10,000 pounds or red grouper, 129 vessels landing more than 10,000 pounds but less than 50,000 pounds of red grouper, and 23 vessels landing more than 50,000 pounds of red grouper. Despite the relatively more even distribution (relative to gag vessels), close to 70 percent of all vessels landing red grouper averaged 5,000 pounds or less red grouper.

As would be expected, there were more vessels landing any species of shallow-water grouper than either gag or red grouper. However, the distribution of vessels across the landing categories would appear to follow the pattern observed for vessels landing red grouper. A fair number of vessels populated the entire distribution, but a majority (about 65%) of vessels still belonged to the 5,000 pounds or less category.

For vessels landing any reef fish species, the distribution by landing category would look more evenly spread than those for gag, red grouper, and shallow-water grouper. Vessels landing more than 5,000 pounds outnumbered those landing 5,000 pounds or less (520 vs. 477 vessels). A relatively good number of vessels (126) landed more than 50,000 pounds. Some of these would be those landing red grouper or shallow-water grouper, but many were also landing other species of reef fish than shallow-water grouper.

Table 3.4.1.3. Number of boats by pounds of selected species landed, 2001-2006.

Pounds	2001	2002	2003	2004	2005	2006	Average
Number of vessels landing gag							
1 --100	104	124	132	108	114	116	116
101 -- 1,000	229	217	233	229	177	216	217
1,001 -- 5,000	196	207	184	196	192	166	190
5,001 – 10,000	63	65	55	62	57	39	57
10,001 – 50,000	64	55	53	53	55	24	51
> 50,000	0	0	0	0	0	0	0
Number of vessels landing red grouper							
1 --100	147	149	169	136	128	99	138
101 -- 1,000	211	214	208	232	192	181	206
1,001 -- 5,000	153	177	179	173	183	135	167
5,001 – 10,000	71	54	83	71	74	63	69
10,001 – 50,000	144	154	105	137	114	121	129
> 50,000	27	29	20	23	21	20	23
Number of vessels landing any species of shallow-water grouper							
1 --100	139	126	125	107	95	89	114
101 -- 1,000	245	234	250	229	228	203	232
1,001 -- 5,000	244	248	239	233	216	196	229
5,001 – 10,000	79	88	104	105	92	62	88
10,001 – 50,000	206	205	167	188	173	156	183
> 50,000	50	48	39	42	37	34	42
Number of vessels landing any species of reef fish							
1 --100	50	43	55	50	58	33	48
101 -- 1,000	182	191	180	179	149	141	170
1,001 -- 5,000	308	283	253	245	254	211	259
5,001 – 10,000	106	110	124	126	119	88	112
10,001 – 50,000	305	305	287	284	265	243	282
> 50,000	133	132	130	135	114	114	126

Fish Dealers

There are currently 178 Gulf reef fish dealers with active permits, but since the reef fish dealer permitting system in the Gulf is an open access program, the number of dealers can vary from year to year. As part of the commercial reef fish logbook program, reporting vessels identify the dealers who receive their landed fish. Commercial reef fish vessels with federal permits are required to sell their harvest only to permitted dealers. Based on vessel logbook records for 2004 to 2006, an average of 156 reef fish dealers were actively buying and selling gag. These dealers were distributed around the Gulf as follows: 138 in Florida, 7 in Alabama and Mississippi, and 10 in Louisiana. One dealer was identified to have a homeport outside the Gulf. Dealers in Florida purchased about $6.27 million worth of gag, followed by dealers in Louisiana with purchases of $50.6 thousand and dealers in other Gulf states with purchases of $14.3 thousand. For the period 2004-2006, an average of 172 reef fish dealers were actively buying and selling red grouper. They were distributed around the Gulf as follows: 160 in Florida and 11 all in all for Alabama, Mississippi and Louisiana. Dealers in Florida purchased about $13.7 million of red grouper while the rest of the Gulf states purchased $29.4 thousand of red grouper.

The dominance of Florida in terms of the number of grouper dealers and vessels implies that most of the direct and indirect effects of regulatory changes for grouper would fall on fishery participants in Florida. As such, rippling effects of those regulations would be felt in communities and support industries in the area.

Economic Impacts

Estimates of the output (sales) and job (full time equivalent (FTE)) impacts of the commercial grouper and tilefish were derived using 2006 west Florida landings and value data (James E. Kirkley, Virginia Institute of Marine Science, personal communication). While this perspective encompasses more than just the gag and red grouper fisheries, these two species accounted for approximately 84 percent of the total ex-vessel value from all grouper and tilefish species west Florida landings in 2006. Further, while grouper and tilefish are landed in other states, west Florida accounted for approximately 98.5 percent of total Gulf of Mexico gag landings (lbs; NOAA Fisheries commercial data at www.st.nmfs.noaa.gov/st1/commercial/index.html) and approximately 99.7 percent of red grouper landings. The total 2006 output (sales) impacts of the commercial grouper and tilefish fishery on the Florida economy is approximately $88.2 million, supporting an estimated 1,848 jobs. The largest component of these impacts accrues to the restaurant sector, accounting for approximately $45.8 million and 1,202 FTE jobs, followed by the harvest sector, accounting for approximately $22.3 million and 425 FTE jobs. These estimates include the direct effects (effects in the sector where an expenditure is actually made), indirect effects (effects in sectors providing goods and services to directly affected sectors), and induced effects (effects induced by the personal consumption expenditures by employees in the direct and indirectly affected sectors). Because of the adaptations of standard economic impact models or assumptions required to develop economic impact models of fishery sectors, caution is advised in comparing these estimates with those of the recreational fishery due to potential differences in methodology.

Imports

Seafood imports are in general the major source of seafood products in the U.S, and this is also true in the reef fish fishery. Table 3.3.1.4 summarizes imports of snappers and groupers into the

U.S. As can be gleaned from the table, imports steadily increased over the 1993-2006 period, from a low of 22 million pounds in 1994 to a high of 49.7 million pounds in 2005, with a slight drop in 2006. This is in contrast to domestic production of all reef fish in the Gulf which, although averaging at 18.4 million pounds annually, had been declining since its peak in 2002 (see Figure 3.4.1.1). In addition, the lowest import level of 22 million pounds in 1994 is higher than the highest reef fish production of 20.5 million pounds in 2002. Although the levels of domestic production and imports are not totally comparable for a variety of reasons, such as fresh versus frozen, the difference in magnitude still indicates the dominance of imports in the reef fish market.

The value of imports also rose steadily over the years, from a low of $42.3 million (after adjusting for inflation) to its highest level of $101.7 million in 2006. The value of domestic production, on the other hand, rose slightly in the first years but declined after reaching its peak of $50.1 million in 2001. In 2006, the value of domestic reef fish production stood at $43.5 million, which is less than half of that of imports. Again, it should be noted that the two values are not strictly comparable, but the difference in magnitude still signifies the large market share of imports in the domestic market for reef fish.

Table 3.4.1.4. U.S. imports of snapper and grouper, combined fresh and frozen
(Q=Quantity in million pounds, product weight)
(V=Value in million dollars, f.a.s., foreign port)
(VR=Real value in millions of 2006 dollars, f.a.s., foreign port)

Year	Q	V	VR
1993	24.1	32.9	45.5
1994	22.0	30.9	42.3
1995	28.2	38.5	50.8
1996	33.0	47.5	61.3
1997	40.3	58.0	74.9
1998	38.8	58.5	77.4
1999	35.4	53.9	70.8
2000	38.7	63.0	78.2
2001	39.5	62.3	76.4
2002	42.6	69.5	87.3
2003	44.5	73.3	87.4
2004	43.1	75.6	84.9
2005	49.7	93.1	97.5
2006	48.6	101.7	101.7

3.4.2 Recreational Sector

Additional information on the Gulf of Mexico recreational fishery is provided in Reef Fish Amendment 27/Shrimp Amendment 14 (GMFMC 2007), Reef Fish Amendment 25/Coastal Migratory Pelagics Amendment 17 (GMFMC 2005c), the 2005 recreational fishery grouper regulatory amendment (GMFMC 2005d), and Reef Fish Amendment 30A and is incorporated herein by reference.

Anglers

In 2005, more than 3.3 million in-state anglers (anglers who fished within their state of residence) took 23 million trips (inclusive of visitor trips) and caught over 154 million fish. These totals do not include activity occurring solely in Texas (all modes) or in the headboat sector (all Gulf states). More than 70 percent of these anglers fished in Florida, followed by, in decreasing order, Louisiana, Alabama, and Mississippi. Similarly, Florida accounted for a large percentage of the trips (70 percent), followed in order by Louisiana, Alabama, and Mississippi. The most commonly caught non-bait species were spotted seatrout, red drum, gray snapper, white grunt, sand seatrout, sheepshead, red snapper, king mackerel, and Spanish mackerel.

The level and pattern of change in recreational effort, in terms of number of trips, for the period 1993-2006 are presented in Tables 3.4.2.1 to 3.4.2.6. Total recreational effort for all species from Florida through Louisiana averaged at 19.5 million trips annually. This effort remained about flat from 1993 through 1996, increased in 1997, but subsequently fell to its lowest level of 15.9 in 1999. It then registered a relatively fast growth in the 2000s.

Summary characteristics for red grouper target effort are presented in Tables 3.4.2.1 to 3.4.2.3. Target effort for red grouper averaged at 115,855 trips annually (Table 3.4.2.1). This effort followed a seesaw pattern throughout the period. It fell from 1993 through 1998, increased from 1999 through 2001; fell again in the next two years but only to increase again in the last two years. Relative to total recreational effort, target effort for red grouper ranged from 0.3 percent (1998) to 0.95 percent (1993), or averaged at 0.59 percent annually.

Florida accounted for most of red grouper target trips (see Table 3.4.2.2). In fact target trips for red grouper in other states, except Alabama in the last few years, were practically non-existent. Due to the dominance of Florida in red grouper target trips, the seesaw pattern of all red grouper target trips described earlier was mainly influenced by the same seesaw pattern of red grouper target trips in Florida. Except in the last three years when red grouper target trips started appearing in Alabama, the overall red grouper target trips were practically Florida trips.

Private and charter fishing modes accounted for most of target trips, with the charter mode far outweighing the private mode (see Table 3.4.2.3). Shore mode target trips for red grouper only showed up in the early years, but were practically non-existent in the last 8 years. Private mode target trips remained low but increasing especially n the last few years. The pattern of red grouper target trips by the charter mode followed a similar seesaw pattern as that of total red grouper target trips.

What the foregoing discussions imply is that the pattern of overall target trips for red grouper in 1993-2005 was primarily determined by the pattern of red grouper target trips in Florida taken by the charter mode.

Red grouper catch trips are another factor which may be used to describe the effort in the recreational red grouper fishery. Summary characteristics for red grouper catch effort are presented in Tables 3.4.2.4 to 3.4.2.6. Catch effort for red grouper averaged at 463,167 trips annually (Table 3.4.2.4). This about 4 times the size of red grouper target trips, indicating many trips which did not target red grouper actually ended up catching one. After a steady decline in the early years, catch effort for red grouper picked up in 1998 and rose rapidly thereafter until its decline in 2005. Relative to total recreational effort, catch effort for red grouper ranged from 1.62 percent (1997) to 3.37 percent (2004), or averaged at 2.34 percent annually.

Florida is clearly the dominant state in terms of catch effort (Table 3.4.2.5). Among other states in the Gulf, only Alabama registered some red grouper catch trips although it did so mainly in the last few years. This dominance of Florida also translated to determining the pattern of change in overall red grouper catch trips. As with overall red grouper catch trips, Florid catch trips for red grouper fell in the early years, picked up in 1998 and rose rather steeply thereafter until its fall in the last year. Red grouper catch effort in Florida averaged at 458, 808 trips and ranged from 300,490 trips in 1997 to 807,217 trips in 2004.

All fishing modes registered a fair amount of red grouper catch trips, but clearly the charter mode dominated all other fishing modes (Table 3.4.2.6). Throughout the whole period, shore mode catch trips remained rather flat. The private mode, on the other hand, registered increasing red grouper catch trips, with rather steep increases in the last few years except the last. This fishing mode started to challenge the dominance of the charter mode in the last few years. Catch trips for the charter mode declined in the early years, picked up in 1998 and steeply rose thereafter until 2004. This exactly the same pattern characterizing the movement of overall red grouper catch trips. Catch effort for the charter mode averaged at 383,446 trips and ranged from 240,215 trips in 1997 to 672,288 trips in 2004.

As with target effort, red grouper catch trips by Florida charterboats determined the pattern of movement of overall red grouper catch trips.

Summary characteristics for gag target effort are presented in Tables 3.4.2.7 to 3.4.2.9. Target effort for gag averaged at 297,189 trips annually and ranged from 144,785 trips in 1994 to 580,424 trips in 2005 (Table 3.4.2.7). This effort increased in the early years, and although it fell in 1998 it did recover in subsequent years, with rather steep increases in the last few years. Relative to total recreational effort, target effort for gag ranged from 0.83 percent (1994) to 2.57 percent (2005), or averaged at 1.50 percent annually.

Florida accounted for most of gag target trips (Table 3.4.2.8). In fact target trips for gag in other states, except Alabama, were practically non-existent. Due to the dominance of Florida in gag target trips, the pattern of movement for all gag target trips described earlier was mainly influenced by the same pattern of gag target trips in Florida. It is worth noting, though, that gag target trips in Alabama rose over time although still way below those of Florida.

Although the charter mode is the dominant mode in terms of gag target trips, the shore and private modes also registered a fair amount of gag target trips (Table 3.4.2.9). Both the shore and private modes registered a rather flat movement of gag target trips over time. They also registered about the same number of gag target trips, except in the last year when private mode target trips for gag almost tripled. Gag target trips by the charter mode increased over time and exactly mimicked that of overall gag target trips.

As in the red grouper case, the performance of the Florida charter mode determined the pattern of movement in the overall gag target trips.

Summary characteristics for gag catch effort are presented in Tables 3.4.2.10 to 3.4.2.12. Catch effort for gag averaged at 830,016 trips annually (Table 3.4.2.10). This is close to 4 times the size of gag target trips, indicating a majority of trips which did not target gag actually ended up catching one. After a slight decline in the early years, catch effort for gag picked up in 1998 and rose rapidly thereafter. Unlike target effort, gag catch effort continued to increase in 2005. Relative to total recreational effort, catch effort for gag ranged from 2.75 percent (1993) to 5.91 percent (2005), or averaged at 4.18 percent annually.

Gag catch trips mostly came from Florida, which accounted for 96 percent of all gag catch trips (Table 3.4.2.11). Alabama came in second, followed by Louisiana and Mississippi in that order. This dominance of Florida also translated to determining the pattern of change in overall gag catch trips. As with overall gag catch trips, Florida catch trips for gag fell slightly in the early years, picked up in 1998 and rose rather steeply thereafter. They did taper off in the last two years. Gag catch effort in Florida averaged at 796,579 trips and ranged from 467,749 trips in 1993 to 1,256,016 trips in 2005.

All fishing modes registered some amount of gag catch trips, but clearly the charter mode dominated all other fishing modes (Table 3.4.2.12). Throughout the whole period, shore mode catch trips steadily rose but only slightly. The private mode gag catch trips rose steadily in the early years, fell sharply in 2000, recovered in subsequent years and rose sharply in the last year. Catch trips for the charter mode declined in the early years, picked up in 1998 and steeply rose thereafter but fell sharply in 2005. This is exactly the same pattern characterizing the movement of overall gag catch trips. Catch effort for the charter mode averaged at 624,866 trips and ranged from 359,892 trips in 1993 to 1,039,212 trips in 2004.

The Headboat data do not support the estimation of target effort. Nevertheless, Table 3.4.2.13 provides estimates of the number of headboat angler days from 1987 through 2005, and for the current purpose these angler days are taken to represent headboat angler effort. This effort has averaged at 244,387 days annually, with a range of 190,090 days in 2005 to 317,991 days in 1994. It has slowly declined over the years, with occasional increases in certain years. The West Florida/Alabama region has accounted for most of the effort and has been the major force in slightly downward trend of overall effort. Angler days in Louisiana and Texas have remained relatively flat through the years. Louisiana has the lowest number of headboat angler days.

Social and economic characteristics of recreational anglers are collected periodically as an add-on survey to the MRFSS. Holiman (1999) and Holiman (2000) summarize the data from the 1997-1998 survey. Table 3.4.14 contains some of the major findings of this survey.

The typical Gulf marine recreational angler was 44 years old, male (80%), white (90%), employed full time (92%), and had an average annual household income of $42,700. The average number of years fished in the state was 16. The average number of fishing trips taken in the 12 months preceding the interview was approximately 38 and these trips were mostly (75%) one-day trips. The average expenditure on the intercepted trip was less than $50. Seventy-five percent of the surveyed anglers reported they held saltwater licenses, and 59 percent owned boats used for recreational saltwater fishing. Those anglers who did not own their own boat spent an average of $269 per day on boat fees when fishing on a party/charter or rental boat. About 76 percent of the surveyed anglers were employed or self-employed and the majority of those unemployed were retired.

Using the 1997-1998 socioeconomic data, Haab et al. (2001) estimated three types of economic values: 1) Value of access to sites for individual anglers; 2) value of access to species for individual anglers; and, 3) value associated with changes in the ability of anglers to catch fish. The value for site access is generally interpreted as the value lost when a fishing site is closed to fishing. An analogous interpretation holds for the species access value; that is, it is the value associated with a prohibition for fishing for a specific fish species. The value of a unit increase in species caught and kept refers to the angler's valuation of the worth of an extra fish caught and kept above expenditures.

Haab et al. (2001) estimated the following values associated with the private/rental fishing mode. The economic loss per trip from closing a fishing site ranged from $1.44 in Alabama to $71.84 in West (Gulf) Florida. The loss was also estimated to be relatively high in Louisiana. The economic loss per trip from unavailability (closure) of snapper-grouper ranged from $0.30 in Alabama to $5.24 in West Florida, whereas the value of a unit increase in the catch of snapper-grouper ranged from $0.27 in Alabama to $4.15 in West Florida. For all fishing modes, the economic loss per trip from closing a fishing site ranged from $1.84 in Alabama to $54.14 in West Florida, whereas the economic value from a unit increase in the catch of bottom fish (which include other reef fish species) ranged from $3.47 in Alabama to $3.65 in West Florida.

Table 3.4.2.1. GULF OF MEXICO RED GROUPER TARGET EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1993	165,442	0.95	17,431,009
1994	112,655	0.64	17,503,737
1995	163,294	0.94	17,390,316
1996	86,561	0.51	17,032,778
1997	56,854	0.31	18,593,084
1998	50,052	0.30	16,703,364
1999	57,461	0.36	15,893,729

2000	135,417	0.64	21,017,783
2001	155,316	0.68	22,889,697
2002	106,967	0.54	19,665,578
2003	62,858	0.27	22,956,673
2004	155,688	0.64	24,355,357
2005	184,311	0.84	21,906,426
2006	141,860	0.59	23,862,890

Table 3.4.2.2. GULF OF MEXICO RED GROUPER TARGET EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE												TOTAL		
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI					
	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
YEAR															
1993	0	0.00	933,061	165,442	1.28	12,928,092	0	0.00	2,703,754	0	0.00	866,103	165,442	0.95	17,431,009
1994	0	0.00	886,949	112,655	0.86	13,166,982	0	0.00	2,485,308	0	0.00	964,498	112,655	0.64	17,503,737
1995	0	0.00	998,539	163,294	1.32	12,396,870	0	0.00	2,941,473	0	0.00	1,053,434	163,294	0.94	17,390,316
1996	0	0.00	931,884	86,561	0.70	12,331,873	0	0.00	2,823,868	0	0.00	945,154	86,561	0.51	17,032,778
1997	0	0.00	1,024,177	56,854	0.42	13,384,436	0	0.00	3,185,378	0	0.00	999,093	56,854	0.31	18,593,084
1998	0	0.00	968,485	50,052	0.41	12,234,580	0	0.00	2,672,764	0	0.00	827,536	50,052	0.30	16,703,364
1999	0	0.00	1,169,914	57,461	0.51	11,296,851	0	0.00	2,621,446	0	0.00	805,518	57,461	0.36	15,893,729
2000	0	0.00	1,086,818	135,417	0.90	15,086,213	0	0.00	3,751,609	0	0.00	1,093,144	135,417	0.64	21,017,783
2001	0	0.00	1,635,798	155,316	0.95	16,388,611	0	0.00	3,615,244	0	0.00	1,250,045	155,316	0.68	22,889,697
2002	866	0.07	1,190,004	106,100	0.74	14,418,275	0	0.00	3,018,946	0	0.00	1,038,353	106,967	0.54	19,665,578
2003	202	0.01	1,499,989	62,656	0.39	16,008,974	0	0.00	4,270,921	0	0.00	1,176,788	62,858	0.27	22,956,673
2004	602	0.03	2,040,041	155,087	0.94	16,431,321	0	0.00	4,795,033	0	0.00	1,088,962	155,688	0.64	24,355,357
2005	2,312	0.15	1,566,072	181,999	1.18	15,488,773	0	0.00	3,926,076	0	0.00	925,504	184,311	0.84	21,906,426
2006	0	0.00	2,143,425	141,860	0.87	16,230,274	0	0.00	4,491,280	0	0.00	997,911	141,860	0.59	23,862,890

Table 3.4.2.3. GULF OF MEXICO RED GROUPER TARGET EFFORT TRIPS, BY MODE, MRFSS DATA.

	MODE									TOTAL		
	SHORE			PARTY/CHARTER			PRIVATE/RENTAL					
	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1993	8,726	0.11	7,642,451	0	0.00	747,252	156,716	1.73	9,041,306	165,442	0.95	17,431,009
1994	0	0.00	7,293,305	11,280	1.37	825,632	101,374	1.08	9,384,801	112,655	0.64	17,503,737
1995	3,290	0.05	6,925,453	5,577	0.62	893,967	154,427	1.61	9,570,896	163,294	0.94	17,390,316
1996	0	0.00	6,800,513	6,444	0.73	881,248	80,116	0.86	9,351,017	86,561	0.51	17,032,778
1997	1,534	0.02	7,423,022	3,496	0.36	974,979	51,824	0.51	10,195,083	56,854	0.31	18,593,084
1998	0	0.00	6,861,289	301	0.03	903,170	49,752	0.56	8,938,905	50,052	0.30	16,703,364
1999	0	0.00	5,918,885	10,042	1.15	877,041	47,419	0.52	9,097,803	57,461	0.36	15,893,729
2000	0	0.00	8,477,685	4,407	0.54	811,634	131,010	1.12	11,728,464	135,417	0.64	21,017,783
2001	0	0.00	9,776,174	9,283	1.25	742,386	146,033	1.18	12,371,138	155,316	0.68	22,889,697
2002	0	0.00	7,266,262	7,016	0.92	764,222	99,951	0.86	11,635,095	106,967	0.54	19,665,578
2003	0	0.00	8,155,304	7,215	1.04	691,362	55,643	0.39	14,110,007	62,858	0.27	22,956,673
2004	0	0.00	9,430,325	17,263	2.11	818,147	138,425	0.98	14,106,865	155,688	0.64	24,355,357
2005	0	0.00	8,542,648	14,221	2.00	712,417	170,089	1.34	12,651,361	184,311	0.84	21,906,426
2006	2,444	0.03	9,205,661	7,268	0.89	820,483	132,149	0.96	13,836,746	141,860	0.59	23,862,890

Table 3.4.2.4. GULF OF MEXICO RED GROUPER CATCH EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	CATCH EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1993	421,165	2.42	17,431,009
1994	439,130	2.51	17,503,737
1995	408,641	2.35	17,390,316
1996	342,052	2.01	17,032,778
1997	300,493	1.62	18,593,084
1998	320,497	1.92	16,703,364
1999	403,272	2.54	15,893,729
2000	403,393	1.92	21,017,783
2001	471,798	2.06	22,889,697
2002	466,325	2.37	19,665,578
2003	557,209	2.43	22,956,673
2004	829,491	3.41	24,355,357
2005	541,018	2.47	21,906,426
2006	297,903	1.25	23,862,890

Table 3.4.2.5. GULF OF MEXICO RED GROUPER CATCH EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE												TOTAL		
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI					
	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS
YEAR	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1993	0	0.00	933,061	421,165	3.26	12,928,092	0	0.00	2,703,754	0	0.00	866,103	421,165	2.42	17,431,009
1994	0	0.00	886,949	439,130	3.34	13,166,982	0	0.00	2,485,308	0	0.00	964,498	439,130	2.51	17,503,737
1995	314	0.03	998,539	408,327	3.29	12,396,870	0	0.00	2,941,473	0	0.00	1,053,434	408,641	2.35	17,390,316
1996	465	0.05	931,884	341,587	2.77	12,331,873	0	0.00	2,823,868	0	0.00	945,154	342,052	2.01	17,032,778
1997	0	0.00	1,024,177	300,493	2.25	13,384,436	0	0.00	3,185,378	0	0.00	999,093	300,493	1.62	18,593,084
1998	0	0.00	968,485	320,497	2.62	12,234,580	0	0.00	2,672,764	0	0.00	827,536	320,497	1.92	16,703,364
1999	165	0.01	1,169,914	403,107	3.57	11,296,851	0	0.00	2,621,446	0	0.00	805,518	403,272	2.54	15,893,729
2000	35	0.00	1,086,818	403,357	2.67	15,086,213	0	0.00	3,751,609	0	0.00	1,093,144	403,393	1.92	21,017,783
2001	75	0.00	1,635,798	471,723	2.88	16,388,611	0	0.00	3,615,244	0	0.00	1,250,045	471,798	2.06	22,889,697
2002	7,856	0.66	1,190,004	457,825	3.18	14,418,275	0	0.00	3,018,946	644	0.06	1,038,353	466,325	2.37	19,665,578
2003	16,000	1.07	1,499,989	540,892	3.38	16,008,974	0	0.00	4,270,921	316	0.03	1,176,788	557,209	2.43	22,956,673
2004	16,052	0.79	2,040,041	812,526	4.94	16,431,321	0	0.00	4,795,033	912	0.08	1,088,962	829,491	3.41	24,355,357
2005	11,916	0.76	1,566,072	529,102	3.42	15,488,773	0	0.00	3,926,076	0	0.00	925,504	541,018	2.47	21,906,426
2006	4,831	0.23	2,143,425	293,072	1.81	16,230,274	0	0.00	4,491,280	0	0.00	997,911	297,903	1.25	23,862,890

Table 3.4.2.6. GULF OF MEXICO RED GROUPER CATCH EFFORT TRIPS, BY MODE, MRFSS DATA.

	MODE									TOTAL		
	SHORE			PARTY/CHARTER			PRIVATE/RENTAL					
	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
YEAR												
1993	10,175	0.13	7,642,451	29,119	3.90	747,252	381,871	4.22	9,041,306	421,165	2.42	17,431,009
1994	13,342	0.18	7,293,305	42,948	5.20	825,632	382,840	4.08	9,384,801	439,130	2.51	17,503,737
1995	6,663	0.10	6,925,453	77,901	8.71	893,967	324,077	3.39	9,570,896	408,641	2.35	17,390,316
1996	13,190	0.19	6,800,513	28,274	3.21	881,248	300,589	3.21	9,351,017	342,052	2.01	17,032,778
1997	9,102	0.12	7,423,022	51,176	5.25	974,979	240,215	2.36	10,195,083	300,493	1.62	18,593,084
1998	5,484	0.08	6,861,289	37,576	4.16	903,170	277,436	3.10	8,938,905	320,497	1.92	16,703,364
1999	3,957	0.07	5,918,885	49,256	5.62	877,041	350,059	3.85	9,097,803	403,272	2.54	15,893,729
2000	6,421	0.08	8,477,685	31,981	3.94	811,634	364,990	3.11	11,728,464	403,393	1.92	21,017,783
2001	3,220	0.03	9,776,174	42,772	5.76	742,386	425,805	3.44	12,371,138	471,798	2.06	22,889,697
2002	0	0.00	7,266,262	63,442	8.30	764,222	402,883	3.46	11,635,095	466,325	2.37	19,665,578
2003	914	0.01	8,155,304	98,535	14.25	691,362	457,760	3.24	14,110,007	557,209	2.43	22,956,673
2004	3,915	0.04	9,430,325	154,780	18.92	818,147	670,796	4.76	14,106,885	829,491	3.41	24,355,357
2005	2,362	0.03	8,542,648	133,144	18.69	712,417	405,512	3.21	12,651,361	541,018	2.47	21,906,426
2006	0	0.00	9,205,661	74,507	9.08	820,483	223,396	1.61	13,836,746	297,903	1.25	23,862,890

Table 3.4.2.7. GULF OF MEXICO GAG TARGET EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1993	172,114	0.99	17,431,009
1994	144,785	0.83	17,503,737
1995	321,017	1.85	17,390,316
1996	288,406	1.69	17,032,778
1997	339,951	1.83	18,593,084
1998	213,096	1.28	16,703,364
1999	221,259	1.39	15,893,729
2000	303,671	1.44	21,017,783
2001	312,471	1.37	22,889,697
2002	276,644	1.41	19,665,578
2003	311,864	1.36	22,956,673
2004	378,398	1.55	24,355,357
2005	545,491	2.49	21,906,426
2006	469,625	1.97	23,862,890

Table 3.4.2.8. GULF OF MEXICO GAG TARGET EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE												TOTAL		
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI					
	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
YEAR															
1986	4,450	0.51	866,722	18,000	0.13	14,367,176	0	0.00	3,029,420	0	0.00	776,626	22,450	0.12	19,039,944
1987	0	0.00	622,080	42,204	0.34	12,321,111	0	0.00	2,370,674	0	0.00	775,582	42,204	0.26	16,089,446
1988	0	0.00	1,182,515	67,236	0.46	14,730,478	0	0.00	2,922,611	0	0.00	907,695	67,236	0.34	19,743,299
1989	0	0.00	622,719	108,769	0.90	12,031,576	0	0.00	2,263,719	0	0.00	704,496	108,769	0.70	15,622,510
1990	0	0.00	722,805	75,307	0.76	9,922,602	0	0.00	1,978,380	0	0.00	686,439	75,307	0.57	13,310,226
1991	55	0.01	648,774	192,323	1.35	14,261,115	0	0.00	2,419,805	0	0.00	843,905	192,378	1.06	18,173,598
1992	326	0.04	763,018	181,426	1.32	13,763,989	1,421	0.06	2,550,806	0	0.00	1,001,436	183,173	1.01	18,079,250
1993	2,547	0.27	933,061	169,567	1.31	12,928,092	0	0.00	2,703,754	0	0.00	866,103	172,114	0.99	17,431,009
1994	0	0.00	886,949	144,785	1.10	13,166,982	0	0.00	2,485,308	0	0.00	964,498	144,785	0.83	17,503,737
1995	2,181	0.22	998,539	316,275	2.55	12,396,870	2,561	0.09	2,941,473	0	0.00	1,053,434	321,017	1.85	17,390,316
1996	1,903	0.20	931,884	280,236	2.27	12,331,873	4,546	0.16	2,823,868	1,722	0.18	945,154	288,406	1.69	17,032,778
1997	1,025	0.10	1,024,177	338,925	2.53	13,384,436	0	0.00	3,185,378	0	0.00	999,093	339,951	1.83	18,593,084
1998	2,030	0.21	968,485	210,907	1.72	12,234,580	0	0.00	2,672,764	158	0.02	827,536	213,096	1.28	16,703,364
1999	13,324	1.14	1,169,914	207,569	1.84	11,296,851	0	0.00	2,621,446	365	0.05	805,518	221,259	1.39	15,893,729
2000	18,392	1.69	1,086,818	283,626	1.88	15,086,213	0	0.00	3,751,609	1,652	0.15	1,093,144	303,671	1.44	21,017,783
2001	11,409	0.70	1,635,798	301,063	1.84	16,388,611	0	0.00	3,615,244	0	0.00	1,250,045	312,471	1.37	22,889,697
2002	29,013	2.44	1,190,004	245,366	1.70	14,418,275	0	0.00	3,018,946	2,265	0.22	1,038,353	276,644	1.41	19,665,578
2003	9,719	0.65	1,499,989	302,145	1.89	16,008,974	0	0.00	4,270,921	0	0.00	1,176,788	311,864	1.36	22,956,673
2004	18,515	0.91	2,040,041	358,502	2.18	16,431,321	1,353	0.03	4,795,033	0	0.00	1,088,962	378,398	1.55	24,355,357
2005	20,394	1.30	1,566,072	525,097	3.39	15,488,773	0	0.00	3,926,076	0	0.00	925,504	545,491	2.49	21,906,426
2006	3,608	0.17	2,143,425	466,017	2.87	16,230,274	0	0.00	4,491,280	0	0.00	997,911	469,625	1.97	23,862,890

Table 3.4.2.9. GULF OF MEXICO GAG TARGET EFFORT TRIPS, BY MODE, MRFSS DATA.

	SHORE			PARTY/CHARTER			PRIVATE/RENTAL			TOTAL		
	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS
YEAR	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1993	4,357	0.06	7,642,451	4,244	0.57	747,252	163,513	1.81	9,041,306	172,114	0.99	17,431,009
1994	7,860	0.11	7,293,305	13,640	1.65	825,632	123,285	1.31	9,384,801	144,785	0.83	17,503,737
1995	14,150	0.20	6,925,453	19,147	2.14	893,967	287,720	3.01	9,570,896	321,017	1.85	17,390,316
1996	8,349	0.12	6,800,513	8,475	0.96	881,248	271,582	2.90	9,351,017	288,406	1.69	17,032,778
1997	25,699	0.35	7,423,022	11,283	1.16	974,979	302,969	2.97	10,195,083	339,951	1.83	18,593,084
1998	21,864	0.32	6,861,289	15,596	1.73	903,170	175,635	1.96	8,938,905	213,096	1.28	16,703,364
1999	11,057	0.19	5,918,885	32,651	3.72	877,041	177,552	1.95	9,097,803	221,259	1.39	15,893,729
2000	10,419	0.12	8,477,685	19,175	2.36	811,634	274,076	2.34	11,728,464	303,671	1.44	21,017,783
2001	19,968	0.20	9,776,174	20,583	2.77	742,386	271,921	2.20	12,371,138	312,471	1.37	22,889,697
2002	13,106	0.18	7,266,262	28,411	3.72	764,222	235,127	2.02	11,635,095	276,644	1.41	19,665,578
2003	14,438	0.18	8,155,304	22,291	3.22	691,362	275,135	1.95	14,110,007	311,864	1.36	22,956,673
2004	20,613	0.22	9,430,325	28,371	3.47	818,147	329,414	2.34	14,106,885	378,398	1.55	24,355,357
2005	22,872	0.27	8,542,648	34,141	4.79	712,417	488,478	3.86	12,651,361	545,491	2.49	21,906,426
2006	44,024	0.48	9,205,661	17,046	2.08	820,483	408,555	2.95	13,836,746	469,625	1.97	23,862,890

(MODE spans SHORE, PARTY/CHARTER, PRIVATE/RENTAL.)

Table 3.4.2.10. GULF OF MEXICO GAG CATCH EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	CATCH EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1993	479,270	2.75	17,431,009
1994	691,218	3.95	17,503,737
1995	677,076	3.89	17,390,316
1996	593,945	3.49	17,032,778
1997	660,004	3.55	18,593,084
1998	627,553	3.76	16,703,364
1999	765,178	4.81	15,893,729
2000	768,196	3.65	21,017,783
2001	794,281	3.47	22,889,697
2002	939,298	4.78	19,665,578
2003	1,168,782	5.09	22,956,673
2004	1,297,609	5.33	24,355,357
2005	1,132,599	5.17	21,906,426
2006	821,487	3.44	23,862,890

Tabl3 3.4.2.11. GULF OF MEXICO GAG CATCH EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE												TOTAL		
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI					
	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
YEAR															
1993	5,232	0.56	933,061	467,749	3.62	12,928,092	4,071	0.15	2,703,754	2,218	0.26	866,103	479,270	2.75	17,431,009
1994	6,555	0.74	886,949	677,232	5.14	13,166,982	3,874	0.16	2,485,308	3,556	0.37	964,498	691,218	3.95	17,503,737
1995	13,520	1.35	998,539	660,286	5.33	12,396,870	1,287	0.04	2,941,473	1,982	0.19	1,053,434	677,076	3.89	17,390,316
1996	24,875	2.67	931,884	555,623	4.51	12,331,873	8,002	0.28	2,823,868	5,444	0.58	945,154	593,945	3.49	17,032,778
1997	12,855	1.26	1,024,177	642,612	4.80	13,384,436	2,716	0.09	3,185,378	1,822	0.18	999,093	660,004	3.55	18,593,084
1998	15,948	1.65	968,485	606,002	4.95	12,234,580	2,778	0.10	2,672,764	2,825	0.34	827,536	627,553	3.76	16,703,364
1999	55,106	4.71	1,169,914	697,094	6.17	11,296,851	9,640	0.37	2,621,446	3,338	0.41	805,518	765,178	4.81	15,893,729
2000	33,503	3.08	1,086,818	727,730	4.82	15,086,213	3,856	0.10	3,751,609	3,106	0.28	1,093,144	768,196	3.65	21,017,783
2001	16,430	1.00	1,635,798	770,459	4.70	16,388,611	6,706	0.19	3,615,244	686	0.05	1,250,045	794,281	3.47	22,889,697
2002	21,258	1.79	1,190,004	902,920	6.26	14,418,275	4,648	0.15	3,018,946	10,471	1.01	1,038,353	939,298	4.78	19,665,578
2003	24,310	1.62	1,499,989	1,137,746	7.11	16,008,974	6,649	0.16	4,270,921	77	0.01	1,176,788	1,168,782	5.09	22,956,673
2004	24,986	1.22	2,040,041	1,258,174	7.66	16,431,321	13,525	0.28	4,795,033	924	0.08	1,088,962	1,297,609	5.33	24,355,357
2005	53,195	3.40	1,566,072	1,064,772	6.87	15,488,773	14,632	0.37	3,926,076	0	0.00	925,504	1,132,599	5.17	21,906,426
2006	16,527	0.77	2,143,425	794,493	4.90	16,230,274	10,467	0.23	4,491,280	0	0.00	997,911	821,487	3.44	23,862,890

Table 3.4.2.12. GULF OF MEXICO GAG CATCH EFFORT TRIPS, BY MODE, MRFSS DATA.

	MODE									TOTAL		
	SHORE			PARTY/CHARTER			PRIVATE/RENTAL					
	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS
YEAR	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1993	52,279	0.68	7,642,451	67,099	8.98	747,252	359,892	3.98	9,041,306	479,270	2.75	17,431,009
1994	49,408	0.68	7,293,305	61,061	7.40	825,632	580,749	6.19	9,384,801	691,218	3.95	17,503,737
1995	67,367	0.97	6,925,453	118,182	13.22	893,967	491,527	5.14	9,570,896	677,076	3.89	17,390,316
1996	35,988	0.53	6,800,513	116,639	13.24	881,248	441,318	4.72	9,351,017	593,945	3.49	17,032,778
1997	39,492	0.53	7,423,022	124,930	12.81	974,979	495,582	4.86	10,195,083	660,004	3.55	18,593,084
1998	45,748	0.67	6,861,289	155,790	17.25	903,170	426,014	4.77	8,938,905	627,553	3.76	16,703,364
1999	44,696	0.76	5,918,885	187,242	21.35	877,041	533,240	5.86	9,097,803	765,178	4.81	15,893,729
2000	46,415	0.55	8,477,685	86,816	10.70	811,634	634,965	5.41	11,728,464	768,196	3.65	21,017,783
2001	52,270	0.53	9,776,174	79,963	10.77	742,386	662,048	5.35	12,371,138	794,281	3.47	22,889,697
2002	99,654	1.37	7,266,262	106,611	13.95	764,222	733,033	6.30	11,635,095	939,298	4.78	19,665,578
2003	105,057	1.29	8,155,304	132,189	19.12	691,362	931,536	6.60	14,110,007	1,168,782	5.09	22,956,673
2004	81,451	0.86	9,430,325	180,367	22.05	818,147	1,035,790	7.34	14,106,885	1,297,609	5.33	24,355,357
2005	126,162	1.48	8,542,648	213,992	30.04	712,417	792,446	6.26	12,651,361	1,132,599	5.17	21,906,426
2006	82,499	0.90	9,205,661	108,963	13.28	820483	630,025	4.55	13,836,746	821,487	3.44	23,862,890

Table 3.4.2.13. Headboat angler days, NMFS Headboat Survey.

	STATE			
	LOUISIANA	TEXAS	WFLORIDA/-ALABAMA	TOTAL
	Sum	Sum	Sum	Sum
	TOTAL #	TOTAL #	TOTAL #	TOTAL #
YEAR				
1993	11,256	80,904	207,898	300,058
1994	12,651	100,778	204,562	317,991
1995	10,498	90,464	182,410	283,372
1996	10,988	91,852	154,913	257,753
1997	9,008	82,207	149,442	240,657
1998	7,854	77,650	185,331	270,835
1999	8,026	58,235	176,117	242,378
2000	.	.	.	.
2001	.	.	6,260	6,260
2002	6,222	66,951	141,831	215,004
2003	6,636	74,432	144,211	225,279
2004	.	64,990	158,430	223,420
2005	.	59,857	130,233	190,090

Table 3.4.2.14. Socio-economic Characteristics of Recreational Anglers

	Charter	**Private/Rental**	**Shore**
Average Age			
Alabama	42.17	42.49	47.59
Florida East	43.60	42.41	44.39
Florida West	43.85	44.03	44.18
Louisiana	44.99	44.35	41.39
Mississippi	43.70	41.51	41.74
Average Income			
Alabama	57,980	54,090	42,110
Florida East	94,590	56,250	44,100
Florida West	78,430	51,370	42,590
Louisiana	86,340	55,180	40,870
Mississippi	61,730	48,500	31,300
Average Number of Fishing Trips			
Alabama	3.64	31.99	34.92
Florida East	12.16	53.26	56.94
Florida West	10.83	47.07	50.56
Louisiana	11.73	30.50	31.78
Mississippi	15.09	43.34	69.63
Average Years of Fishing Experience			
Alabama	13.07	21.56	20.76
Florida East	18.37	22.20	21.18
Florida West	17.77	21.51	19.37
Louisiana	22.94	24.08	18.24
Mississippi	12.62	21.83	21.33
Average Years of Fishing Experience in the State			
Alabama	7.81	19.75	14.54
Florida East	10.61	18.07	15.04
Florida West	11.65	16.70	13.14
Louisiana	16.17	22.21	15.97
Mississippi	7.18	18.59	16.46
Average Total Trip Expenditures			
Alabama	479.17	53.55	150.25
Florida East	380.32	52.10	82.91
Florida West	622.29	127.44	98.88
Louisiana	326.26	39.35	57.56
Mississippi	296.91	27.04	28.27

Source: Holiman (2000)

For-hire Vessels

A federal for-hire vessel permit has been required for reef fish since 1996 and the sector currently operates under a limited access system (GMFMC 2005c). Prior to the implementation of the current moratorium, NMFS had issued 3,340 permits associated with 1,779 unique vessels. Of these vessels, 1,625 had reef fish permits (GMFMC 2005c).

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

In support of the development of the current limited access system, permits data were evaluated to identify summary characteristics of the fleet (GMFMC 2005c). This evaluation revealed that approximately 79 percent of the fleet had a maximum capacity of 6 or fewer passengers, 82 percent were in the 21-50 foot length range, and 70 percent had engines ranging from 101-600 horsepower. Sixty-one vessels had passenger capacity greater than 60 passengers. Individual ownership is the dominant form of ownership type (69 percent), with less than a third of vessels corporate-owned. Florida was the homeport of 61 percent of all federally permitted for-hire vessels, followed by Texas (13 percent), Alabama (8 percent), Louisiana (8 percent), and Mississippi (4 percent).

Financial information on the for-hire vessels in the Gulf is not routinely collected. Data presented below are from two studies conducted in 1998-1999 and summarized in Holland et al. (1999) and Sutton et al. (1999). Selected financial statistics from these studies are summarized in Tables 3.4.15 and 3.4.16. Included in the cost estimates are 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. The cost calculations do not account for capital expenses, other fixed costs, and returns to owners/operators. The 1999 figures have been adjusted to 2004 dollars using the producer price index for all commodities, with 1982-1984 as the base year.

As expected, since they carry larger passenger loads, headboats earn substantially higher revenues than charterboats. The average charterboat is estimated to generate $76,960 in annual revenues and $36,758 in annual profits, whereas the appropriate values for the

Table 3.4.2.15. Economic Characteristics of Charterboats and Headboats

Characteristic	Charterboats	Headboats
All Vessel Classes		
Revenues ($)	76,960	404,172
Costs ($)	40,200	65,962
Profits ($)	36,758	338,209
Avg. fees per angler per trip ($)	146	61
Avg. trips per vessel	108	209
Avg. passenger	5	30
Max. passenger	8	60
Length (feet)	37	65
Horsepower	493	786
6 or less maximum passenger capacity		
Revenues	70,491	
Costs	35,540	
Profits	34,949	
Avg. fees per angler per trip ($)	152	
Avg. trips per vessel	105	
Avg. passenger	4	
Length	35	
Horsepower	475	
7 to 12 maximum passenger capacity		
Revenues	129,813	
Costs	43,311	
Profits	86,502	
Avg. fees per angler per trip ($)	128	
Avg. trips per vessel	146	
Avg. passenger	6	
Length	41	
Horsepower	546	
13 to 30 maximum passenger capacity		
Revenues	113,266	298,812
Costs	73,887	35,750
Profits	39,379	263,062
Avg. fees per angler per trip ($)	94	70
Avg. trips per vessel	115	201
Avg. passenger	9	17
Length	44	43
Horsepower	617	726
31 to 60 maximum passenger capacity		
Revenues	149,905	327,615
Costs	116,099	46,602
Profits	33,806	281,013
Avg. fees per angler per trip ($)	64	55
Avg. trips per vessel	152	208
Avg. passenger	21	27
Length	60	64
Horsepower	750	735
61 or greater maximum passenger capacity		
Revenues		570,376
Costs		109,616
Profits		460,760
Avg. fees per angler per trip ($)		67
Avg. trips per vessel		213
Avg. passenger		40
Length		76
Horsepower		903

Notes: (1) Trips are calculated as the sum of half-day, full-day, and overnight trips after converting all classes of trips to full-day trips. **(2)** Revenues do not necessarily equal the product of average fees, trips and passengers because of the way trips are calculated and because all averages are calculated independently on a per vessel basis. **Source:** Holland et al. (1999) and Sutton et al. (1999).

average headboat are $404,172 and $338,209, respectively. On average, both types of operations are profitable, with headboat operations showing a relatively large profit figure. As mentioned above, however, the calculation of costs does not take into account fixed costs, which would be expected to be much larger for headboats. For both charterboats and headboats, the number of passengers carried per trip is about half of the maximum passenger capacity. Therefore, substantial excess capacity exists in the sector.

Table 3.4.2.16 compares for-hire characteristics for the Florida west-coast sector with that of the rest of the Gulf of Mexico. Florida vessels, on average, earn less than those in the rest of the Gulf. This difference may be due partly to the difference in the size of charterboat or headboat operation. On average, Florida vessels are smaller, have smaller horsepower, have lower maximum passenger capacity, and take fewer passengers per trip. The difference, although not apparent from the information provided, may also be influenced by the increased competition created by the larger number of vessels in the state.

Table 3.4.2.16. Economic Characteristics of Charterboats and Headboats by Geographical Area

Characteristic	Charterboats		Headboats	
	Florida	Rest of Gulf	Florida	Rest of Gulf
All Vessel Classes				
Revenues ($)	68,233	106,118	318,512	630,046
Costs ($)	37,984	62,624	69,410	87,621
Profits ($)	30,249	43,494	249,103	542,425
Avg. fees per angler per trip ($)	149	133	59	70
Avg. trips per vessel	104	110	205	209
Avg. passenger	4	8	25	41
Max. passenger	6	14	56	71
Length (feet)	35	41	60	74
Horsepower	465	615	795	732
6 or less maximum passenger capacity				
Revenues	68,620	69,748		
Costs	37,962	34,417		
Profits	30,656	35,330		
Avg. fees per angler per trip ($)	151	159		
Avg. trips per vessel	104	86		
Avg. passenger	4	4		
Length	35	35		
Horsepower	467	553		
7 to 12 maximum passenger capacity				
Revenues	67,760	186,793		
Costs	30,116	70,944		
Profits	37,643	115,848		
Avg. fees per angler per trip ($)	105	158		
Avg. trips per vessel	137	149		
Avg. passenger	5	8		
Length	31	48		
Horsepower	303	706		
13 to 30 maximum passenger capacity				
Revenues	55,124	141,134	352,515	84,000
Costs	43,407	94,458	30,296	57,568
Profits	11,716	46,676	322,219	26,432
Avg. fees per angler per trip ($)	108	90	73	56
Avg. trips per vessel	81	128	214	151
Avg. passenger	6	11	18	10
Length	39	47	40	52
Horsepower	492	687	757	600
31 to 60 maximum passenger capacity				
Revenues		176,629	227,996	556,080
Costs		145,124	58,459	37,296
Profits		31,505	169,535	518,784
Avg. fees per angler per trip ($)		61	50	69
Avg. trips per vessel		178	182	219
Avg. passenger		23	24	36
Length		59	61	70
Horsepower		738	704	875
61 or greater maximum passenger capacity				
Revenues			490,448	840,524
Costs			124,790	145,460
Profits			365,657	695,064
Avg. fees per angler per trip ($)			67	75
Avg. trips per vessel			248	213
Avg. passenger			32	53
Length			73	83
Horsepower			1,083	624

Notes: (1)Trips are calculated as the sum of half-day, full-day, and overnight trips after converting all classes of trips to full-day trips. (2) Revenues do not necessarily equal the product of average fees, trips and passengers because of the way trips are calculated and because all averages are calculated independently on a per vessel basis. Source of basic data: Databases from Holland et al. (1999) and Sutton et al. (1999).

Economic Impacts

Estimates of the economic impacts of the recreational gag and red grouper fisheries were derived using average output (sales) and job (FTE) impact coefficients for recreational angling across all fisheries (species), as derived by an economic add-on to the MRFSS (Rita Curtis, NOAA Fisheries Office of Science and Technology, personal communication). The estimates of total economic impacts were based on the 2004-2006 average number of individual angler trips (shore, charter, or private modes) that caught either gag or red grouper. Because approximately 96 percent of all catch trips for these species were occurred in west Florida, only average output and job coefficients from west Florida were used. Thus, while all trips from west Florida through Louisiana were included in the estimates, the impacts estimates could be higher (lower) than actual if the impacts coefficients for trips in other states are lower (higher) than those from west Florida. It should also be noted that the estimates do not include the headboat sector and, thus, underestimate total impacts by an unknown amount. The total 2006 output (sales) impacts across all modes for trips which caught gag or red grouper is approximately \$119.5 million, supporting an estimated 1,217 FTE jobs. The contributions of charter anglers were the greatest, accounting for approximately \$63.8 million in output impacts and 656 FTE jobs, followed by private anglers accounting for approximately \$48.9 million and 488 FTE jobs. Similar to the discussion for the commercial fishery, these estimates include direct, indirect, and induced effects. As also discussed in the description of the commercial fishery, because of the adaptations of standard economic impact models or assumptions required to develop economic impact models of fishery sectors, caution is advised in comparing these estimates with those of the commercial fishery due to potential differences in methodology. It should also be emphasized that these estimates cover only gag and red grouper, whereas the commercial estimates cover all grouper and tilefish, and do not include the headboat sector.

3.4.3 Affected Environment, Social

As described in the social impact statement, there is little data to adequately describe the affected environment for communities dependent on the gag and red grouper fisheries. However, a combination of secondary data including landings data, federal permits data, and census data can be analyzed as a starting point to identify some of the communities that may be affected by changes in federal fishing regulations. Data from the 1990 and 2000 US Census was used for the descriptions of Madeira Beach, St. Petersburg, and Panama City, Florida so that it is possible to see changes in the communities in those ten years. The demographics tables are from a report prepared by Impact Assessment, Inc. (2005a)

Fishing communities were ranked according to the dealer reported number of pounds and value for gag and red grouper, using data for 2004, 2005, and 2006 to get an idea of which communities are dependent on the commercial gag and red grouper fisheries. Permits data was also taken into consideration. Specific communities that are substantially involved in the recreational gag and red grouper fisheries were not described because the recreational landings data describes landings at the regional level, not at the community level. Overall, the majority of the gag and red grouper is landed off of west Florida. The major area for gag grouper is from Tampa to Apalachicola and for red grouper the major area is Crystal River to Ft. Myers.

A problem with the exclusive use of secondary data is that there is not enough information to know the social impacts of changes in regulations on any one community. Landings data may be inconclusive. If we look at the permits data, the homeport of a vessel may be in a different community than where the owner and/or operator live. A boat that is home-ported in one location may not necessarily unload its catch at that location.

An analysis of the mailing addresses of licenses holders may not identify which community a vessel is docked in or unloaded in because the owner may reside in another community. The data may list the mailing address of a processor that actually has a processing business in another community, making it difficult to ascribe processing to a certain community. Fishermen, dockside workers, and processors may work in one community and live in another. As the price of water front property continues to rise, it is becoming more common for fishermen and others working in fishing dependent businesses to live inland, away from the water. In some areas, commercial fishermen who used to live in the same community they docked their boats in, may now be dispersed in several outlying communities with more affordable housing. This compounds the problem of trying to identify fishing communities as a specific location where people dependent on marine resources live and work.

The census data offers its own set of problems when trying to identify the number of people who are dependent on fishing resources in a given community. First, a complete census is only conducted every ten years. In the span of ten years much can change in a coastal community due to changes in the population or the increasing pressure to develop waterfront property for uses other than for support of the fishing industry. Second, people who work seasonally in fishing dependent areas may or may not be counted in a particular community that is dependent on fishing, depending if they are residing in that community at the time of the census. A third problem is that in the census fishing is lumped together with farming and forestry occupations under the occupation category and with agriculture, forestry, and hunting under the industry category. Therefore, it is impossible to discern how many people are actually dependent of fishing from the other occupations fishing is lumped with. Further, people who rely on other supplemental work outside of fishing related occupations, such as construction, may report their occupation under another category besides fishing.

By analyzing the demographic data from the U.S. Census, we can start to develop an idea of the how the community ranks on data points such as income, home ownership, educational levels, etc. The census data gives the percentages for race and ethnicity but, this information cannot be extrapolated to be used to fully describe the race and ethnicity of those that are involved in the fishing industry. Like landings and permit data, the

Census data is used with caution as a starting point to understand the dynamics of a particular community.

Several of the species in the reef fish complex are under restrictions because they are undergoing overfishing or are overfished. It is becoming more difficult for fishermen to switch to targeting other species of fin fish due to regulations in place. Collectively, fishermen may be able to fish for enough reef fish to make a trip worthwhile. Even small changes in federal fishing regulations, that limit the amount of a species that can be caught, the minimum size of keeper fish, the seasons when a particular species can be caught, the number of fishing trips in a given time frame, and place restrictions on gear used, have the potential to impact communities that depend on these fisheries.

The recreational sector is also restricted by regulations that limit sizes, total catches, bag limits, and seasons. With many species under management plans it is becoming more difficult to target other species if the one originally targeted is put under further restrictions. Collectively, more restrictive management measures make it more difficult for recreational fishermen to find species to target in a way that makes the fishing experience worth the money invested. Gag and red grouper are targeted species for private and for-hire recreational fishermen. As with the commercial sector, any changes in regulations that aim to reduce landings may have an impact on how many trips recreational fishermen take within a given year. A reduction in the number of trips will have an impact on businesses and communities that support the recreational sector. If there are closed seasons for a particular preferred species, that discourage people from fishing in certain months, businesses such as hotels, bait and tackle shops, marinas, etc., that cater to the recreational fishermen may negatively impacted by a reduction in recreational fishermen coming to the area. At this time, it is not possible to fully analyze the impacts of these proposed changes in regulations for fishermen, businesses, and communities dependent on the red or gag grouper fisheries.

As illustrated above, more time and money need to be invested in conducting community research if we are to really begin to understand the dynamics of fishing dependency within individual communities and be able to competently describe the social impacts of any changes in federal fishing regulations. As more community profiles are developed in the future, it may be possible to better describe specific social impacts of fishing regulations on some communities. Until that time, secondary data will be used as a starting point.

The rankings for communities based on secondary data can change from year to year. The state of their fisheries has surely changed due to the hurricanes that have hit the communities in the Gulf of Mexico in recent years. Therefore, the communities chosen are communities that may be affected by new regulations but would not necessarily be ranked the same year to year according to landings.

Communities Substantially Involved in the Gag and Red Grouper Fisheries

After analyzing secondary data relating to the commercial red and gag grouper fisheries, for the purpose of this amendment, three communities that are dependent on these fisheries were chosen as representative communities that could be impacted by new regulations. These include Madeira Beach, Panama City, and St. Petersburg, Florida.

3.4.4 Madeira Beach, Florida (incorporated, pop. 4,511)

Location and Overview. Madeira Beach is located on a barrier island just west of St. Petersburg and north of John's Pass on Florida's central west coast. The town is one of several beachfront communities in the area with both a well-established population of year-round inhabitants, and a range of services and attractions suitable for tourists and seasonal residents.

History. Madeira Beach was incorporated in 1947. According to Wilson and McCay (1998) offshore fishing in Madeira Beach began as bandit reel fishing for grouper in the 1960's. There were two fish houses supported primarily by charter fishing and a small commercial operation. It was during the early 1970's that two vessels began experimenting with long line fishing, but were initially unsuccessful. Later, several vessels began using long lines successfully for swordfish, but as swordfish stocks began to diminish in the Gulf, they were forced to expand their fishing territory to the eastern seaboard. It was on return trips that these vessels began to experiment with long lines in deeper water, thereby discovering an abundance of tilefish and yellow edge grouper. Reportedly, 95 percent of the fishing fleet in Madeira Beach was using long lines (Wilson & McCay 1998). There were four fish houses in Madeira Beach at the time, dealing primarily in grouper, but also swordfish, shark, and other species. Approximately 100 vessels were working from there during the latter part of the 20th century (Impact Assessment, Inc. 2005).

Current Conditions. The year 2000 census enumerated 4,511 persons, up from 4,225 in 1990. The community is undergoing change, as waterfront property values increase and condominium development ensues. There are three fish houses in Madeira Beach and approximately 70 commercial vessels moor in the area. The town is sometimes referred to as the "Grouper Capital of the World" as the majority of snapper-grouper in the U.S. is landed here. The fish is an important recreational catch as well. Lucas (2001) reported an estimated 87 long line and 48 bandit reel vessels call Madeira their homeport. Moreover, she found that most captains and crew lived nearby, with over 40 captains living in Madeira, and the rest within 30 minutes away. Overall direct employment, related to vessels and fish houses, was approximately 441 persons in 2000. These numbers are likely less today than in the past, as the number of fish houses and vessels have decreased.

With regard to recreational fishing, there are four marinas, including a public marina with over 90 slips. Many residents own their own boat and fish in the Gulf. Support industries do exist, as there are several bait and tackle shops, recreational boat yards, and other related businesses. The community continues to hold a Seafood Festival in October.

In 2005, there were 298,153 pounds of gag grouper landed in Madeira Beach, Florida with a value of $750,185. In 2006, landings for gag dropped to 197,328 pounds with a value of 546,874. During 2005, there were 1,006,150 pounds of red grouper landed with a value of $2,084,928. In 2006, landings for red grouper increased to 1,138,116 pounds with a value of $2,633,002.

In the 2000 census, 0.7 percent of the population listed their occupation under the category for farming, fishing, and forestry, a decrease from the 1.4 percent who were in this category in 1990. In 200, 0.0 percent listed their occupation under the agriculture, forestry, fishing, and hunting category also a decrease from the 1.4 percent listed in 1990.

Following the demographic table are four tables that help to describe the presence of fishing in Madeira Beach in 2003 including a table of infrastructure that was observed in the community and primary fishing-related businesses that were listed in the phone books when Impact Assessment, Inc. conducted research for the Southeast Regional Office (Impact Assessment, Inc. 2005a). There is also a table that shows the amount of commercial landings and another one that shows the number of permits in the community (Impact Assessment, Inc. 2005a).

Madeira Beach Demographics for 1990 and 2000

Factor	1990	2000
Total population	4,225	4,511
Gender Ratio M/F (Number)	2,156/2,069	2,376/2,135
Age (Percent of total population)		
Under 18 years of age	8.7	8.2
18 to 64 years of age	65.7	69.8
65 years and over	25.6	22.0
Ethnicity or Race (Number)		
White	4,160	4,378
Black or African American	10	12
American Indian and Alaskan Native	7	14
Asian	32	26
Native Hawaiian and other Pacific Islander	--	2
Some other race	16	30
Two or more races	--	49
Hispanic or Latino (any race)	105	107
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	4.2	2.6
Percent high school graduate or higher	83.8	87.3
Percent with a Bachelor's degree or higher	19.5	22.2
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	4.5	6.8
Percent who speak English less than very well	1.5	2.0
Household income (Median $)	24,748	36,671
Poverty Status (Percent of population with income below poverty line)	8.4	9.8
Percent female headed household	5.3	5.3
Home Ownership (Number)		
Owner occupied	1,290	1,454
Renter occupied	940	1,074
Value Owner-occupied Housing (Median $)	111,400	171,000
Monthly Contract Rent (Median $)	392	555
Employment Status (Population 16 yrs and over)		
Percent in the labor force	58.5	61.5
Percent of civilian labor force unemployed	2.7	4.4
Occupation (Percent in workforce)**		
Management, professional, and related occupations	--	30.4
Service occupations	--	22.1
Sales and office occupations	--	28.9
Farming, fishing, and forestry occupations	1.4	0.7
Construction, extraction, and maintenance occupations	--	10.6
Production, transportation, and material moving occupations	--	7.2
Industry (Percent in workforce)**		
Agriculture, forestry, fishing and hunting	1.4	0.0†
Manufacturing	7.5	7.0
Percent government workers	8.2	4.5
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	8.7	14.7
Percent using public transportation	2.2	1.6
Mean travel time to work (minutes)	--	23.1
Percent worked outside of county of residence	10.6	16.0

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.

†Year 2000 figures include mining in this group; 1990 figures do not. Mining includes the offshore oil industry workforce.

Fishing Infrastructure and Services Observed in Madeira Beach in 2003

This information was obtained in 2003 during preliminary research conducted by Impact Assessment, Inc. under a contract for NMFS for the preliminary identification of fishing communities. The research team drove through the community and made notes of what fishing infrastructure and businesses were observed. This methodology serves as a starting point for describing fishing related infrastructure and businesses, but is not an all inclusive account of what exists in the community.

Infrastructure or Service	Quantity
Air fill stations (diving)	2
Boat yards/ Boat builders (recreational/commercial)	3
Churches with maritime theme	1
Docking facilities (commercial)	4
Fishing Gear, Electronics, Welding, and other repair	4 (2com/2 rec)
Fishing associations (recreational/commercial)	1 (com)
Fish processors, Wholesale Fish House	5
Fisheries research laboratories	0
Fishing monuments/ festivals	1
Fishing pier	0
Hotels/Inns (dockside)	Many
Marine railways/haul out facilities	0
Museums—fishing/marine-related	0
Net makers	0
NMFS or state fisheries office (port agent, etc.)	0
Public boat ramps	2
Recreational docks/marinas	4
Bait & Tackle/fishing supplies	5
Recreational Fishing Tournaments	0
Sea Grant Extension office	0
Seafood restaurants	Many
Seafood retail markets	2
Trucking operations	1
Site-seeing/pleasure tours	7+
Charter/Head Boats	3+
Commercial Boats	40

Primary Fishing-related Businesses Listed for Madeira Beach in 2003

This information was obtained in 2003 during preliminary research conducted by Impact Assessment, Inc. under a contract for NMFS for the preliminary identification of fishing communities. The research team used the local yellow pages in each community to determine which businesses were listed.

Type of Business	Frequency
Boat Builder/Broker	3
Boat Rentals & Pier	10
Boat Rentals & Pier; Marina	1
Marina	3
Processor; Wholesale Seafood Dealer	1

Retail/Wholesale Seafood Dealer	1
Total	19

Madeira Beach Commercial Landings and Value Summary: 2002 (based on all address fields)

Species	Pounds Reported	Ex-Vessel Value ($)
Total Combined	935,201	1,686,739

Madeira Beach License/Permit Summary: 2000

<table>
<tr><td colspan="2">Commercial (based on physical address data only)</td><td>Recreational (based on all address fields)</td></tr>
<tr><td>State License Holders</td><td>Federal Permit Holders</td><td>State Saltwater License Holders</td></tr>
<tr><td>15</td><td>26</td><td rowspan="2">125</td></tr>
<tr><td colspan="2">Total = 41</td></tr>
<tr><td colspan="2">% Households Holding Comm. Permit or License: 41/2,528 = 1.6</td><td>Average Number of Licenses per Household: 125/2,528 = 0.05</td></tr>
</table>

Please reference Table 3.19-5 above for the total number of commercial permit and license holders attributable to this community as based on both street *and* post office box address data.

3.4.5 Panama City, Florida (incorporated, pop. 36,417)

Location and Overview. Panama City is located on St. Andrews Bay just inland from the Gulf in the central Panhandle region. The city is typically accessed by U.S. Highway 98 and State Highway 22. Tallahassee is nearly 100 miles to the southwest. Local and visiting fishing vessels access the Gulf through the channel at St. Andrew Bay, roughly two miles from the waterfront.

History. The town was named in 1906 under the leadership of developer G.M. West, and incorporated in 1909. Development focused on the waterfront, where numerous piers, a post office, and the city jail were built. In 1908, the Atlanta and St. Andrew Bay Railroad connected Panama City with cities to the north. In 1913, Panama City became the seat of Bay County.

Current Conditions and Trends. The year 2000 census enumerated 36, 417 persons in Panama City, up from 34,378 in 1990. More than 6,700 residents are employed at neighboring Tyndal Air Force Base. The U.S. Navy maintains a 648-acre Coastal Systems Station in the area, and employs approximately 2,200 persons, many of whom reside in Panama City. Many residents are employed in positions associated with regional commerce and government.

There are numerous commercial and recreational fishing businesses in Panama City. At least 100 commercial and charter vessels moor at various harbors. Several wholesale fish houses handle a wide variety of finfish and shellfish, and there are numerous bait and tackle shops, ship stores, boat builders and dealers, fishing piers, and marinas where charter fishing is offered. There were nine active processors in 2000, employing a total of 55 persons on average that year. In short, there is considerable infrastructure for both commercial and recreational fishing.

In 2005, there were 551,041 pounds of gag grouper landed in Panama City, Florida with a value of $1,504,045. In 2006, landings for gag dropped to 249,340 pounds with a value of $751,055.

During 2005, there were 770,466 pounds of red grouper landed with a value of $1,600,415. In 2006, landings for red grouper decreased to 522,758 pounds with a value of $1,257,892.

In the 2000 census, 0.4 percent of the population listed their occupation under the category for farming, fishing, and forestry, a decrease from the 1.5 percent who were in this category in 1990. In 2000, 0.5 percent listed their occupation under the agriculture, forestry, fishing, and hunting category also a decrease from the 1.5 percent listed in 1990.

Following the demographic table are four tables that help to describe the presence of fishing in Panama City in 2003 including a table of infrastructure that was observed in the community and primary fishing-related businesses that were listed in the phone books when Impact Assessment, Inc. conducted research for the Southeast Regional Office (Impact Assessment, Inc. 2005a). There is also a table that shows the amount of commercial landings and another one that shows the number of permits in the community (Impact Assessment, Inc. 2005a).

Panama City Demographics for 1990 and 2000

Factor	**1990**	**2000**
Total population	34,378	36,417
Gender Ratio M/F (Number)	16,094/18,284	17,683/18,734
Age (Percent of total population)		
Under 18 years of age	24.5	23.0
18 to 64 years of age	58.5	61.1
65 years and over	17.0	15.9
Ethnicity or Race (Number)		
White	25,954	26,819
Black or African American	7,500	7,813
American Indian and Alaskan Native	215	231
Asian	583	564
Native Hawaiian and other Pacific Islander	--	28
Some other race	126	274
Two or more races	--	688
Hispanic or Latino (any race)	460	1,060
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	12.1	6.7
Percent high school graduate or higher	70.3	79.2
Percent with a Bachelor's degree or higher	16.7	18.9
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	5.3	7.2
Percent who speak English less than very well	1.9	2.0
Household income (Median $)	26,629	31,572
Poverty Status (Percent of population with income below poverty line)	19.6	17.2
Percent female headed household	23.0	15.4
Home Ownership (Number)		
Owner occupied	8,193	8,565
Renter occupied	5,860	6,254
Value Owner-occupied Housing (Median $)	49,800	75,800
Monthly Contract Rent (Median $)	279	526
Employment Status (Population 16 yrs and over)		
Percent in the labor force	58.6	56.4
Percent of civilian labor force unemployed	8.0	5.8

Occupation (Percent in workforce)**		
Management, professional, and related occupations	--	32.2
Service occupations	--	20.8
Sales and office occupations	--	27.7
Farming, fishing, and forestry occupations	1.5	0.4
Construction, extraction, and maintenance occupations	--	8.6
Production, transportation, and material moving occupations	--	10.4
Industry (Percent in workforce)**		
Agriculture, forestry, fishing and hunting	1.5	0.5†
Manufacturing	7.7	7.0
Percent government workers	20.4	18.6
Commuting to Work (Workers 16 yrs and over)		
Percent in carpools	12.5	13.7
Percent using public transportation	0.2	0.7
Mean travel time to work (minutes)	--	18.6
Percent worked outside of county of residence	1.8	3.3

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.
†Year 2000 figures include mining in this group; 1990 figures do not. Mining includes the offshore oil industry workforce.

Fishing Infrastructure in Panama City, Florida as of January 2008.
This chart was updated by the NMFS' port agent in January 2008 to reflect current infrastructure that is in Panama City.

Infrastructure or Service	Quantity
Air fill stations (diving)	Several
Bars/clubs (dockside or in town)	Several
Boat yards/ Boat builders (recreational/commercial)	Several
Churches with maritime theme	None observed
Docking facilities (commercial)	4
Fishing Gear, Electronics, Welding, and other repair	25
Fishing associations (recreational/commercial)	3
Fish processors, Wholesale Fish House	6
Fisheries research laboratories	1
Fishing monuments	0
Fishing pier	3
Hotels/Inns (dockside)	6
Marine railways/haul out facilities	0
Museums—fishing/marine-related	1
Net makers	10
NMFS or state fisheries office (port agent, etc.)	1 Fed/1State
Public boat ramps	30
Recreational docks/marinas	28
Bait & Tackle/fishing supplies	108
Recreational Fishing Tournaments	Several
Sea Grant Extension office	0

Seafood restaurants	100+
Seafood retail markets	20+
Trucking operations	0
Site-seeing/pleasure tours	12
Charter/Head Boats	100+
Commercial Boats	100+

Primary Fishing-related Businesses Listed for Panama City in 2003

This information was obtained in 2003 during preliminary research conducted by Impact Assessment, Inc. under a contract for NMFS for the preliminary identification of fishing communities. The research team used the local yellow pages in each community to determine which businesses were listed.

Type of Business	**Frequency**
Boat Builder/Broker	44
Boat Builder/Broker; Boat Rentals & Pier	1
Boat Builder/Broker; Diving & Fishing Equipment	1
Boat Builder/Broker; Marina	13
Boat Rentals & Pier	15
Boat Rentals & Pier; Marina	1
Marina	17
Retail Seafood Dealer	19
Retail/Wholesale Seafood Dealer	2
Wholesale Seafood Dealer	4
Total	117

Panama City Commercial Landings and Value Summary: 2002 (based on all address fields)

Species	**Pounds Reported**	**Ex-Vessel Value ($)**
Total Combined	1,972,052	3,869,807

Panama City License/Permit Summary: 2000

Commercial (based on physical address data only)		**Recreational** (based on all address fields)
State License Holders	Federal Permit Holders	State Saltwater License Holders
125	139	1,352
Total = 264		
% Households Holding Commercial Permit or License: 264/14,819 = 1.8		Average Number of Licenses per Household: 1,352/14,819 = 0.1

Please reference Table 3.5-5 above for the total number of commercial permit and license holders attributable to this community as based on both street *and* post office box address data.

Mining (includes the offshore oil/gas industry workforce)	11.4	12.0
Manufacturing	4.5	8.0
Percent government workers	10.9	12.8
Commuting to Work (Workers 16 yrs and over)		
Mean travel time to work (minutes)	N/A	30.9
Percent worked outside of county of residence	9.8	13.3

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons for those census years.

3.4.6 St. Petersburg, Florida (incorporated, pop. 248,232)

Location and overview. Situated just west of Tampa on the Pinellas Peninsula, St. Petersburg is part of a large metropolitan area within Pinellas County. With over 234 miles of coastline along Tampa Bay, the Gulf of Mexico, and the Intracoastal Waterway, St. Petersburg has the largest municipal marina in the Southeast, with 610 boat slips. Continued growth has occurred over the last decade, and county officials estimate that approximately 80 percent of Pinellas County's developable land area is now developed.

History. St. Petersburg, like most of Florida's Gulf coast, was first explored by Juan Ponce de Leon and Hernando De Soto in the 1500s. However, it was not until the 1800s that pioneers began to arrive and settle the area. The town was named after the birthplace of one influential Russian immigrant–railroad magnate Peter Demens– who brought the Orange Belt railroad to the area in 1888. Demens' railroad was instrumental in the development of St. Petersburg as a center for railway shipping. By the 1890s, St. Petersburg annually shipped approximately three million pounds of mackerel, snapper, and other fish along the eastern seaboard via the Orange Belt railroad. St. Petersburg incorporated in 1892.

Current Conditions and Trends. St. Petersburg had a year 2000 population of 248,232; an increase of 9,603 persons from 1990. Unemployment and poverty rates in St. Petersburg have changed little over the last decade. There are now four major seafood processors in St. Petersburg (BAMA, Save on Seafood, Sigma, and United Seafood), down from six in 2000. One processor serves as a fish house with dockages reserved for five to six independent Vietnamese grouper fishermen and five or six shrimpers. The others are situated in landlocked areas and receive products trucked from fish houses or independent fishermen in adjacent communities like Madeira Beach and Tarpon Springs. While mullet was the primary catch prior to the 1994 gill net ban, processors are now primarily interested in domestic shrimp and grouper– the bulk of which is harvested between Texas and the Florida Keys. Due to a decrease in locally available product, however, these processors now import much of their tuna, grouper, crab, shrimp, and squid from Asia and South America (Impact Assessment, Inc. 2005).

One of the largest frozen bait distributors in Florida is located here, supplying almost all of the bait shops in the area. Mullet was among their best selling products, but cleaned and frozen bait is now the principal product.

Unlike Tampa, the City of St. Petersburg has not assigned an industrial area (like the Port of Tampa) to enhance commercial fishing operations. Presently, the total available commercial fishing dockage supports less than 15 spaces; much of the waterfront area is now occupied by hotels, homes, marinas, and tourist attractions. The municipal marina is largely occupied by sailboats. There are approximately ten public boat ramps, mostly located in the western part of St. Petersburg. The St. Petersburg pier was originally built to serve recreational fishermen, but has become more of a sight-seeing and entertainment spot. Marina staff estimate that only 40 to 50 percent of clientele are interested in fishing. Indeed, local anglers tend to favor Gandy Bridge, Weedon Island fishing pier, Skyway Piers, and the Fort De Soto beaches. Some local fishery participants express concern that increased waterfront development will damage water quality, even though this expansion increases their business. The local fleet is extensive and productive (Impact Assessment, Inc. 2005).

In 2005, there were 191,255 pounds of gag grouper landed in St. Petersburg, Florida with a value of $498,748. In 2006, landings for gag dropped to 98,004 pounds with a value of $280,409. During 2005, there were 737,463 pounds of red grouper landed with a value of $1,583,436. In 2006, landings for red grouper decreased to 530,413 pounds with a value of $1,252,409.

In the 2000 census, 0.1 percent of the population listed their occupation under the category for farming, fishing, and forestry, a decrease from the 1.3 percent who were in this category in 1990. In 2000, 0.1 percent listed their occupation under the agriculture, forestry, fishing, and hunting category also an increase from the 1.5 percent listed in 1990.

Following the demographic table are four tables that help to describe the presence of fishing in St. Petersburg, Florida in 2003 including a table of infrastructure that was observed in the community and primary fishing-related businesses that were listed in the phone books when Impact Assessment, Inc. conducted research for the Southeast Regional Office (Impact Assessment, Inc. 2005a). There is also a table that shows the amount of commercial landings and another one that shows the number of permits in the community (Impact Assessment, Inc. 2005a).

St. Petersburg Demographics for 1990 and 2000

Factor	**1990**	**2000**
Total population	238,629	248,232
Gender Ratio M/F (Number)	110,824/127,805	118,411/129,821
Age (Percent of total population)		
Under 18 years of age	19.8	21.5
18 to 64 years of age	58.0	61.1
65 years and over	22.2	17.4
Ethnicity or Race (Number)		
White	186,125	177,133
Black or African American	46,726	55,502
American Indian and Alaskan Native	596	769
Asian	3,967	6,640
Native Hawaiian and other Pacific Islander	--	130
Some other race	1,215	2,661
Two or more races	--	5,397
Hispanic or Latino (any race)	6,255	10,502
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	8.2	4.9
Percent high school graduate or higher	75.1	81.9
Percent with a Bachelor's degree or higher	18.6	22.8
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	8.8	11.7
Percent who speak English less than very well	3.2	4.9
Household income (Median $)	23,577	34,597
Poverty Status (Percent of population with income below poverty line)	13.5	13.3
Percent female headed household	21.3	13.8

Home Ownership (Number)		
Owner occupied	105,703	69,626
Renter occupied	66,577	40,037
Value Owner-occupied Housing (Median $)	63,000	81,000
Monthly Contract Rent (Median $)	353	567
Employment Status (Population 16 yrs and over)		
Percent in the labor force	59.2	62.4
Percent of civilian labor force unemployed	5.2	5.2
Occupation (Percent in workforce)**		
Management, professional, and related occupations	--	34.0
Service occupations	--	16.7
Sales and office occupations	--	28.3
Farming, fishing, and forestry occupations	1.3	0.1
Construction, extraction, and maintenance occupations	--	8.2
Production, transportation, and material moving occupations	--	12.7
Industry (Percent in workforce)**		
Agriculture, forestry, fishing and hunting	1.5	0.1†
Manufacturing	12.8	10.1
Percent government workers	12.7	12.1
Commuting to Work (Workers 16 yrs and Over)		
Percent in carpools	13.2	11.8
Percent using public transportation	3.0	2.9
Mean travel time to work (minutes)	--	22.9
Percent worked outside of county of residence	10.2	13.4

**Differences in the types of data the U.S. Census Bureau used to generate Occupation and Industry percentages in 1990 and 2000 preclude valid comparisons between those census years.
†Year 2000 figures include mining in this group; 1990 figures do not. Mining includes the offshore oil industry workforce.

Fishing Infrastructure and Services Observed in St. Petersburg in 2003

This information was obtained in 2003 during preliminary research conducted by Impact Assessment, Inc. under a contract for NMFS for the preliminary identification of fishing communities. The research team drove through the community and made notes of what fishing infrastructure and businesses were observed. This methodology serves as a starting point for describing fishing related infrastructure and businesses, but is not an all inclusive account of what exists in the community.

Infrastructure or Service	Quantity
Air fill stations (diving)	0
Boat yards/ Boat builders (recreational/commercial)	3 (builders)
Churches with maritime theme	0
Docking facilities (commercial)	1
Fishing Gear, Electronics, Welding, and other repair	3 (rec)
Fishing associations (recreational/commercial)	0
Fish processors, Wholesale Fish House	4
Fisheries research laboratories	2
Fishing monuments/ festivals	0
Fishing pier	1
Hotels/Inns (dockside)	10
Marine railways/haul out facilities	0
Museums—fishing/marine-related	0
Net makers	0

NMFS or state fisheries office (port agent, etc.)	1
Public boat ramps	7
Recreational docks/marinas	10
Bait & Tackle/fishing supplies	6
Recreational Fishing Tournaments	0
Sea Grant Extension office	0
Seafood restaurants	Many
Seafood retail markets	5
Trucking operations	0
Site-seeing/pleasure tours	0
Charter/Head Boats	5
Commercial Boats	12

Primary Fishing-related Businesses Listed for St. Petersburg in 2003

This information was obtained in 2003 during preliminary research conducted by Impact Assessment, Inc. under a contract for NMFS for the preliminary identification of fishing communities. The research team used the local yellow pages in each community to determine which businesses were listed.

Type of Business	Frequency
Boat Builder/Broker	92
Boat Builder/Broker; Boat Rentals & Pier	1
Boat Builder/Broker; Diving & Fishing Equipment	1
Boat Builder/Broker; Marina	17
Boat Rentals & Pier	22
Boat Rentals & Pier; Marina	2
Marina	39
Processor; Wholesale Seafood Dealer	4
Retail Seafood Dealer	24
Retail/Wholesale Seafood Dealer	1
Wholesale Seafood Dealer	10
Total	213

St. Petersburg Commercial Landings and Value Summary: 2002 (based on all address fields)

Species	Pounds Reported	Ex-Vessel Value ($)
Total Combined	2,223,277	5,863,162

St. Petersburg License/Permit Summary: 2000

Commercial (based on physical address data only)		**Recreational** (based on all address fields)
State License Holders	Federal Permit Holders	State Saltwater License Holders
123	69	10,368
Total = 191		
% Households Holding Comm. Permit or License: 191/109,663 = 0.2		Average Number of Licenses per Household: 10,368/109,663 = 0.1

Please reference Table 3.19-5 above for the total number of commercial permit and license holders attributable to this community as based on both street *and* post office box address data.

3.5 Administrative Environment

Federal Fishery Management

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

Responsibility for federal fishery management decision-making is divided between the 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 MSFCMA 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 NMFS. The public is also involved in the fishery management process through participation on advisory panels and through council meetings that, with few exceptions for discussing personnel matters, are open to the public. The regulatory process is also in accordance with the Administrative Procedures Act, in the form of “notice and comment” rulemaking, which provides extensive opportunity for public scrutiny and comment, and requires consideration of and response to those comments.

Regulations contained within FMPs are enforced through actions of the NOAA’s Office of Law Enforcement, the USCG, and various state authorities. To better coordinate enforcement activities, federal and state enforcement agencies have developed cooperative agreements to enforce the Magnuson-Stevens Act. These activities are being coordinated by the Council’s Law Enforcement Advisory Panel and the Gulf States Marine Fisheries Commission’s (GSMFC) Law Enforcement Committee have developed a 5-year “Gulf Cooperative Law Enforcement Strategic Plan - 2006-2011.”

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 2004a).

4 BYCATCH PRACTICABILITY ANALYSES

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.

The shallow-water grouper fishery is currently regulated through measures such as quotas, size limits, bag limits, and seasonal closures. These measures are intended to protect grouper 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. Consequently, the Council is considering in this amendment the practicability of taking additional action to further minimize directed fishery reef fish bycatch. Additionally, the Council approved Amendment 27 to the Reef Fish FMP in June 2007. The final rule for this amendment was published in February 2008, and imposed additional regulatory measures (e.g., use of circle hooks, dehooking devices, and venting tools) for reducing reef fish bycatch.

Gag Release Mortality Rates

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. Discard mortality rates were estimated to increase with depth (Turner et al. 2001). Several discard mortality studies (Rudershausen et al. 2005; Burns et al. 2002; Overton and Zabawski 2003; McGovern et al. 2005) were conducted in both the Gulf of Mexico and South Atlantic following the 2001 assessment. These studies updated estimates of release mortality, which were used for the 2006 gag assessment. The studies used direct observations of release condition, tag-release comparison, and cage observations to evaluate release mortality. Release mortality rates displayed a positive relationship with depth, increasing from 11 percent at 30 feet to 50 percent at 150 feet and greater than 80 percent at depths of 225 feet or more (see Figure 1.2.1.1). The 2006 gag stock assessment estimated the average release mortality rate for commercially caught gag was 67 percent. Estimates of release mortality for recreationally caught gag averaged 20 percent and ranged from 11-42 percent depending on the geographic region and depth zone fished (Table 1.2.1.2). While the release mortality rate is higher in the commercial sector than in the recreational sector, the number of discards is significantly lower in the commercial sector than the recreational sector (see Table 1.2.1.1 and Magnitude of Bycatch section below).

Magnitude of Gag Bycatch

Commercial gag discards are primarily due to minimum size regulations, which began in federal waters in 1990. From 1990 to June 2000 the gag minimum size limit was 20 inches TL. From July 2000 to present, the commercial gag minimum size limit has been 24 inches TL. A report of commercial discards from logbooks was presented at the SEDAR10 Data Workshop (McCarthy 2006). This report was limited to only a few vessels and a limited number of years of data. For these reasons, the data workshop panel recommended not using these commercial discard estimates. Instead, it was assumed that the commercial sector did not discard gag prior to 1990, and after that discarded only fish below the legal size limit (SEDAR 10 2006). The assessment estimated the size distribution of discarded fish from the cumulative size frequency distribution observed for the respective commercial sectors (handline, longline, other) using data from 1984 to 1989. Size-at-depth data from the Trip Interview Survey and GULFIN was then used to generate a probability matrix of size at capture by depth for the commercial sector. The probability matrix accounted for changes in the minimum size limit over time and was combined with the above described release mortality at depth matrix to estimate the portion of dead discards at size by year (SEFSC 2007).

The magnitude of commercial discards is estimated to be a small fraction of total removals. Dead discards in the commercial trawl, trap, and spear fisheries were not calculated because those gears account for less than 3 percent of the total gag landings and bycatch is relatively low for those gears. From 1990-1999, under a 20 inch minimum size limit, commercial dead discards were estimated to account for about 0.03 percent of the total commercial removals by weight and 0.1 percent of the total gag dead discards by weight (see Table 1.2.1.1). Since 2000, under a 24-inch TL minimum size limit, dead discards have accounted for about 1.3 percent of the total commercial removals of gag and 2.8 percent of the total dead discards by weight (see Table 1.2.1.1).

Recreational gag discards were initially calculated during SEDAR 10 in a similar manner as commercial gag discards. However, the SEDAR Evaluation and Grouper Review panels determined that size-at-depth information was limited and restricted to a small geographic area. As a result, recreational gag discards were estimated in a different manner than commercial gag discards. Discards were estimated for three regions (Peninsular Florida, Florida Keys, and the Florida Panhandle) and three depth zones (inshore, state waters, and federal waters; see Table 1.2.1.2) using recreationally reported discard information from the Marine Recreational Fisheries Statistics Survey (MRFSS). These discard estimates were multiplied by the average release mortality rate for that region and depth zone to determine total dead recreational discards. Average depths for each stratum were based on depth-contour plots and information from recreational anglers and scientists.

Recreational discards were attributed primarily to the minimum size limit. During 1990-1999, when a 20-inch TL minimum size limit was in effect, recreational dead discards were 16 percent of total recreational removals and 99.9 percent of the total dead discards by weight (see Table 1, Section 1.2.1). Since the increase to a 22-inch TL minimum size limit in 2000, recreational dead discards have been 23 percent of the total recreational removals by weight and 97.2 percent of total dead discards by weight (see Table 1, Section 1.2.1). 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).

Total gag dead discards have increased with each increase in the minimum size limit. Before the first federal minimum size limit was implemented, total dead discards averaged 83,005 pounds (1986-1989). Total dead discards increased to an average of 495,418 pounds with the implementation of the 20-inch TL minimum size limit and then increased further to an average of 1,368,935 pounds with the implementation of the 24-inch minimum size limit. Since 1990, recreational gag dead discards have been greater than commercial dead discards (Figure 4.1).

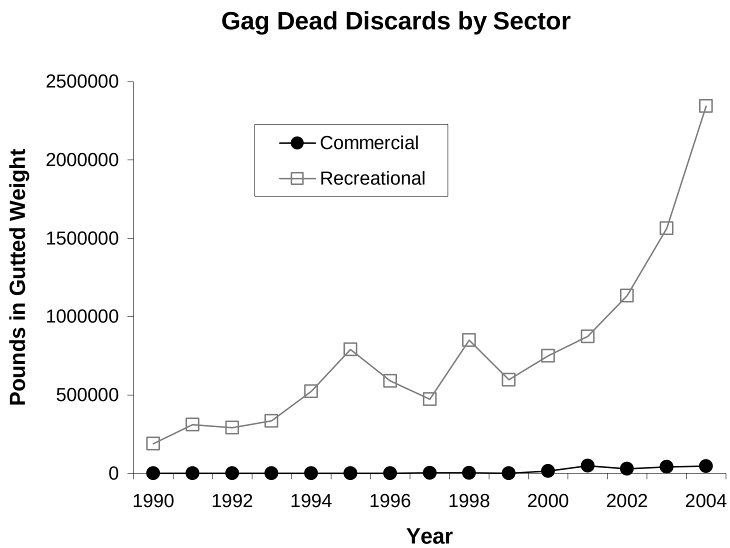


Figure 4.1 Gag Dead Discards by Sector from 1990 - 2004

Red Grouper Release Mortality Rates

The 2002 red grouper stock assessment used release mortality rates of 33 percent and 90 percent for the commercial handline and longline fisheries, respectively. A 10 percent release mortality rate was used for the recreational sector (from Wilson and Burns 1996). Similar to gag, it was determined during the 2006 SEDAR 12 data workshop that enough information was available to calculate a release mortality by depth function (SEDAR 12 2007). However, available red grouper release mortality data were not as complete as they were for gag. Size at depth data were available for red grouper, but the relationship between discard mortality and depth was less clear because available studies did not handle or release red grouper in the same way for all depths and fewer samples were used. Additionally, analyses demonstrated that there was no difference in median red grouper length over time by gear or depth (SEDAR 12 2007). Therefore, discard mortality was not calculated using a depth specific release mortality rate.

Estimates of red grouper release mortality were collected from seven data sources (SEDAR 12 2007). Data were designated either pre-release mortality or post-release mortality. Pre-release mortality data were observations of fish condition on the surface at the time of release and represented a minimum estimate of release mortality. Pre-release mortality data for commercial catches were obtained from Hale (2006) and the NOAA Fisheries Service Cooperative Research Program. Pre-release mortality data for recreational catches were also obtained from Sauls (2005) and the MRFSS program. Post-release mortality data were observations of fish from cages and tag-recaptures, usually reflecting a higher rate of release mortality than that observed from surface releases (SEDAR 12 2007). These data were collected from Koenig (2007), Wilson and Burns (1996), and Burns et al (2002). Based on a review of the data collected from these studies, 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 (SEDAR 12 2007).

Magnitude of Red Grouper Bycatch

Annual commercial red grouper dead discards were calculated by geartype from landings and average discard rates from observer data, bottom longline survey data, and discard logbook reports. It was assumed that there were no discards before implementation of a minimum size limit in 1990. Average discard rates per pound landed were estimated using a generalized linear modeling approach. There was no significant difference in discard rates among years. Handline and fish trap discard rates calculated from logbook reports were similar to bottom longline and observer discard rates (SEDAR 12 2007). In contrast, longline discard rates from logbook reports were an order of magnitude less than NOAA Fisheries Service bottom longline survey data or observer data. It was therefore recommended that longline discards be calculated by multiplying the handline red grouper discards to landings ratios with the longline landings in each area and targeting stratum. Recreational discards were derived from headboat observer data and MRFSS (charter, private). Discards in numbers were then estimated in terms of weight by multiplying the estimated number of discards by the derived age composition (computed using the Goodyear probabilistic approach). Numbers at age were then multiplied by weight at age to estimate total dead discards by weight for each sector and geartype.

Since the implementation of the 20-inch minimum size limit in 1990, commercial dead discards have averaged 12 percent of the commercial removals and 73 percent of the total dead discards of red grouper (Table 1.2.1, Section 1.2.2). During this time, an average of 87.3 percent of the total commercial dead discards was attributed to the longline sector, an average of 12.2 percent was attributed to the handline sector and 0.5 percent was attributed to the fish trap sector. Recreational dead discards since 1990 have averaged 15 percent of the recreational removals and 27 percent of the total dead discards of red grouper (Table 1.2.1, Section 1.2.2). Annually, the commercial sector discards dead an average of 600-900 thousand pounds of red grouper, while the recreational sector discards dead an average 200-400 thousand pounds.

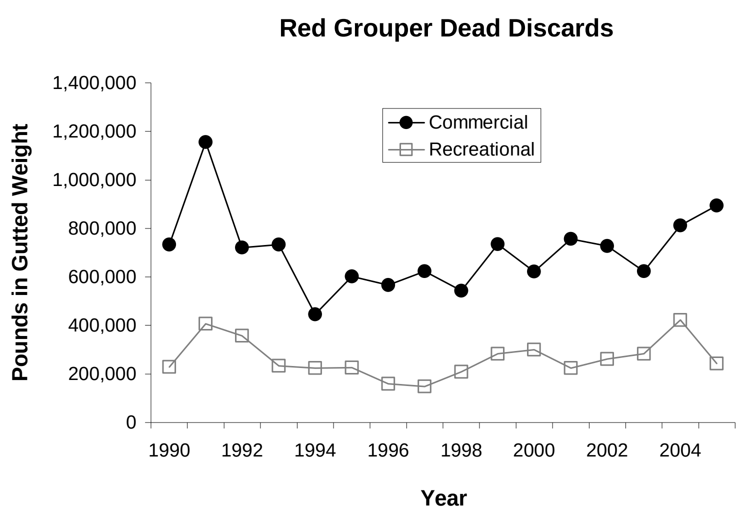


Figure 4.2 Red Grouper Dead Discards by Sector from 1990 - 2004

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 (March 28, 2007; 72 FR 14466). This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1 percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. The risk of serious injury or mortality to marine mammals resulting from the recreational sector of the reef fish fishery, which uses similar gear (i.e., handlines, rod and reel, spears, etc.), is also expected to be low, although interactions with dolphins and sea turtles are known to occur.

A 2005 biological opinion (NMFS 2005a) conducted for the Gulf reef fish fishery found mortalities of endangered and threatened species are uncommon from gear used in the reef fish fishery and were not likely to jeopardize the continued existence of threatened or endangered species. The biological opinion indicated recreational anglers infrequently take sea turtles, although loggerhead, leatherback, Kemp's ridley and green sea turtles are known to bite baited hooks (NMFS 2005a). During 2001-2003, it was estimated recreational anglers spent 35.7 million hook-hours fishing for reef fish, during which an estimated 111 hard-shell sea turtles were caught; 40 of which died (NMFS 2005a). During this same time period, it was estimated there were 113 commercial longline hardshell sea turtle takes, 87 commercial vertical line hardshell sea turtle takes, and 9 leatherback sea turtle takes (NMFS 2005a). The biological opinion also estimated eight smalltooth sawfish were caught and released by the commercial and recreational reef fish fishery during 2001-2003 (NMFS 2005a). Two reasonable and prudent measures to minimize stress and increase survival of sea turtles and smalltooth sawfish were identified:

1. NOAA Fisheries Service must ensure that any caught sea turtle or smalltooth sawfish is handled in such a way as to minimize stress to the animal and increase its survival rate.
2. NOAA Fisheries Service must ensure that monitoring and reporting of any sea turtles or smalltooth sawfish encountered (1) detect any adverse effects resulting from the GOM reef fish fishery; (2) assess the actual level of incidental take in comparison with the anticipated incidental take documented in that opinion; (3) detect when the level of anticipated take is exceeded; and (4) collect improved data from individual encounters.

The Council addressed these measures in Amendment 18A to the Reef Fish FMP (GMFMC 2005b), which established regulations to minimize stress to endangered species incidentally caught in the reef fish 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) and red snapper (SEDAR 7 2005) 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. 28 inches FL recreational; Amendment 30A when implemented will increase the recreational minimum size limit to 30 inches FL). Because greater amberjack are pelagic and grouper are bottom fish, bycatch of greater amberjack is relatively low in the SWG 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 IFQ shares and therefore are unable to retain large quantities of red snapper when fishing for grouper. Bycatch is a significant source of mortality in the red snapper fishery, resulting in the Council approving actions in Amendment 27/14 to reduce directed fishery bycatch. The statuses of other shallow-water grouper species, such as black grouper and 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, since 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 12-14 percent of the total biomass removed from the red grouper fishery each year. In the gag fishery, dead discards account for an even greater percentage of the total biomass removed (10-23 percent) 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 in the directed SWG fishery. The commercial SWG fishery is 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 SWG fishery is 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

Grouper minimum size limits are the greatest factors contributing to bycatch in the directed SWG fishery. Currently, there is a 20-inch TL commercial and recreational red grouper minimum size limit, a 22-inch TL gag recreational minimum size limit, and a 24-inch TL gag commercial minimum size limit. There are also minimum size limits for black grouper (24-inches TL), yellowfin grouper (20-inches TL), and scamp (16-inches TL). Bycatch logbook records indicate > 99 percent of all commercially caught red grouper and gag are discarded due to regulations. The recreational minimum size limit is likely also the primary reason for discarding gag, red grouper, and other SWG. Size limits are intended to protect immature fish and reduce fishing mortality. The red grouper minimum size limit is above the size at 50 percent maturity (Moe 1969; Collins et al. 2002), while gag minimum size limits are at or slightly above the size at 50 percent maturity (SEDAR 10 2006). Sizes at maturity for black grouper, yellowfin grouper, and scamp are 33 inches TL (NMFS 2005b), 20 inches TL (Cummings, 2007), and 14 inches TL (NMFS 2005), respectively. Size limits for yellowfin grouper and scamp are at or above the size at 50 percent maturity, while the size limit for black grouper is below the size at 50 percent maturity.

Several yield-per-recruit (YPR) analyses were recently conducted (Ortiz 2007; Walter 2007) for gag and red grouper to identify the sizes that best balance the benefits of harvesting fish at larger sizes against losses due to natural mortality. Similar YPR analyses are not available for other SWG. Walter (2007) concluded YPR was maximized for all red grouper sectors at 14-inches TL. This resulted in an 8 percent increase in YPR relative to the status quo 20-inch TL minimum size limit. If only commercial minimum size limits were reduced or only the commercial longline minimum size limit was reduced, then YPR was maximized at 10-inches TL (5 percent increase in YPR). Walter (2007) estimated discards would be reduced by 20-66 percent in the longline fishery (relative to equilibrium or 2005 conditions) if the minimum size limit was reduced to 18-inches TL and 40-90 percent if the minimum size limit (relative to equilibrium or 2005 conditions) was reduced to 16-inches TL. Similarly, discards in the commercial handline sector would be reduced by 15-68 percent relative to equilibrium or 2005 conditions under an 18-inch TL minimum size limit, and 33-90 percent under a 16-inch TL minimum size limit.

Observer data collected onboard reef fish vessels during 2006 and 2007 support the findings of Walter (2007). Red grouper longline discards would be reduced by approximately 38 percent if the size limit is reduced to 18-inches TL and 78 percent if the size limit is reduced to 16-inches TL. Similarly, handline discards would be reduced by approximately 33 percent if the size limit is reduced to 18-inches TL and 77 percent if the size limit is reduced to 16-inches TL.

Although decreasing the minimum size limit for red grouper positively benefits YPR and reduces bycatch, it also negatively affects spawning potential. Lowering the 20-inch TL minimum size limit across all sectors by 2-, 4-, or 6-inches would reduce the spawning potential ratio (SPR) by 2.7 percent, 5.6 percent, and 8.1 percent, respectively (Walter 2007). SPR would decrease by 1.5 to 5.2 percent, if only the commercial minimum size limit is reduced to 10-18 inches TL. Similarly, SPR would decrease 0.7 to 2.2 percent if the commercial longline minimum size limit was reduced to 10-18 inches TL. Status quo conditions (20-inch TL size limit) indicate SPR is just slightly less than the SPR at optimum yield. SPR would decrease below the SPR at MSY if the minimum size limit is reduced to 16-inches TL or less across all sectors (Figure 5.10.2 in Section 5.10). If only the commercial red grouper minimum size limit is reduced then SPR would be approaching the SPR at MSY under minimum size limits of 10- to 12-inches TL (Figure 5.10.2 in Section 5.10). SPR would be between the SPR at OY and the SPR at MSY if only the commercial longline minimum size limit is reduced or eliminated (Figure 5.10.2 in Section 5.10). It should be noted that the above described SPR-YPR analyses assumed the red grouper fishery is regulated through a constant fishing mortality policy rather than through a quota (Walter 2007). The YPR and SPR results would be different if a constant catch strategy (i.e., red grouper quota) was used for analysis purposes.

Ortiz (2007) conducted YPR analyses for gag and determined YPR was maximized across all sectors at 16-inches TL (note: this was the smallest minimum size limit analyzed). Ortiz (2007) did not analyze differences in YPR if just one sector's minimum size limits was reduced. Relative to the status quo minimum size limits (22-inches TL recreational; 24-inches TL commercial), overall YPR was estimated to increase by 9.9 percent if the minimum size limit was reduced to 16-inches TL. Minimum size limits of 18- and 20-inches TL were estimated to increase overall YPR by 8.3 and 5.6 percent, respectively, relative to status quo conditions. The number of dead discards per fish recruiting to the fishery was estimated to decrease by 93 percent at 16-inches TL, 77 percent at 18-inches TL, and 52 percent at 20-inches TL. Similar to red grouper, decreases in the minimum size limit negatively affect gag SPR. SPR at Fmax is estimated to be 38.4 percent. Existing size limits are estimated to produce an SPR of 35.8 percent. Decreasing the current commercial and recreational minimum size limits would decrease SPR. The more the minimum size limit is reduced the more SPR would also be reduced. At 16-inches TL, SPR would be near 30 percent (Ortiz 2007). However, as mentioned above, the YPR-SPR analyses assumed a constant fishing mortality policy rather than regulating fishing mortality through a quota. As a result, reductions in SPR resulting from lower minimum size limits may have been less than estimated.

Commercial observer data indicates that 50 percent of gag discards in the handline fishery are between 21 and 24 inches TL. Eighty-three percent of gag observed to be discarded by handlines were greater than 19 inches. In the longline fishery, only 4 out of 142 gag observed during 2006 and 2007 were less than the 24-inch minimum size limit. No gag caught on longlines were less than 20 inches TL.

Closed Seasons and Quota Closures

The recreational and commercial SWG fisheries are closed in the EEZ from February 15 to March 15. The commercial one-month closure was implemented in 2000, while the recreational closure was implemented in 2006 and first became effective in 2007. The one-month closure is intended to protect gag, black, and red grouper during spawning. The closure applies to all three species to reduce bycatch, since these species are commonly caught in the same areas and habitat. The commercial SWG fishery is also regulated by quota closures. In 2004, the commercial SWG fishery was closed November 15 after the red grouper quota was projected to be met. In 2005, the SWG fishery was closed even earlier, on October 10. In 2006 and 2007, the commercial grouper quotas for red and shallow-water grouper were not met.

Closed season discards are not believed to be significant in the commercial SWG fishery. Commercial fishermen often avoid bycatch of gag, black, and red grouper by targeting other species during the one-month closed season, such as tilefish, deep-water grouper, and greater amberjack (until March 1). Quota closures are also not expected to have a significant impact on closed season bycatch, because the entire SWG fishery closes once either the red grouper or SWG quotas are met, Anecdotal information indicated most grouper vessels stopped fishing or targeting other species during the 2004 and 2005 quota closures.

The impact of the one-month recreational closed season on recreational grouper discards is unknown, because this closure was only recently implemented. MRFSS data for March-April 2007 indicates discards were less than the previous three-year average. Although this may be a result of the closed season and reduced effort, the reduction is confounded by reductions in gag availability (see Section 1.2). More years of data will be needed to determine the actual impact of the recreational closed season on bycatch.

Bag and Trip Limits

The recreational SWG fishery is regulated by a 1-red grouper daily bag limit per person and a 5-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 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 one-fish bag limit is likely limiting and results in discards of red grouper once the bag limit is reached. When the one red grouper bag limit was initially imposed, it was estimated to achieve a 30 percent reduction in harvest. Actions proposed in this amendment would potentially increase the bag limit, thereby reducing discards associated with the red grouper bag limit. However, proposed actions that lower the gag bag limit will increase gag discards, especially on trips targeting red grouper. Lowering the aggregate bag limit is not likely to greatly affect overall SWG discards, since few trips (~5 percent) currently report harvesting more than three grouper per angler.

The commercial SWG fishery is regulated by a 6,000 pound trip limit. This trip limit was implemented in 2006 and is intended to slow the rate of harvest in order to extend the commercial grouper fishing season as long as possible. The trip limit is not limiting for most commercial fishing vessels in the fishery, with the exception of large longline vessels. Commercial trips meeting or approaching the trip limit stop fishing and return to port, rather than attempting to target other species and subsequently discarding grouper as bycatch. As mentioned previously, bycatch in the commercial fishery is low for gag and largely a result of the minimum size limit. Red grouper bycatch in the commercial SWG fishery ranges from 600-900 thousand pounds annually. Most bycatch is due to the commercial red grouper size limit. Bycatch for other species of SWG is unknown or has not been estimated.

Allowable Gear

Vertical hook-and-line gear (bandit rigs, manual handlines) and longlines are the primary gears used in the commercial grouper fishery. 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.

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 in the recreational fishery. Circle hooks are commonly used by recreational anglers to harvest grouper and other reef fishes. The extent of circle hook use is not well known. Recreational anglers also use spears to capture grouper. Spearfishing does not affect release mortality since all fish caught are killed. Only undersized grouper mistakenly killed while spearfishing would contribute to dead discards.

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. Bottom fishing is also prohibited in the Tortugas North and South marine reserves in the southern Gulf of Mexico near the Dry Tortugas. Marine reserves and time/area closures benefit fish residing within reserve boundaries by prohibiting their capture during part or all of the year. Within marine reserves, fish that are undersized potentially have an opportunity to grow to legal size 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 proposed 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.

<u>Alternatives being considered to minimize bycatch</u>

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 SWG, 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 SWG discards and discard mortality. Alternatives that either directly or indirectly could reduce SWG bycatch, include lower grouper minimum size limits (Actions 9 and 10), a higher recreational red grouper bag limit (Action 9), and pamphlets and prominently displayed placards describing proper handling and release methods (Action 10). Other alternatives considered in this amendment that may increase grouper bycatch include a lower gag bag limit, longer recreational closed seasons, commercial quota closures, and commercial gag trip limits.

<u>Practicability Analysis</u>

Criterion 1: Population effects for the bycatch species

For both the red and gag grouper stocks, total dead discards have increased significantly since the implementation of minimum size limits. From 1990-2004, recreational gag dead discards on average have been greater than commercial gag dead discards, 99 percent versus 1 percent of total dead discards (Figure 4.1). From 1990-2005, commercial red grouper dead discards on average have been greater than recreational discards, 73 percent versus 27 percent of total dead discards (Figure 4.2). Therefore, management measures to reduce bycatch will have the greatest effect on recreationally caught gag and commercially caught red grouper.

Measures being considered to end overfishing of gag and/or extend the length of gag fishing season, such as decreased TAC, gag trip limits, and longer closed seasons may increase bycatch. However, the overall benefits to the stock resulting from these management measures are expected to exceed the losses associated with increasing bycatch.

The bycatch minimization methods being considered for this amendment are expected to benefit the stocks. Reducing the size limit of red grouper in the commercial fishery 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 red grouper minimum size limit in the commercial longline sector is expected to provide greater biological benefits than lowering the red grouper minimum size limit for the entire commercial fishery because release mortality rates are higher in the longline sector. Lowering the commercial gag minimum size limit is expected to provide little benefit to the population since most fish harvested are legal size and not discarded. In contrast, lowering the recreational gag minimum size limit to 20-inches is estimated to reduce dead discards by 14 percent, providing net benefits to the population. The decrease in the size limit, however, would increase angler catch rates and result in a longer recreational closed season. The Council will need to balance the tradeoff of lowering the recreational gag minimum size limit to reduce bycatch with social impacts on the recreational fishing community resulting from a longer closed season. While lowering minimum size limits for gag, red, and shallow-water grouper may reduce discards or discard mortality, they may also reduce SPR since fish would be harvested at smaller sizes with lower fecundity.

Amendment 27/14 to the Reef Fish and Shrimp FMPs recently required fishermen to use circle hooks, dehooking devices, and venting tools when harvesting reef fish. These gears are all intended to reduce bycatch and release mortality. The benefits of such gears are discussed in detail in Amendment 27/14.

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 red grouper stock assessment (SEDAR 12 2007) indicates the stock has recovered from an overfished status, allowing the Council to increase TAC. 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 remain stable if TAC is increased to OY; although more recent projections indicate stock biomass may have declined since the 2005 stock assessment. 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 SWG 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. Snappers, greater amberjack, gray triggerfish and other reef fishes are commonly caught in association with SWG. Red snapper, gray triggerfish, and greater amberjack are undergoing overfishing and overfished (SEDAR 7 2005; SEDAR 9 2006b; SEDAR 9 2006c), and vermilion snapper are not undergoing overfishing and not overfished (SEDAR 9 2006a). 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 are expected to benefit reef fish stocks. Measures include requiring the use of circle hooks, venting tools, and dehooking devices while harvesting reef fish. These gears can reduce discards and bycatch mortality of reef fishes by selectively reducing the capture of undersized fish or reducing the release mortality of fish after capture (i.e., improve handling and release practices). Venting tools and dehooking devices may also increase survival of released fish by improving handling techniques and reducing time a fish spends at the surface. Because mouth gape size for both gray triggerfish and vermilion snapper is small, circle hooks will likely reduce the capture of both sub-legal and legal fish. However, bycatch does not appear to be compromising the status of either of these stocks, since gray triggerfish release mortality is relatively low (1.5 percent, SEDAR 9 2006b) and vermilion snapper are not overfished or undergoing overfishing. If required, pamphlets and prominently displayed placards will increase awareness of the importance of reducing bycatch and educate anglers on proper handling techniques for releasing fish.

Lowering the red grouper minimum size limit is estimated to significantly reduce commercial discards. Decreasing the size limit will increase catch rates and allow the commercial quota to potentially be met faster. Mid-season quota closures may also occur for the grouper fishery if the gag commercial quota is reached quickly. These quota closures have the unintended consequences of shifting fishing effort to other species. This shift in effort could negatively impact reef fish stocks not currently constrained by annual quotas. The magnitude of this impact would depend on how much the commercial quota is reduced, the length of the closure, and the amount of effort shifting that occurs. Because most reef fish fisheries in the Gulf are now managed by quotas (e.g., SWG, DWG, tilefishes, greater amberjack, gray triggerfish, and commercial and recreational red snapper) and annual catch limits and accountability measures are now being implemented for species undergoing overfishing, the potential for effort shifting and changes in bycatch may be lessened for other reef fish 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.

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

Lower size limits will all reduce costs associated with fishing operations. Decreasing the red grouper minimum size limit will increase efficiency and will reduce the number of fish released, especially in the longline sector. Expanding the commercial and recreational seasonal closures for the grouper fisheries will have direct impacts to both recreational anglers and commercial fishermen. Commercial fishermen will incur losses in revenue because fish would have to be released during the closed season and after quotas are met. Recreational anglers 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 angler behavior and fishing practices. Decreases to minimum size limits will increase catch rates, reduce bycatch, and affect decisions about where to fish. Seasonal closures and lower bag limits will alter angler effort and may affect decisions about when and where to fish. A one or two gag bag limit may deter some anglers from taking fishing trips. Anglers may also choose to fish closer to shore because of higher fuel prices and lower bag limits. If a gag quota is implemented, derby fishing may occur or commercial fishermen may change their behavior to avoid catching gag in order to extend the duration of the SWG fishing season. Early season commercial quota closures may also result in effort shifting to other fisheries, placing increased fishing pressure on those species that are not regulated by quotas If bycatch allowances or trip limits for gag are established (see Action 8), commercial fishermen may change their fishing practices and behavior to maximize their ability to catch the gag grouper bycatch/trip limit while harvesting other SWG.

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

Proposed bycatch minimization 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 within the SWG fishery. None of the commercial actions are expected to diminish regulatory effectiveness; as of May 6, 2007, all commercial reef fish vessels are required to have vessel monitoring systems. Establishing a gag quota and annual catch limits will increase the burden on administrators to monitor the gag quota and annual SWG catch limits and determine when they are met. All of these bycatch minimization measures will require additional research to determine the magnitude and extent of reductions in bycatch and bycatch mortality.

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

Reducing minimum size limits in the SWG fishery may positively impact these stocks by reducing regulatory discards and increasing efficiency. 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) and increases in consumer surplus for recreational anglers. Increasing the red grouper bag limit would result in increases in consumer surplus for recreational anglers.

Imposing longer closed seasons, a gag bag limit, and a gag trip limit will positively benefit the gag stock by reducing fishing mortality. Reductions in the aggregate bag limit and SWG quota will similarly benefit SWG. These management measures, however, will increase bycatch, increase harvest costs for commercial fishermen, and reduce consumer surplus for recreational anglers.

The implementation of circle hooks, dehooking devices, and venting tools through Amendment 27/14 will result in long-term social and economic benefits resulting from reductions in reef fish discards and discard mortality. Requiring these devices will result in initial economic costs for persons not already possessing these gears. Mandatory pamphlets and placards are expected to have small economic costs to fishermen. 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 the same and there is a two-inch difference between the recreational and commercial gag minimum size limit. This amendment proposes reducing size limits in the SWG commercial fishery and the recreational gag fishery. 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. Some commercial fishermen may perceive time/area closures as inequitable, since the proposed areas are located far offshore and would have greater impacts to commercial fishermen than recreational anglers. Modifying the red grouper allocations is expected to result in net economic benefits to the recreational sector and reduced benefits to the commercial sector. Since the recreational sector discards a much smaller amount of red grouper as bycatch, shifts in allocation may result in greater net benefits to the biological environment. 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. Gear restrictions, lower minimum size limits, and higher recreational bag limits should all have positive social benefits, since these actions would reduce bycatch or bycatch mortality.

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 directed grouper 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. Reducing the red grouper minimum size limit, especially in the commercial longline fishery, appears to be a practical option for reducing discards as long as landings are constrained (to the commercial TAC needed to rebuild the stock) by a quota or other management measures. Gear restrictions, as proposed in Amendment 27/14, also appear to be a practical option to reduce bycatch with minimal social and economic costs. Lowering the gag minimum size limit in the recreational fishery 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. The Council will have to weigh the benefits of reducing bycatch with the negative social effects of longer seasonal closures.

In some cases, management measures (e.g., lower bag limits, closed seasons, quota closures) may need to be imposed that increase bycatch. 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. 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 will need to consider the practicability of implementing the bycatch minimization measures discussed above with respect to the overall objectives of the Reef Fish FMP and Magnuson-Stevens Act.

5 ENVIRONMENTAL CONSEQUENCES

5.1 Action 1. Set Gag Thresholds and Benchmarks

5.1.1 Direct and Indirect Effects on Physical Environment

Red grouper and gag are bottom dwelling fish, and fishing methods must consequently place the gear on or near the bottom where it may interact with the habitat. 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 (see Table 3.2.2.1).

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

Longline gear comes 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 direct observations of longline fishing from submersibles, High (1998)) observed in a halibut longline fishery off of Alaska that the longline gear on the bottom would sometimes take extreme angle turns as currents, snags, and hooked fish would affect its location. Hooked halibut were observed pulling portions of longlines 15 to 20 feet over the bottom. In addition, longlines were observed in contact with or snagged on a variety of objects including coral, and upon retrieval, corals were brought to the surface. In contrast, in a similar submersible study by Grimes et al. (1982) on a tilefish longline fishery off of New Jersey, there was no evidence that longlines shifted significantly even when set in currents. This was attributed to the use of anchors at the ends and weights placed along the line. However, tilefish, once hooked, were observed attempting to enter their burrows.

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). If vertical-line gear is lost or improperly disposed of it can entangle marine life (Hamilton 2000; Barnette, 2001). Entangled gear often becomes fouled with algal growth. If this gear becomes entangled on corals, the algae can eventually overgrow and kill the coral.

Anchor damage by vertical-line fishing vessels, particularly by the recreational fishery, is also potentially damaging. 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.

Longline gear is deployed over hard bottom habitats using weights to keep the gear on the bottom. This gear, upon retrieval, can abrade, snag and dislodge smaller rocks, corals, and sessile invertebrates (Bohnsack in Hamilton, 2000; Barnette 2001). The damage that this gear inflicts to the bottom depends on currents and the amount of line sweep caused by hooked fish (Barnette 2001).

Fish traps previously accounted for as much as 14 percent 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. However, the Council phased out this gear in February 2007 and this gear no longer impacts habitat in the Gulf of Mexico. Spear fishing has minimal effects on the bottom, although divers may cause damage by coming in contact with habitat while spearfishing.

Thresholds and benchmarks do not directly impact the physical environment, but indirectly they have impacts by affecting the decisions regarding the fishing regulations and amount of fishing effort necessary to stay within thresholds and achieve target levels.

Alternative 1 would maintain the existing levels. This includes the least restrictive MSST ($SSB_{20\%\ SPR}$), but the MFMT ($F_{30\%\ SPR}$) is intermediate between **Preferred Alternative** 2 and **Alternative 3**. The OY target (yield at $F_{20\%\ SPR}$) exceeds the MFMT overfishing threshold and should therefore never be reached. Under the **Alternative** 1 MFMT, overfishing is occurring, requiring a reduction in gag fishing mortality and effort. Since this will result in less gear being fished, or the existing gear being fished for a lesser amount of time, impacts to the physical environment will be reduced, though to the least amount of any of the alternatives in this action.

Preferred Alternative 2 would set MSST, MFMT, and OY based on maximum yield per recruit (MAX). As shown in Table 2.1.2, MFMT (F_{MAX}) is more conservative than either **Alternative** 1 or **Alternative** 3 (which are both $F_{30\%SPR}$). MSST will provide a more conservative (i.e., higher) equilibrium spawning stock biomass than either of the other two alternatives. The options for OY are also all more conservative the equivalent OY options in **Alternative 3**, or the OY in **Alternative 1**. This alternative results in the smallest amount of fishing gear, or gear being fished for the smallest amount of time, of any of the alternatives, resulting in the greatest reduction in impacts to the physical environment.

Alternative 3 would set MSST, MFMT, and OY based on 30% SPR. MSST is intermediate between **Alternative 1** and **Preferred Alternative 2**. MFMT is identical to **Alternative 1** and less conservative than **Preferred Alternative 2**. The OY options are less conservative than the equivalent options in Alternative 2 but more conservative than the OY in **Alternative 1** (however, the **Alternative 1** OY will be overridden by the more conservative MFMT in that alternative). If management is set based on avoiding overfishing (MFMT), then the impacts of this alternative will be identical to **Alternative 1**. However, the long term management goals are to achieve OY, in which case the impacts will be intermediate between **Alternatives 1 and Preferred Alternative 2**.

5.1.2 Direct and Indirect Effects on the Biological / Ecological Environment

Since overfishing is occurring under any of the alternatives, reductions in fishing mortality and fishing effort need to occur, resulting in positive impacts to the biological/ecological environment by reducing mortality on the target gag stock as well as incidental bycatch. In addition, reducing the fishing mortality rate for gag will increase the probability of a female gag surviving to transition to a male gag. 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). However, the relative degree of positive impact will vary among the alternatives.

Alternative 1 would maintain status quo MFMT, which would likely be the primary threshold driving management decisions since it is more conservative that the MSST or OY in the alternative. This is less conservative than **Preferred Alternative 2**. It is identical to **Alternative 3** if management is based on preventing overfishing, but less conservative if management is based on achieving OY. Although gag has only recently been declared to be undergoing overfishing, the estimates of historical fishing mortality rates indicates that this level of MFMT has been exceeded in most years as far back as 1982 (Table Gag-2). Thus, even though the overfishing threshold will not change, the management actions to achieve this threshold will require a reduction in F, benefiting the biological/ecological environment. However, the level of reduction, and benefit to the environment, will be the less than under **Preferred Alternative 2**, and either equal to or less than under **Alternative 3**.

Preferred Alternative 2 would set MSST, MFMT, and OY based on maximum yield per recruit (MAX), which is more conservative than either **Alternative** 1 or **Alternative** 3. Thus, this alternative would require the greatest reduction if F, resulting in the greatest benefit to the biological/ecological environment.

Alternative 3 would set MSST, MFMT, and OY based on 30% SPR. MSST is intermediate between **Alternative 1** and **Preferred Alternative 2**. MFMT is identical to **Alternative 1** and less conservative than **Preferred Alternative 2**. The OY options are less conservative than the equivalent options in **Preferred Alternative 2** but more conservative than the OY in **Alternative 1** (however, the **Alternative 1** OY will be overridden by the more conservative MFMT in that alternative). If management is set based on avoiding overfishing (MFMT), then the impacts of this alternative will be identical to Alternative 1. However, the long term management goals are to achieve OY, in which case the impacts will be intermediate between **Alternatives 1 and Preferred Alternative 2**.

5.1.3 Direct and Indirect Effects on Economic/Social Environment

5.1.3.1 Direct and Indirect Effects on the Economic Environment

Defining the MSY, OY, MFMT and MSST of a species does not alter the current harvest or use of the resource. Specification of these measures merely establishes benchmarks for fishery and resource evaluation from which additional management actions for the species would be based, should comparison of the fishery and resource with the benchmarks indicate that management adjustments are necessary. The impacts of these management adjustments are evaluated at the appropriate sections of this document. As benchmarks, these parameters would not limit how, when, where, or with what frequency participants in the fishery engage the resource. This includes participants who directly utilize the resource (principally, commercial vessels, for-hire operations, and recreational anglers), as well as participants associated with peripheral and support industries. All entities could continue normal and customary activities under any of the alternative specifications. Participation rates and harvest levels could continue unchanged.

Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Direct effects only accrue to actions that alter harvest or other use of the resource. Specifying MSY, OY, MFMT and MSST, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, specifying these parameters may be considered to have indirect economic effects.

Fishery management decisions influence public perception of responsible government control and oversight. These perceptions in turn influence the public's response to management. This response may be positive, such as cooperative participation in the management process, public hearings, and data collection initiatives, or negative, such as non-cooperation with data initiatives, or pursuit of political relief from management action. Positive responses support the efficient use of both the natural resource and the economic and human capital resources dedicated to the management process. Negative responses harm the integrity of the information on which management decisions are based, induces inefficient use of management resources, and may prevent or delay efficient use of the natural resource. The specific benefits and costs of these responses cannot be calculated. The various alternatives setting thresholds and benchmarks satisfy the technical guidelines and would establish the required platform from which future action can be taken and, thus, should generally induce satisfaction with the management of the resource. However, the alternatives vary in implications for total allowable harvest and constituents who favor more liberal harvests would likely prefer the alternatives in the decreasing order of the potential harvest implied by the alternative specifications, while those who favor more conservative harvests would likely hold the opposing preferences. The net effect of the behavioral responses from these opposing constituent groups cannot be determined.

In addition to the trigger to subsequent management that MSY and OY may provide, the MSST identifies the stock level below which a resource is determined overfished while the MFMT sets the threshold for considering the stock to be undergoing overfishing or not. Should the evaluation of the resource relative to the benchmark result in said designation, harvest and/or effort controls are mandated as part of a recovery plan. These harvest and effort controls would directly impact the individuals, social networks, and associated industries associated with the resource or fishery, inducing short-term adverse economic impacts until the resource is rebuilt and less restrictive management is allowable. The economic issue with such type of management measures involves a trade-off between short-run economic losses and long-run economic benefits. Losses stem from a reduction in harvest or participation in the fishery while benefits arise from a higher harvest level or fishery participation under a more sustainable environment.

In trading off short-run losses for long-term benefits over time, both the magnitude and timing of losses and benefits are important. The magnitude issue is somewhat self-evident. The timing issue comes into play because economic conditions, along with a host of other factors, change over time so as to alter the valuation of both losses and magnitudes. It is then the interplay of magnitude and timing that is critical in assessing the net results from loss/benefit trade-off over time.

From the discussion on the biological effects of the various measures, it appears that Preferred Alternative 2 is the most conservative and Alternative 1, the least conservative. The term "more conservative" is understood here to imply a higher likelihood of triggering more restrictive management measures but at the same time a higher likelihood of adequately protecting the stock. Under all alternatives, gag would be considered undergoing overfishing but not overfished. Thus, whichever alternative is selected, the trigger for adopting corrective measures would be activated. But being the most conservative, Preferred Alternative 2 may be expected to require stricter measures, and thus would tend to create more short-term losses than the other alternatives. On the other hand, it would also provide the best environment for sustainable stock and therefore more stable, long-term benefits to fishing participants and the nation as a whole. In this sense, Preferred Alternative 2 may also be considered to yield the highest benefits. Under the assumption that all alternatives result in long-term benefits outweighing short-run losses, Preferred Alternative 2 may be considered to provide more stable streams of net benefits than the other alternatives.

<u>Summary</u>

Defining the OY, MFMT and MSST of a species does not alter the current harvest or use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying OY, MFMT and MSST, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, specifying these parameters may be considered to have indirect economic effects. Restrictive management measures are required by all alternatives, but weighing both short-term losses and long-term benefits, Preferred Alternative 2 appears to provide more stable streams of net benefits over time than any of the other alternatives.

5.1.3 Direct and Indirect Effects on the Social Environment

Alternative 1, no action, will leave the existing definitions unchanged. With this alternative, there would not be any short term impacts, positive or negative, on the fishermen, fishing-dependent businesses, or fishing communities that are involved with the gag grouper fishery. With **Alternative 1**, in the long term, the OY would not be reduced from the MSY. This may require more restrictive measures in the future if the stocks are reduced and declared overfished.

Preferred Alternative 2 and **Alternative 3** will not have any direct impacts on the fishermen, fishing-dependent businesses, or communities that depend on the gag grouper fishery in the short term because this is an administrative action that will set the thresholds and benchmarks. There may be negative impacts on those that depend on this fishery in the future when the thresholds and benchmarks are established if it is determined that more restrictive measures need to be in place to meet the desired definitions. Establishing thresholds and benchmarks for the gag grouper fishery will give fisheries managers a target for managing the fishery with the goal to rebuild the fishery. Once the overfishing of gag grouper is ended then stocks can rebuild.

Fishermen, fishing-dependent businesses, and communities that are involved with this fishery will benefit in the future when stocks are rebuilt and there are more fish to harvest.

Summary

Alternative 1 would continue the status quo and would not stop overfishing of gag grouper as required by the SFA. Preferred **Alternative 2** and **Alternative 3** would not have any direct impact on the fishermen, fishing-dependent businesses, or communities that depend on the gag grouper fishery in the short term because this is an administrative action that will set the thresholds and benchmarks. It is important for the council to define MSST and OY to stop overfishing.

5.1.4 Direct and Indirect Effects on Administrative Environment

The Sustainable Fisheries Act of 1996 requires that overfished and overfishing thresholds (MSST and MFMT) be developed for all stocks under management. The Council's initial attempt to do this through a Generic SFA Amendment (GMFMC 1999a) resulted in an adoption of $F_{30\%\ SPR}$ as a default MFMT for most reef fish (goliath grouper and Nassau grouper were given more conservative thresholds). However, the amendment's proposals to set MSST and MSY proxies based on SPR were rejected by NMFS on the basis that SPR is not biomass-based and is not an acceptable proxy for MSY or MSST (letter from NMFS Regional Administrator to Council Chairman dated November 17, 1999). However, at about the same time, NOAA General Counsel stated that SPR is still a viable proxy to SSB_{MSY} in data moderate or data poor situations (e-mail from Michael McLemore to RFSAP October 5, 1999).

As a result of the NMFS rejection of the proposed biomass thresholds, the Council did not have an SFA-approved MSST or OY definition for reef fish. There was a definition from Amendment 1 of 20% SPR for both the overfished threshold and optimum yield, but it these pre-SFA definitions had not been determined to comply with SFA requirements. In addition, the pre-SFA definition of OY as the yield at 20% SPR while a new MFMT was adopted at $F_{30\%\ SPR}$ meant that OY could not be attained since the fishing mortality rate needed to reach OY exceeded MFMT and constituted overfishing.

Alternative 1 is the no action alternative, and will continue the incompatibility between a "yield at 20% SPR" OY and an $F_{30\%\ SPR}$ MFMT. It also leaves the OY biomass level equal to MSST when, under the NMFS National Standard guidelines and technical guidance, OY should be more conservative than MSST. This alternative will therefore continue to create administrative conflicts in determining appropriate management measures and stock status determinations for gag MSY directly.

Alternatives 2 and 3 will both clearly define MSST and OY as well as MFMT and remove any ambiguity. **Alternative 2** bases the thresholds and targets on maximum yield per recruit (MAX). In the case of the gag stock, these coincide with the thresholds and targets based on actual MSY estimates. The National Standard guidelines state that MSY proxies are acceptable "when data are insufficient to estimate MSY directly" (50 CFR 600.310(c)(3). The gag stock assessment (SEDAR 10, 2006) was able to produce actual estimates of MSY, which corresponds to the proxies based on MAX. Therefore, from an administrative perspective, **Alternative 2** complies with the National Standard guidelines more than either of the other alternatives.

Alternative 3 bases thresholds and targets on 30% SPR. This proxy was originally proposed for gag in the Generic SFA Amendment, but only the overfishing threshold was accepted by NMFS. NMFS rejected the use of SPR for biomass-based thresholds and targets, but also indicated that it might be an acceptable proxy in data-poor situations. Since actual MSY estimates were produced by the gag stock assessment (SEDAR 10, 2006), the stock does not appear to be in a data-poor situation, making this alternative administratively less acceptable than **Alternative 2**, where the MAX-based proxies correspond directly to actual MSY estimates.

The MSST suboptions in **Alternatives 2 and 3** set MSST at a level more conservative than the SSB_{proxy} at MSY, as recommended in the National Standard guidelines. **Option a** uses the formula - yield at (1-M)*proxy to determine MSST. Given a natural mortality rate of M = 0.15, this results in the yield at 85% of proxy. **Option b** is more conservative, setting the MSST at 75% of proxy, and **Option c** is the most conservative, setting the MSST at 50% of proxy. Analyses conducted by the SEFSC indicate there is a 20-28 percent probability that SSB would fall below $(1-M)*SSB_{MSY}$ given natural fluctuations in recruitment and assessment uncertainty if fishing mortality is maintained to achieve MSY. Under **Option a**, if fishing mortality is maintained to achieve an OY of 85% of F_{proxy}, then there would be less than a 0.2 percent probability of SSB falling below MSST (Cass-Calay and Ortiz 2007). Under **Option b**, there is a 2 percent or less probability that SSB would fall below 75% of F_{proxy} if fishing mortality is maintained at MSY and a less than 1 percent probability if fishing mortality is maintained at OY (Cass-Calay and Ortiz 2007). Under **Option c**, there is a less than 1 percent probability that SSB would fall below 50% of F_{proxy} if fishing mortality is maintained at either MSY or OY (Cass-Calay and Ortiz 2007).

The above probabilities are based on an OY level set equal to the yield at 75% of F_{proxy} (**Option e**), which is the recommended level in the NMFS technical guidance (Restrepo et al. 1999). **Alternatives 2 and 3** also contain options to set OY at the yield at 60% of F_{proxy} (**Option d**), and the yield at 90% of F_{proxy} (**Option f**). Probabilities of dropping below MSST were not calculated for these options, but **Option d** is more conservative and would have a lower probability than **Option e**, while **Option f** is less conservative and would have a higher probability than **Option e**.

All of the options satisfy the guideline to have an OY that is more conservative than MSY and thus benefit the administrative environment. For MSST (**Options a,b,c**) the less conservative options decrease the chance that an overfished status declaration will be made, but will require greater rebuilding if that declaration occurs. For OY (**Options d,e,f**) the less conservative options reduce the gap between OY and MFMT and increase the chance that an overfishing status declaration will be made, triggering the need for a plan to end overfishing.

5.2 Action 2. Red Grouper Minimum Stock Size Threshold

This action has been moved to Considered but Rejected.

5.3 Action 3. Set Gag TAC

5.3.1 Direct and Indirect Effects on Physical Environment

The alternatives in this section establish harvest limits and will not directly affect the physical environment. However, specifying gag TAC could indirectly affect the physical environment by defining the level (i.e., the amount of gear in the water at any given time) of commercial fishing effort and the duration and level of recreational fishing effort over the course of the fishing season. Level and duration of effort together define the total cumulative amount of effort (i.e., gear-hours of soak time), which affects the potential for gear to impact the physical environment.

A description of the gears used in the commercial and recreational grouper fisheries is provided in Section 3.1 and is included herein by reference. A listing of gears and potential impacts is provided below.

The primary gear types used in the commercial grouper fishery are bottom longlines and bandit rigs. Recreational fishermen predominately use rod and reel. Spearfishing also constitutes a small part of both recreational and commercial grouper fishing. Fish traps were used in the commercial fishery until February 7, 2007, when their use became prohibited in the Gulf of Mexico EEZ.

Longlines

Direct underwater observations of longline gear in the Pacific halibut fishery noted that the gear could sweep across the bottom, and its location could be affected by currents, snags, and even the efforts of hooked fish. While 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 (High 1998). However, another direct underwater observation study of longline gear in the 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).

Bandit Gear

Concentrations of many managed reef fish species are higher on hard bottom areas than on sand or mud bottoms, thus bandit gear fishing generally occurs over hard bottom areas (GMFMC 2004a). In their use, 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).

Spear and Powerhead

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 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.

Recreational Rod and Reel

Fishing line from hook and line fishing 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[6].

Alternative 1 (no action) would leave the gag TAC undefined. Management measures for the recreational fishery would not change as a result of the TAC (or lack thereof), but would likely change due to a need to end overfishing, which has a current definition ($F_{30\%\ SPR}$). Since recreational anglers target gag more often than red grouper, it is likely that this would result in a reduction in rod and reel and recreational spearfishing impacts. Management measures for the commercial fishery would also likely not change as a result of the gag TAC, but would change as a result of a change in the red grouper TAC. Since some commercial fishermen may attempt to target gag in order to delay a closure due to the red grouper quota being filled. Thus, there could be an increase in longline, bandit rig and vertical line impacts.

Preferred Alternative 2 sets the gag TAC based on the projected F_{OY} harvest level for each year from 2009 to 2011. Subsequent increases in TAC would need to be implemented in a future amendment. A TAC based on F_{OY} is more conservative than one based on F_{MAX} (as a proxy for F_{MSY}). Along with **Alternative 3**, this will require the greatest initial reduction in fishing effort from both sectors, and the greatest reduction in physical impacts. As the gag stock rebuilds toward its SSB_{OY} level, and the harvest is expected to keep pace with the increasing biomass and TAC with little change in effort. Thus, impacts to the physical environment should remain at about the 2009 level through 2011.

Alternative 3, as with **Preferred Alternative 2**, sets the initial TAC at the projected F_{OY} level for 2009, and it will have the same initial physical impacts. However, **Alternative 3** holds the TAC at the 2009 level for three years. Any subsequent increase in TAC would need to be implemented in a future amendment. As the stock rebuilds in each three-year period with no corresponding increase in TAC, the commercial fishery will fill its quota more quickly, resulting in reduced effort and physical impacts. The recreational sector effort will be unaffected after the initial reduction, but may overrun its allocation in subsequent years of each three year period. If accountability measures are implemented in Action 6, this could force reductions in fishing effort resulting in reduced physical impacts.

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

Alternative 4 sets the gag TAC based on the projected F_{MAX} (as a proxy for F_{MSY}) harvest level for each year from 2009 to 2011. Subsequent increases in TAC would need to be implemented in a future amendment. This is similar to **Alternative 2** except it sets a higher TAC based on the less conservative MSY threshold. Since the gag stock is currently undergoing overfishing, this will result in reductions in recreational and commercial fishing effort, and corresponding reductions in the physical impacts. However, the reductions will not be as great as for **Alternative 2**. As the gag stock rebuilds toward its SSB_{MSY} level, and the harvest is expected to keep pace with the increasing biomass and TAC with little change in effort. Thus, impacts to the physical environment should remain at about the 2009 level through 2011.

Alternative 5, is similar to Alternative 3 except that is sets TAC based on F_{MAX} (as a proxy for F_{MSY}). It will have the same initial physical impacts as Alternative 4, which also sets TAC based on MSY. However, subsequent impacts will be similar to Alternative 3. As the stock rebuilds in each three-year period with no corresponding increase in TAC, the commercial fishery will fill its quota more quickly, resulting in reduced effort and physical impacts. The recreational sector effort will be unaffected after the initial reduction, but may overrun its allocation in subsequent years of each three year period. If accountability measures are implemented in Action 6, this could force reductions in fishing effort resulting in reduced physical impacts.

5.3.2 Direct and Indirect Effects on the Biological / Ecological Environment

The gag stock is undergoing overfishing under both the current MFMT ($F_{30\%\ SPR}$) and the preferred alternative MFMT presented in Action 1 (F_{MAX}). This is not a recent phenomenon. Estimates of F indicate that overfishing has been occurring in most years since 1982 under the current MFMT ($F_{30\%\ SPR}$), and every year since 1976 under the preferred alternative MFMT (F_{MAX}) (Table 1.2.1.3). There is currently no TAC set for gag. In 2001, the Reef Fish Stock Assessment Panel recommended that the gag catches be no higher than about 5 million pounds. However, landings have been above that every year from 1998 through 2005, ranging from 5.8 to 7.4 mp. In 2006 and 2007, landings dropped to 3.3 and 3.7 mp respectively, close to the 2009 OY TAC of 3.38 mp (Table 2.3.4)

Alternative 1 would leave TAC undefined for gag. Although 2006 may turn out to be a low year for catches, there will be no constraints on the fishery to end the long-term trend of overfishing. One possible consequence of this long-term overfishing may be a loss in the proportion of male gag in the population. Gag are protogynous hermaphrodites, initially maturing as females and switching to males later in life. Sex transformation starts in individuals that are 7-8 years old (about 31 inches TL), with 50% transformation occurring by age 13 (about 43 inches TL) (Ortiz 2006). With minimum size limits (22 inches TL recreational/24 inches TL commercial) well below the size of transformation to male, combined with high fishing mortality rates, the likelihood of any individual surviving to become a male is very low. The current percentage of males in the population is about 2% (personal communication, Chris Koenig), much lower than the estimate of 19.4% for samples collected during 1977-82 (McGovern et al. 1998). This alternative would continue to exacerbate the low male to female ratio, and would allow overfishing to continue, and may eventually result in the stock dropping below MSST and entering an overfished state.

Alternatives 2 and 3 set TAC based on F_{OY}. This is a more conservative level than setting TAC based on the $F_{MSY\ proxy}$, and will eventually rebuild the stock to close to its B_{OY} level. Due to the low minimum size limit, it will still be difficult for a fish to reach male maturity, but the percent of males will rise under Alternatives 1, 4 or 5. However, this will not be an immediate benefit. Since male transformation begins at age 7-8 (Ortiz 2006), it will take that long to begin to see any increase in the proportion of males. As the number of males increases, the number of spawning harems will also increase, which may lead to a wider geographic area of spawning or denser spawning aggregations within established spawning areas. **Alternative 3**, which changes the TAC at 3-year intervals, is slightly more conservative that **Preferred Alternative 2**, which increases TAC every year, but the differences between these alternatives are relatively small compared with the differences to Alternatives 4 and 5.

Alternatives 4 and 5 set TAC based on $F_{MSY\ proxy}$. This is the minimum reduction in catch rate needed to end overfishing. However, given the natural fluctuations in annual year-class strength, fishing right at F_{MSY} is likely to result in exceeding the overfishing threshold half the time. These alternatives will eventually rebuild the stock to close to its B_{MSY} level, but not to its B_{OY} level. The discussion for **Alternatives 2 and 3** relative to size of male maturity and proportion of males applies to these alternatives as well. At a higher fishing mortality rate, the increase in proportion of males will not be as great as with **Alternatives 2 and 3**, although some increase can be expected. **Alternative 5**, which changes the TAC at 3-year intervals, is slightly more conservative that **Alternative 4**, which increases TAC every year, but both alternatives are less conservative than **Alternatives 2 and 3**.

5.3.3 Direct and Indirect Effects on Economic/Social Environment

5.3.3.1 Direct and Indirect Effects on the Economic Environment

The current regulatory regime in the shallow-water grouper fishery includes, among others, a commercial shallow-water grouper quota of 8.8 MP, commercial red grouper quota of 5.31 MP, and recreational red grouper target level of 1.25 MP. The commercial red grouper quota is part of the 8.8 MP for shallow-water grouper. There is no separate quota/allocation for gag. Instead, the commercial segment of gag is part of the overall commercial shallow-water grouper quota. In terms then of TAC provisions, only the red grouper fishery has one; gag and other shallow-water grouper species as well as the entire shallow-water grouper complex do not have one. Hence, output controls apply only to the overall shallow-water grouper fishery and red grouper fishery in particular. And only the commercial segment of these fisheries is effectively subject to output controls. Of course, there are input controls such as bag/size limits, trip limits, and area/season closures designed to limit commercial and recreational catches to some target levels. In a sense, the recreational fishery can harvest any amount of any shallow-water grouper species subject only to input controls. Given the current input controls, the recreational fishery harvest of any shallow-water grouper species is more influenced by such factors as fish stock conditions, economic conditions, and fishing conditions such as weather. Improvements in any of these factors can lead to increases in recreational catches.

Allowable commercial harvest of gag depends on the interplay of red grouper quota and shallow-water grouper quota. Given an overall shallow-water grouper quota, allowable gag harvest to the commercial sector is inversely related to the red grouper quota: increases in red grouper quota results in lower allowable gag harvest and vice-versa. Given a commercial red grouper quota, allowable gag harvest to the commercial sector is directly related to overall shallow-water grouper quota: any increases in shallow-water grouper quota results in higher allowable gag harvest.

Allowable recreational harvest of gag, or of any shallow-water grouper species for that matter, is not directly affected by harvest changes in the commercial sector. There are indirect effects, however, since both sectors harvest the same stock and generally fish in the same area some commercial boats fish. These indirect effects could also lead to changes in regulations that would have direct effects on the recreational sector.

Part of the intent for setting a gag TAC is to provide a general mechanism for addressing the overfishing status of the stock. There is then the presumption that management measures would become more restrictive and that a recovered stock provides higher benefits to fishery participants. Specific analysis of potential management actions is postponed to the next sections. At this point, the general economic implications of the various TAC levels are explored but this is done under certain assumptions regarding potential regulatory changes provided in other sections of this amendment.

In general, setting a TAC for gag necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. Since regulations proposed for the recreational sector in this amendment are input controls, the interaction of commercial and recreational harvest of gag described above for the current conditions still applies. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified.

Within the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also lead to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure leads to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change.

In and by itself, a gag TAC has no direct economic effects but it assumes significance when combined with other management measures. For the commercial sector, the economic implications of various TAC alternatives for gag are presented below. Estimates were derived using a simulation model developed by Waters (2008, pers. comm.). Estimates of net operating revenues were generated by subtracting trip costs and from total revenues for all species harvested. Trip costs were predicted based on gear specific cost functions. If trip revenues exceeded trip costs after accounting for the expected effects of proposed regulations on trip-level harvests, then short-term economic losses were measured as the resulting reduction in trip revenues. Conversely, if the combination of proposed alternatives would cause trip revenues to fall below trip costs, then the trip was recorded as not taken, and losses were measured as a reduction in net operating revenues, which included the loss in revenues from all species minus the savings of trip costs not incurred.

It should be noted that this analytical approach may overestimate or underestimate actual impacts. The analysis relies on actual historic trip records. Models of how fishing behavior might change in response to increased restrictions for individual species are not available for shallow-water grouper or other Gulf species. As a result, while changes in grouper harvests and revenues on historic trips can be examined to identify which trips would remain profitable, it is not currently possible to identify how fishing behavior might change, targeting substitute species in order to maintain revenues. In essence, the current model can only eliminate trips, or allow them to occur with decreased revenues, but neither more trips nor trips with substituted revenues can be modeled at this time. The model can also underestimate impacts if observed fishing activities reflect more restrictive regulations than what are proposed. For example, the quota for red grouper was filled and the fishery closed during the latter months of 2004 and 2005. Observed trips during the closure would not have recorded landings of red grouper, and there may have been fewer recorded trips than if the red grouper fishery were open. Therefore, the full benefits of a proposed larger quota would not be calculated in the model because there would not be observed trips to harvest the larger quota during these months. Since this limitation applies to all of the management measures on the commercial sector, it is not expected to affect ranking of the alternatives. Caution is necessary, however, if an attempt is made to compare these values with those generated for the recreational sector.

For each management alternative considered including the baseline, discounted net operating revenues were calculated and summed over the policy period. For purposes of economic analysis, policy period is defined as the years 2008-2013. Most provisions in this amendment consider this timeframe as the period during which management measures affecting harvest and participation would apply. Those measures could last longer or shorter depending on future Council decisions, but for this amendment the years 2008-2013 compose the relevant period. The model used logbook records, including the economic add-on survey, supplemented by ALS ex-vessel price information and Bureau of Labor Statistics data on price indices. The baseline scenario refers to the model run using the no action alternative for all actions in this amendment.

For **Action 3** (and all other Actions in this amendment), each alternative, including the no action alternative, is analyzed assuming the preferred alternative for all other actions in this amendment. In actions where there is no preferred alternative, the no action alternative takes its place. Each alternative is compared with the baseline to estimate the alternative's resulting economic effects.

Although the measures considered in this amendment for red grouper are mostly favorable to the fishing participants in general and to the commercial sector in particular, some measures for gag and shallow-water grouper are not. In addition, certain actions such as some allocation alternatives could have negative consequences on the expected commercial share and harvest of gag, red grouper, or shallow-water grouper. It is then not surprising that most of the modeling results would turn out negative for the commercial sector. It should also be pointed out that the policy period considered does not go beyond the time when most of the benefits from management are expected to occur.

The baseline scenario, shown in Table 5.3.3.1, states that over the policy period net operating revenues to the commercial harvesting sector from harvest of all reef fish species in the Gulf would amount to $197 million (using a 3% discount rate). About $122.6 million of this would accrue to the hook and line sector, $62.9 million to the longline sector, and $11.7 million to the rest of the harvesting sector. **Alternative 1** is the no action alternative in this section, but it differs from the baseline because it assumes the preferred alternatives in other Actions. The positive values associated with **Alternative 1** indicate that if there were no gag TAC but all other preferred alternatives in other Actions were adopted, the harvesting sector would gain $1.1 million over the policy period. This net gain would not be totally negated by using a higher discount factor of 7 percent ($951 thousand). All other alternatives would result in negative values, indicating that setting a gag TAC, together with all the preferred alternatives in all other Actions, would result in losses to the commercial harvesting sector. Among the alternatives for setting a gag TAC, **Alternative 4** would provide for the least negative impacts of about $8.8 million at the 3 percent discount factor. At the other end is Alternative 3, which would result in a loss of $25.8 million. These results are expected since **Alternative 4** and **Alternative 3** would provide for the highest and lowest TAC, respectively.

On the basis of overall effects, the alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4**, **Alternative 5**, **Preferred Alternative 2**, and **Alternative 3**. This ranking based on net revenue effects is consistent with the ordering of alternatives based on TAC levels.

The distribution of effects by gear type indicates the longline sector would bear a disproportionate share of losses under **Alternatives 2 to 5** (see Table 5.3.3.1). Per baseline results, the hook and line sector would generate $122.6 million in net revenues over the policy period, and the longline sector would generate about $62.9 million. But under **Alternatives 2 to 5**, losses to the longline sector would be higher than those to the hook and line sector, both in terms of absolute number and percentage. Other gear types would incur the smallest absolute losses but highest percent losses. This situation is mainly driven by the fact that among all gear types, this gear group contributed least to net revenues.

Table 5.3.3.1. Net present values of the effects of alternatives to set gag TAC. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Hook and Line	Longline	Other Gears	Total
	3% Discount Rate			
Baseline	122,586	62,855	11,707	197,148
Alternative 1	433	594	81	1,108
Alternative 2	-9,737	-10,638	-2,565	-22,940
Alternative 3	-11,115	-11,781	-2,936	-25,832
Alternative 4	-3,348	-4,897	-547	-8,792
Alternative 5	-4,222	-5,620	-719	-10,561
	7% Discount Rate			
Baseline	107,912	55,343	10,303	173,558
Alternative 1	374	510	67	951
Alternative 2	-8,760	-9,448	-2,274	-20,482
Alternative 3	-9,958	-10,446	-2,596	-23,000
Alternative 4	-3,108	-4,390	-495	-7,993
Alternative 5	-3,869	-5,024	-646	-9,539

The distribution of effects by area is shown in Table 5.3.3.2. Rest of Gulf includes the states of Alabama through Texas (fishing areas 11-21). Northwest FL includes the Florida counties of Levy through Escambia (fishing areas 7-10). West-Central FL includes the Florida counties of Sarasota through Citrus (fishing areas 5-6). Southwest FL includes the Florida counties of Monroe through Charlotte (fishing areas 1-4). Per estimates of the baseline scenario, Florida dominates the reef fish fishery in the Gulf accounting for $122.8 million, or about 62 percent, of all net revenues generated by the fishery over the policy period. Within Florida, the West-Central area is the biggest participant, with about $49.7 million in net revenues. This area has been known as the center of all grouper activities in the entire Gulf. The distribution of effects by area appears to be directly proportional to the area's contribution to total net revenues especially from grouper. For example, **Preferred Alternative 2** would result in losses of about $15.2 million to West-Central Florida, $6.8 million to Northwest Florida, $701 thousand to the rest of the Gulf, and $290 thousand to South Florida. It is interesting to note that although the overall effects of all alternatives (except the no action alternative) would be negative, South Florida would actually gain under both **Alternatives 4 and 5**. This gain would remain so even under a higher discount factor of 7 percent. With Florida broken down into three areas, the rest of the Gulf would show the largest baseline net revenues among the four areas. It would not suffer the largest loss from **Alternatives 2 to 4**, mainly because it generates its revenues more from the harvest of species other than grouper.

Table 5.3.3.2. Net present values of the effects of alternatives to set gag TAC. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Rest of Gulf	Northwest FL	West-Cent FL	South FL	Total
	3% Discount Rate				
Baseline	74,331	39,227	49,667	33,923	197,148
Alternative 1	7	188	641	271	1,107
Alternative 2	-701	-6,756	-15,194	-290	-22,941
Alternative 3	-804	-7,592	-16,992	-444	-25,832
Alternative 4	-236	-2,680	-6,058	182	-8,792
Alternative 5	-281	-3,264	-7,141	125	-10,561
	7% Discount Rate				
Baseline	65,380	34,560	43,761	29,858	173,559
Alternative 1	5	162	552	231	950
Alternative 2	-624	-6,051	-13,515	-295	-20,485
Alternative 3	-715	-6,779	-15,080	-429	-23,003
Alternative 4	-213	-2,453	-5,455	127	-7,994
Alternative 5	-253	-2,959	-6,404	77	-9,539

<u>Summary</u>

Setting a TAC for gag necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified with available information.

Within the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also led to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure led to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change. Using an economic model, estimates of the potential effects of each alternative were generated. Based on overall effects on the commercial sector, the alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4**, **Alternative 5**, **Preferred Alternative 2**, and **Alternative 3**. The effects of **Alternative 1** would be a gain of $1.1 million. Losses from the rest of the alternatives would be $22.9 million for **Preferred Alternative 2**, $25.8 million for **Alternative 3**, $8.8 million for **Alternative 4**, and $10.6 million for **Alternative 5**.

5.3.3.2 Direct and Indirect Effects on the Social Environment

With **Alternative 1**, no action, there will be no short term impacts on the fishermen, fishing-dependent businesses, or communities that depend on this fishery because it will not change the way people currently fish. However, without a TAC, overfishing is likely to continue and it will not be possible to reach OY. If overfishing continues, it will be necessary to reduce fishing pressure in the future to stop overfishing and rebuild the stocks. If it becomes necessary to reduce the annual harvest of gag grouper in the future, more restrictive measures may be needed to reach OY. Implementing more restrictive measures on the fishery in the future could have negative impacts to the fishermen, fishing-dependent businesses, and communities that are involved with the fishery. For the commercial sector, this would include communities such as Madeira Beach, St. Petersburg, and Panama City, Florida. For the recreational sector, communities along the west coast of Florida would be impacted. If a TAC is set now, then it may be possible to achieve OY without drastic reductions in effort in the future.

Preferred Alternative 2 would set the TAC on a yearly basis for gag during 2008 through 2012 at the yield for each year as defined by the constant Foy projection from 2007 assessment and reevaluation. As the stock rebuilds, this alternative will allow the TAC to increase each year based on the projected stock growth. If the TAC can be increased each year, commercial and recreational fishermen, fishing-dependent businesses, and communities that are involved with this fishery will benefit from having more fish to harvest.

Alternative 3 would use a stepped approach increasing the TAC every three years. Under **Alternative 3**, the TAC for the first year of each of the three year intervals would be the same as in **Alternative 2**. The TAC for the second and third years of each three year interval will be a little lower than the TAC would be for the same years under **Alternative 2** because it would not be increasing each year. This approach may help to rebuild the stocks sooner, but may prevent the fishermen from harvesting the optimum yield in year two and three of each three year period.

Alternative 4 would set the directed TAC on a yearly basis for gag during 2008 through 2012 at the yield for each year as defined by the constant Fmax projection from the 2007 assessment and reevaluation. This alternative sets the TAC higher to begin with than the TAC for **Alternatives 2** or **3**. It starts with the same TAC as it would in **Alternative 5**. Overall, **Alternative 4** would have the highest TAC of all of the alternatives for all of the following years through 2013. In the short term, commercial and recreational fishermen, fishing-dependent businesses, and communities that are involved with this fishery will benefit from having more fish to harvest. However, if this level of effort is too high and overfishing continues, then more restrictive measures may be necessary in the future to end overfishing and rebuild stocks which would have a negative impact on the fishermen, fishing-dependent businesses, and communities that depend on the gag grouper fishery. For the commercial sector, this would include communities such as Madeira Beach, St. Petersburg, and Panama City, Florida. For the recreational sector, communities along the west coast of Florida could be impacted.

Alternative 5 would set the directed TAC on a three year stepped basis for gag during 2008 through 2010 and 2011 through 2012 using the first year of each interval as defined by the constant Fmax projection from the 2007 assessments and reevaluations. In the first year, **Alternative 5** would have a higher TAC than **Alternative 2** or **3**, and would have the same TAC as **Alternative 4**. The TAC would stay the same for years two and three of each three year interval. This approach may help to rebuild the stocks sooner, but may prevent the fishermen from harvesting the optimum yield in year two and three of each three year period.

Summary

Preferred Alternative 2 would set the TAC on a yearly basis for gag during 2008 through 2012 at the yield for each year as defined by the constant Foy projection from 2007 assessment and reevaluation. As the stock rebuilds, this alternative will allow the TAC to increase each year based on the projected stock growth. If the TAC can be increased each year, commercial and recreational fishermen, fishing-dependent businesses, and communities that are involved with the fishery will benefit from having more fish to harvest. For the commercial sector, this would have the most benefit for communities such as Madeira Beach, St. Petersburg, and Panama City, Florida. For the recreational sector, communities along the west coast of Florida that are most involved with this fishery would benefit the most.

Although **Alternatives 3** and **5** would help to end overfishing, they use a stepped approach to raising the TAC. As the stock recovers, fishermen would not be able to harvest the maximum amount possible each year because the TAC would not be adjusted on a yearly basis. **Alternative 4** is similar to **Alternative 2** except that it starts with a higher TAC and there is more of a chance with fluctuations in the stock that gag grouper could continue to be undergoing overfishing which could require more drastic management measures in the future to end overfishing.

5.3.4 Direct and Indirect Effects on Administrative Environment

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.

Alternative 1 (no action) would not end overfishing or achieve optimum yield. However, it also would not require any regulatory changes and thus would not impose any additional administrative burden.

Alternatives 2 and 3 have a greater than 50 percent probability of ending overfishing, and a 50 percent probability of eventually achieving OY. Both alternatives would increase the administrative burden by requiring regulatory changes to be developed and implemented, published, and notification made to the public and to enforcement agencies. There will be a period of inconsistency between federal and state regulations until the states can adopt compatible regulations. Typically, these inconsistencies last only a few months, but they can last longer if individual states disagree with the changes and choose to not implement them. **Preferred Alternative 2** will require a change to TAC every year for the next three years, with a regulatory amendment required to set TAC for the subsequent three years (TAC will remain at the 2010 level). **Alternative 3** sets a three-year constant TAC with a subsequent 3-year constant TAC to be set in a future regulatory amendment. Since TAC does not increase over each three year period, there will be an increased likelihood of sectors exceeding their allocations and triggering accountability measures from Action 6.

Alternatives 4 and 5 have a 50 percent probability of ending overfishing, and a less than 50 percent probability of eventually achieving OY. Other than the reduced probabilities of complying with the MSA requirements, the administrative burden would be the same as for **Alternatives 2 and 3**.

5.4 Action 4. Set Red Grouper TAC

5.4.1 Direct and Indirect Effects on Physical Environment

The Alternatives in this Action set red grouper TAC at 6.56 mp gutted weight (**Alternative 1** No Action), 7.56 mp gutted weight (**Preferred Alternative 2**, equilibrium OY), or 7.72 mp gutted weight (**Alternative 3**, equilibrium MSY). The red grouper stock is currently rebuilt and biomass in 2005 was at or slightly above the SSB_{OY} level. These alternatives will have no direct effect on the physical environment because, by themselves, they do not alter characteristics of the fishing fleet. However, if the preferred alternative changes TAC and requires changes in management regulations then the physical environment may be affected. New management measures could indirectly affect the physical environment by defining the level (i.e., the amount of gear in the water at any given time) of commercial fishing effort and the duration and level of recreational fishing effort over the course of the fishing season. Level and duration of effort together define the total cumulative amount of effort (i.e., gear-hours of soak time), which affects the potential for gear to impact the physical environment.

Longline gear is used to catch 70 percent of commercial landings and is deployed over hard bottom habitats using weights to keep the gear on the bottom. This gear, upon retrieval, can abrade, snag and dislodge smaller rocks, corals, and sessile invertebrates (Bohnsack in Hamilton, 2000; Barnette, 2001). The damage that this gear inflicts to the bottom depends on currents and the amount of line sweep caused by hooked fish (Barnette 2001).

Vertical-line gear is used by the remainder of the commercial fishery and most of the recreational fishery and has the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette, 2001). Additionally, if vertical-line gear is lost or improperly disposed of it can entangle marine life (Hamilton 2000; Barnette 2001). Entangled gear often becomes fouled with algal growth. If this gear becomes entangled on corals, the algae can eventually overgrow and kill the coral. However, red grouper are not associated with high relief areas as much as some other reef fish species so the effects of directed hook-and-line fishing for red grouper on the physical environment are expected to be less than those associated with directed fisheries for reef fish species that stay around reefs.

Alternative 1 would not change the current TAC of 6.56 mp gutted weight. If the Council selects a different allocation for red grouper, then commercial management measures could be changed as a result of a lower quota. The red grouper quota was filled in 2004-2005, but commercial landings were below the quota in 2006-2007. Landings for the recreational sector exceeded the recreational target catch level in 2004-2005, but were below the recreational target catch level in 2006-2007 (Table 2.4.1). These recent declines in landings could be due in part to changes in regulations, declines in effort, or a potential drop in stock abundance. It is unknown whether or not management measures approved in 2006 would be sufficient to constrain catch to the target catch level if effort and stock abundance increase in the future. Given that the Council is proposing to allocate more of the red grouper TAC to the recreational fishery in

Action 5 than under the allocation used in Secretarial Amendment 1, small changes in management measures may be implemented under the status quo TAC Any changes would be based on the amount allocation is shifted and other proposed management measures that affect red grouper harvest (e.g., seasonal closure for the entire SWG recreational fishery). If the commercial quota is reduced and the recreational target catch level is increased based on the preferred allocation in Action 5, then small benefits to the physical environment may occur from less longline fishing effort and more vertical line fishing effort.

Preferred Alternative 2 would increase TAC to 7.56 mp gutted weight. The commercial fishery would be allowed to increase landings by approximately 8 percent (note: based on 76:24 commercial to recreational allocation) and could increase effort by a similar amount. This would be expected to affect the benthic environment in deeper waters where longlines are used but would likely have little measurable effect on the benthic environment in shallower waters where commercial vertical line fishery and the recreational fishery are prosecuted. **Alternative 3** would increase effort slightly more than **Preferred Alternative 2** and would have a similar, although slightly greater effect on the physical environment.

5.4.2 Direct and Indirect Effects on the Biological / Ecological Environment

Alternative 1, No action, would maintain the TAC at the current level of 6.56 mp gutted weight. This yield would be at level below equilibrium OY and approximately one mp of landings per year could be forgone. Projections indicate this TAC would allow stock biomass to continue to build above the SSB_{OY} level to a level approximately 33 percent above SSB_{MSY} and twelve percent above SSB_{OY}. This increase is partially the result of a strong 1999 year class entering the fishery. In the near term, stock biomass is projected to decline as the 1999 year class ages and moves through the fishery. Recently updated indices of abundance show a decline from the high of 2004 (Figure 2.4.1). This may suggest that the population abundance has declined since 2004, but is still not as low as it was during the 1990s. Other possible reasons for a decline in the index could be fish moving elsewhere due to red tide or other reasons (GMFMC 2008). A stock assessment for red grouper is scheduled for 2009 and will provide an update on the status of the stock. Relative to **Alternatives 2** and **3**, **Alternative 1** is the most conservative TAC and would have the highest likelihood of preventing overfishing and maintaining the stock biomass above the minimum stock size threshold. Direct effects include an increase in the abundance of red grouper relative to Alternatives 2 and 3. Indirect effects could include an increase in regulatory discards due to increased incidental catch by fishermen targeting other species in the same habitat. In addition, there could be an increase in species richness of benthic habitats due to a behavior of red grouper described as habitat engineering (Coleman and Williams 2002). Their excavations harbor suites of fish and invertebrate species whose abundances may increase as a result, including vermilion snapper *Rhomboplites aurorubens*, black grouper *Mycteroperca bonaci* and spiny lobster *Panulirus argus*.

Preferred Alternative 2 would allow regulations to be modified to attain equilibrium OY, 7.57 mp gutted weight. Red grouper TAC would be managed at the equilibrium OY level at least until the next stock assessment. After completion of the next red grouper stock assessment, red grouper TAC would be set either equal to equilibrium OY or the yield at F_{OY}, whichever is less. Under this proposed TAC, stock biomass is projected to continue to increase although more slowly than **Alternative 1**. As the 1999 year-class moves through the fishery, stock biomass may begin to decline. Recently updated indices of abundance have shown a decline since the high of 2004 (Figure 2.4.1). This may suggest that the population abundance has declined since 2004, but is still not as low as it was during the 1990s. Other possible reasons for a decline in the index could be fish moving elsewhere due to red tide or other reasons (GMFMC 2008). If SSB has in fact declined, then the risk of overfishing occurring would increase if TAC is increased. Direct effects include an increase in the abundance of red grouper relative to Alternatives 3, but less than Alternative 2. Indirect effects could include a reduction in regulatory discards relative to Alternative 1 by allowing less restrictive management measures, though they would still be greater than Alternative 3. Red grouper perform an ecosystem function by operating as habitat engineers, in which they modify the bottom habitat by creating excavations which may be used by other species including vermilion snapper *Rhomboplites aurorubens*, black grouper *Mycteroperca bonaci* and spiny lobster *Panulirus argus* (Coleman and Williams 2002). Under this alternative, this function would continue to occur to a greater extent than under Alternative 3 but a lesser extent than Alternative 2. The Council chose **Preferred Alternative 2** as preferred because the red grouper stock is at or above SSB_{OY} and this alternative accomplishes their intent to manage all reef fish species at OY levels once rebuilt.

Alternative 3 would allow the fishery-wide yield to increase to equilibrium MSY, 7.72 mp gutted weight. Stock biomass would decline from approximately 27 percent above SSB_{MSY} to SSB_{MSY}. **Alternative 3** is the least conservative of the red grouper TAC Alternatives. If recruitment pulses continue as they have in the past (See Figure 1.2.2), the stock is likely to fluctuate around SSB_{MSY} causing status of the stock to periodically change to an overfishing condition, and frequent changes in annual ACLs. **Alternative 3** is the least conservative of the red grouper TAC Alternatives and would result in the highest probability of overfishing occurring. Regulatory discards would be minimized under this alternative relative to Alternatives 1 and 2, but the habitat engineering ecosystem function of the red grouper stock (Coleman and Williams 2002) would also be minimized.

5.4.3 Direct and Indirect Effects on Economic/Social Environment

5.4.3.1 Direct and Indirect Effects on the Economic Environment

At present, the red grouper TAC of 6.56 MP is divided into a 5.31 MP commercial quota and a 1.25 MP recreational target allocation. The commercial sector is subject to quota closure, and the fishery closed in 2004 and 2005 but not in 2006. Part of the reason for the fishery to remain open throughout 2006 was the reduction in vessel trip limit. On the other hand, the recreational sector is not subject to quota/allocation closure, and input controls on this sector have not been effective enough to limit the sector's harvest to its allocation. At any rate, red grouper is not overfished and not undergoing overfishing so that alternative red grouper TACs considered in this amendment are higher than the current TAC. These higher alternative TACs may be expected to generate larger benefits to both the commercial and recreational sectors if the attendant regulations are accommodating enough to allow both sectors to harvest up to their respective allocations. Considering the relative ineffectiveness of controlling recreational harvest, it is very likely the benefits to the recreational sector of a TAC increase would be realized even if current recreational rules were maintained.

Using the same economic model, the economic implications of the various red grouper TAC alternatives on the commercial sector are presented in the two tables below. One should note that unlike the case for the gag TAC, the no action alternative for setting red grouper TAC would result in net losses to the commercial sector (see Table 5.4.3.1). Again, it should be stressed that the evaluation of each alternative assumed adoption of the preferred alternatives in other Actions of this amendment, or the no action alternative in the absence a preferred alternative. This then provides the rationale for why **Preferred Alternative 2**, despite raising red grouper TAC about a million pounds, would result in negative effects. Abstracting from all other Actions, **Preferred Alternative 2** may be expected to provide gains to the fishery, but with attendant management measures in other actions of this amendment, the overall effects of this alternative would turn out to be negative. Its presence though would tend to cut down, but not totally offset, the losses due to other restrictive measures in this amendment. Among the alternatives, **Preferred Alternative 2** provides for the lowest amount of losses. Interestingly, **Alternative 3**, which provides for a slightly higher TAC than **Preferred Alternative 2,** would result in slightly higher losses. The reverse is what one would expect, but this can be partly explained by the higher biomass under the Foy (**Preferred Alternative 2**) than under the F_{MSY} (**Alternative 3**) strategy. In its predictions of future landings, the economic simulation model adjusts reported catches from the logbook database to reflect proportional growth in biomass over time. Because biologists estimated that biomass for red grouper would grow faster between 2008 and 2013 for **Preferred Alternative 2** than for **Alternative 3**, **Preferred Alternative 2** actually resulted in slightly higher predictions of catches for red grouper. As with gag, the longline sector would bear the highest losses from setting a red grouper TAC under all alternatives. On the basis of overall effects, the alternatives may be ranked in descending order as follows: **Preferred Alternative 2**, **Alternative 1**, and **Alternative 3**.

As case with Action 1, alternatives in Action 4 would result in more than proportionate losses to the longline sector. Using a 3 percent discount factor, losses to the longline sector would range from $10.6 million under **Alternative 2** to $10.7 million under **Alternative 3**. Losses for the hook and line sector would range from $9.7 million under **Preferred Alternative 2** to $9.8 million under **Alternative 3**. From the magnitudes involved, it would appear that the effects of the various alternatives would not differ substantially from one another and that the distribution of effects by gear type would not differ from one alternative to another.

Table 5.4.3.1. Net present values of the effects of alternatives to set red grouper TAC. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Hook and Line	Longline	Other Gears	Total
		3% Discount Rate		
Baseline	122,586	62,855	11,707	197,148
Alt. 1	-9,771	-10,683	-2,578	-23,032
Alt. 2	-9,737	-10,638	-2,565	-22,940
Alt. 3	-9,806	-10,740	-2,595	-23,141
		7% Discount Rate		
Baseline	107,912	55,343	10,303	173,558
Alt. 1	-8,786	-9,480	-2,284	-20,550
Alt. 2	-8,760	-9,448	-2,274	-20,482
Alt. 3	-8,819	-9,534	-2,300	-20,653

The distribution of effects by area, as shown in Table 5.4.3.2, displays practically similar pattern of results found for the setting of a gag TAC. For all alternatives, West-Central Florida, which is the center of the red grouper fishery, would bear the brunt of the losses from setting red grouper

TAC and other measures in this amendment. Losses for this area would range from $15.2 million to $15.3 million. Northwest Florida would be a far second in terms of net revenue losses. Although the Rest of the Gulf would experience relatively high net revenues in the baseline case, its potential losses would be significantly lower than those of either West-Central or Northwest Florida. The effects of red grouper TAC changes would not affect this area very much, because species other than grouper generally serve as its major source of revenues. Unlike the case with gag, South Florida would not experience any positive results, but it would have the lowest losses. Within each area, the economic effects would not substantially differ from one alternative to another. The difference in effects between the largest (**Alternative 3**) and smallest (**Preferred Alternative 2**) losses would only be about $92 thousand for West-Central Florida, $29 thousand for Northwest Florida, $75 thousand for South Florida, and $1,000 for the Rest of the Gulf.

Table 5.4.3.2. Net present values of the effects of alternatives to set red grouper TAC. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Rest of Gulf	Northwest FL	West-Cent FL	South FL	Total
		3% Discount Rate			
Baseline	74,331	39,227	49,667	33,923	197,148
Alt. 1	-701	-6,771	-15,238	-323	-23,033
Alt. 2	-701	-6,756	-15,194	-290	-22,941
Alt. 3	-702	-6,785	-15,289	-365	-23,141
		7% Discount Rate			
Baseline	65,380	34,560	43,761	29,858	173,559
Alt. 1	-625	-6,062	-13,546	-318	-20,551
Alt. 2	-624	-6,051	-13,515	-295	-20,485
Alt. 3	-625	-6,076	-13,594	-358	-20,653

<u>Summary</u>

In general, setting a TAC for red grouper necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified.

In the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also led to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure led to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change. Using an economic model, estimates of the potential effects of each alternative were generated. Based on overall effects on the commercial sector, the alternatives may be ranked in descending order as follows: **Preferred Alternative 2**, **Alternative 1**, and **Alternative 3**. At a 3 percent discount rate, the losses would amount to $23.0 million for **Alternative 1**, $22.9 million for **Preferred Alternative 2**, and $23.1 million for **Alternative 3**.

5.4.3.2 Direct and Indirect Effects on the Social Environment

With **Alternative 1**, no action, there will be no short term impacts on the fishermen, fishing-dependent businesses, or communities that depend on this fishery because it will not change the way people currently fish. However, if the TAC is not changed, fishermen would potentially be harvesting less than the optimal yield. This would help the stock continue to rebuild but, fishermen, and businesses who are involved in the red grouper fishery would lose out on fish that they could have been harvesting each year as the stock rebounds.

Preferred Alternative 2 would set the red grouper TAC at the constant catch level corresponding to fishing at equilibrium FOY. This would allow for the stock to continue rebuilding while at the same time benefiting commercial and recreational fishermen and businesses involved with the red grouper fishery to benefit from having more fish to harvest. This would benefit the commercial and recreational sectors which will be able to harvest red grouper at the OY level. For the commercial sector, this would benefit communities such as Madeira Beach, St. Petersburg, and Panama City, Florida. For the recreational sector, communities along the west coast of Florida would benefit the most.

Alternative 3 would set the grouper TAC at the constant catch level corresponding to fishing equilibrium FMSY. In the short term, **Alternative 3** will benefit commercial and recreational fishermen and businesses involved with the red grouper fishery the most of the three alternatives because there would be more fish to harvest. In the long term, with a higher TAC, the fishery may undergo overfishing in the future if the stock fluctuates. If this happens, it may be necessary to reduce the TAC level after the new stock assessment in 2011. If the TAC had to be reduced there could be negative impacts on the commercial and recreational fishermen and businesses involved with the red grouper fishery because they would have less fish to harvest.

Summary

Alternative 1 would keep the TAC at current levels and would potentially not allow fishermen to harvest at the OY level. **Preferred Alternative 2** would raise the TAC from current levels and allow fishermen to harvest at the OY level and the stock would continue to rebuild. Commercial and recreational fishermen and businesses involved with the red grouper fishery would benefit from having more fish to harvest. **Alternative 3** would also raise the TAC, but there would be a chance that the stock could undergo overfishing if there are fluctuations in the stock, which may require more restrictive management measures in the future to end overfishing. If the TAC had to be reduced in the future, there would be a negative impact on commercial and recreational fishermen and businesses involved with the red grouper fishery because there would be less fish to harvest.

5.4.4 Direct and Indirect Effects on Administrative Environment

There are no direct effects on the administrative environment from this Action since TAC will be set through this amendment rather than rulemaking. However, the indirect implication is that management measures will have to be implemented that control landings so they are constrained to this harvest level. These will affect enforcement and monitoring. The specific administrative effects change depending on which methods are used to reduce landings (see Sections 5.6.4, 5.7.4, 5.8.4, and 5.9.4). The red grouper fishery's TAC is monitored annually and would likely be adjusted after a stock assessment which occur about every five years .

5.5 Action 5. Red Grouper and Gag Allocations

The alternatives in this action determine the interim allocation of gag and red grouper resources to the recreational and commercial sectors of the fisheries until the Ad Hoc Allocation Committee develops guidance for setting allocations. **Alternative 1** would revert to recreational:commercial allocations as determined under the framework in Amendment 1 to the Reef Fish FMP. The gag allocation would be 65:35; the red grouper allocation would be 23:77. **Alternative 2** would base interim allocations on the average landings during the most recent five-year period for which data are available. During 2001-2005, the allocation was 59:41 for gag and 24:76 for red grouper. **Preferred Alternative 3** would base interim allocations on the average of all years, beginning when grouper landings were identified to species until the most recent year of available landings. During this period, 1986-2005, the average allocation was 61:39 for gag and 24:76 for red grouper.

5.5.1 Direct and Indirect Effects on Physical Environment

The alternatives in this section would not have any direct effect on the physical environment. Indirect effects on the physical environment may occur if the frequency of use of different gear types changes.

Gag are fished by the commercial sector with handlines and bottom longlines. Red grouper are commercially fished primarily with bottom longlines, but also handlines, bandit rigs, and, prior to February 7, 2007, traps (now prohibited in the Gulf of Mexico). Anchors or weights on bottom longlines can impact and damage the bottom habitat. In addition, lines can drag across the surface for considerable distances during retrieval and dislodge lightweight organisms such as invertebrates (Barnette, 2001). The recreational sector catches both species with hook-and-line gear which does not generally interact with bottom habitats, and therefore should have lower impacts on the physical environment. However, both longlines and handlines can entangle in coral reef and other hard bottom and cause physical damage (Barnette, 2001).

Alternative 2 and Preferred Alternative 3 would increase the commercial gag allocation and decrease the commercial red grouper allocation relative to **Alternative 1**. Because the red grouper longline fishery lands nearly four times the amount of fish the gag longline fishery lands, reducing the red grouper commercial allocation could potentially decrease the use of bottom longlines and thus reduce the impacts on the physical environment, although these changes would be minor. The allocations in **Alternative 2** represent the most recent landings data and thus the no action or status quo. Compared to this alternative, the other two alternatives would decrease the gag commercial allocation. **Alternative 1** would slightly increase the red grouper commercial allocation, resulting in a slightly higher potential for impact on the physical environment.

5.5.2 Direct and Indirect Effects on the Biological / Ecological Environment

The alternatives in this action would have no direct effect on the biological environment, but would change only the magnitude of the decrease in gag landings and of the increase in red grouper landings for each sector as considered in Actions 7 and 9. Changes in allocations could have an indirect effect on the biological environment by changing the amount of discards in each sector.

During 2000-2004, gag dead discards averaged 1,332,000 pounds per year (23.0 percent of total removals) for the recreational sector and averaged 35,800 pounds per year (1.3 percent of total removals) for the commercial sector (Table 1.2.1.1). Despite a lower minimum size for the recreational sector than the commercial sector (22 inches versus 24 inches), the proportional loss due to bycatch is substantially higher for the recreational sector. **Alternative 2** bases allocation on the most recent years of landings and has the lowest proportion allocated to the recreational sector. The other two alternatives would shift a greater proportion of the landings to the recreational sector and produce greater total dead discards.

Table 5.5.1 shows estimated dead discards for 2008 for each sector if discard rates and release mortality remain the same as for 2000-2004. For each alternative in Action 5, total dead discards decrease to 24-35 % of the levels estimated for 2000-2004, provided the Council chooses an alternative for Action 3 (Set Gag TAC) other than No Action.

Table 5.5.1. Estimated gag dead discards for 2008 based on alternatives for setting TAC from Action 3 and allocation alternatives from Action 5.

Action 5 Alternative	Allocation (recreational: commercial)	F_{OY} TAC = 2,360,000 lbs.			F_{MAX} TAC = 3,090,000 lbs.		
		Recreational dead discards	Commercial dead discards	Total dead discards	Recreational dead discards	Commercial dead discards	Total dead discards
1	65:35	352,820	10,738	363,558	461,955	14,059	476,014
2	59:41	320,252	12,579	332,831	419,313	16,470	435,783
3	61:39	331,108	11,965	343,073	433,527	15,666	449,193
2000-2004 Average							
	61:39	1,332,000	36,000	1,368,000			

During 2001-2005, red grouper dead discards averaged 286,673 pounds per year (13.9 percent of total removals) for the recreational sector and averaged 762,514 pounds per year (12.0 percent of total removals) for the commercial sector (Table 1.2.2.1). The proportionally similar dead discards and the small change in the allocation among the three alternatives result in little difference in the total dead discards among the alternatives.

Table 5.5.2 shows estimated dead discards for 2008 for each sector if discard rates and release mortality remain the same as for 2001-2005. Regardless of the alternative chosen for Action 4 to set red grouper TAC, the lowest amount of dead discards would be under **Alternative 1** and the highest would be under **Alternative 2 and Preferred Alternative 3**; however, the difference in dead discard weight under these alternatives is less than one percent. It should be noted that while more harvest would be allocated to the recreational fishery under **Alternative 2 and Preferred Alternative 3**, the total number of dead discards will be greater under these alternatives even though the recreational discard mortality rate is lower. The reason for this difference is because of the high overall number of fish discarded by the recreational fishery relative to the commercial fishery.

Table 5.5.2. Estimated red grouper dead discards for 2008 based on alternatives for setting TAC from Action 4 and allocation alternatives from Action 5.

Action 5 Alternative	Allocation (recreational: commercial)	Current TAC = 6,560,000 lbs.			F_{OY} TAC = 7,570,0000 lbs.			F_{MSY} TAC = 7,720,000 lbs.		
		Recreational dead discards	Commercial dead discards	Total dead discards	Recreational dead discards	Commercial dead discards	Total dead discards	Recreational dead discards	Commercial dead discards	Total dead discards
1	23:77	209,723	606,144	815,867	242,013	699,468	941,481	246,808	713,328	960,136
2	24:76	218,842	598,272	817,114	252,535	690,384	942,919	257,539	704,064	961,603
3	24:76	218,842	598,272	817,114	252,535	690,384	942,919	257,539	704,064	961,603
2001-2005 Average										
	24:76	286,673	762,514	1,049,187						

5.5.3 Direct and Indirect Effects on Economic/Social Environment

5.5.3.1 Direct and Indirect Effects on the Economic Environment

Action 5 considers alternative reallocations of gag and red grouper resources between the recreational and commercial sectors. The default gag allocation, using base years specified in **Amendment 1**, grants 65 percent and 35 percent of the gag resource to the recreational and commercial sectors, respectively. Also set in **Amendment 1**, the default red grouper allocation grants 23 percent and 77 percent of the resource to the recreational and commercial sectors, respectively.

In this amendment, red grouper reallocation alternatives considered are relatively close to the status quo; and could, at most, change the commercial and recreational shares by one percentage point each. Measures reallocating gag grouper would result in larger changes. Gag reallocation measures considered could modify the recreational and commercial allocations by 6 percent each.

The evaluation of economic impacts expected to result from various reallocations of gag and red grouper resources between the commercial and recreational sectors assumes that gag and red grouper TACs are set according to **Preferred Alternative 2 - Action 3** and **Preferred Alternative 2-Action 4,** respectively. Comparisons between alternative allocation scenarios are based on changes in economic value expected to result from reallocating resources between sectors. Recent average landings (2001-2005), which correspond to a 59:41 commercial/recreational split for gag and to a 24:76 commercial/recreational split for red grouper serve as benchmarks for comparison.

The aggregate economic value associated with each alternative is determined by summing estimated commercial and recreational economic values. For the commercial sector, the economic value corresponding to each alternative was derived based on a simulation model developed by Waters. The simulation model is detailed in section 5.3.3.1.

For the recreational sector, the economic value corresponding to each alternative is derived by summing its constituting components, i.e., the producer surplus derived by charter operators, the producer surplus enjoyed by headboat operators, and consumer surpluses derived by anglers on headboats, private, and charter vessels. It is assumed that changes in TAC do not affect the relative proportion harvested by each sub-sector. In other terms, when expressed in percentage points, harvest levels for anglers on headboats, private, and charter vessels remain constant, regardless of the recreational TAC. Based on a 2001-2005 average, private anglers, anglers on charter vessels, and anglers on headboats harvested 73.2 percent, 24.3 percent, and, 2.5 percent of the red grouper recreational quota, respectively. Relative proportions of gag grouper harvested in the recreational sector by private anglers, anglers on charter vessels, and anglers on headboats are estimated at 74.3 percent, 22.5 percent, and 3.2 percent, respectively.

Expected changes in producer surplus in the for-hire sector are approximated by changes in net revenues. For the charter sector, average net revenues per angler trip, excluding payment to owners, captain and crew members, were obtained from a recently analyzed charter survey conducted by the SEFSC. Preliminary survey results are provided in Joint Reef Fish/ Shrimp Amendment 27/14 (GMFMC, 2007). Estimated at $141 (in $2003), average net revenues per angler trip approximated $150 when updated to 2005 dollars using an All Urban Consumers CPI series from the Bureau of Labor Statistics[7]. For the headboat sector, net revenues per angler day, excluding payments to owner, captain, and crew, averaged $62 (in $2003). Revenue and costs estimates used to derive this average were obtained from the NMFS Headboat survey and are presented in Joint Reef Fish/ Shrimp Amendment 27/14 (GMFMC, 2007). Adjusted for inflation using the Bureau of Labor Statistics CPI series listed above, average net revenues per angler day approximated $66, in $2005.

In evaluating welfare changes in the charter and headboat sectors, a unitary catch elasticity of effort is assumed which means that a one percent increase or decrease in catch is assumed to result in a one percent increase or decrease in effort. This assumption does not fully account for the adverse impact of decreases in catch rates on demand for trips. While the true value of catch elasticities of effort for gag and red grouper are unknown, in general, more than proportional changes in effort are observed in response to changes in catch rates. For example, for red snapper in the Gulf of Mexico, Gillig and al. report catch elasticities between 1.21 and 2.41 (Gillig et al., 2000). It is also assumed that target behavior in the headboat sector is similar to that in the charter boat sector (target effort is not collected for the headboat sector). This assumption, however, could overestimate impacts on the headboat sector, because the greater mobility and smaller passenger load on charter boats may differentially influence target behavior by the two fleets.

Consumer surpluses, as measured by compensating variation (CV), are estimated as the number of fish harvested times the CV per fish. Derived by Haab et al. (1997), the CV estimate of $3.52 per fish per trip was updated to 2005 dollars using an All Urban Consumers CPI series from the Bureau of Labor Statistics. In $2005, an average CV of $3.74 per fish was used in this analysis. Current data does not permit the quantification of changes in fisherman's behavior, including species substitution. Hence, estimates of lost recreational benefits likely overestimate true losses since fishermen can target other species to mitigate the restrictions on a given species. This assessment also assumes that, although some of the management measures alter the characteristics of recreational trips, the value of the trip remained constant and overall changes in economic value were only associated with changes in the number of fish (or pounds) landed. Hence, changes in consumer surplus, measured by changes in compensating variation (CV), were estimated as the changes in number of fish harvested times the CV per fish. As derived by Haab et al. (1997), the CV estimate of $3.52 per fish per trip was updated to 2005 dollars using an All Urban Consumers CPI series from the Bureau of Labor Statistics resulting in an average CV of $3.74 (2005$) per fish. It should be noted that this value was not developed specifically for gag or red grouper. The value is a composite of the average value of many Gulf species and likely reflects the increased value of more highly valued/targeted species, like red snapper.

[7] The Bureau of Labor Statistics Consumer Price Index All Urban Consumer Series can be downloaded from ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt CPI values for 1997, 2003, and 2005 are 160.5, 184.0, and 195.3, respectively.

Alternative 1 would revert the resource allocation specified by **Amendment 1** to the Reef Fish FMP and grant 65 percent of the gag TAC to the recreational sector and 35 percent to the commercial sector. Under this alternative, the red grouper TAC will be allocated as follows: 23 percent to the recreational sector and 77 percent to the commercial sector. Over time, shares of the resources (gag and red grouper) used by each sector have differed from their assigned allocation under **Amendment 1.**

For the commercial sector, the implementation of **Alternative 1** would decrease its share of the gag from 41 to 35 percent and increase its share of the red grouper TAC from 76 to 77 percent. For the 6-year period considered (2008-2013), based on a 7 percent discount rate, a net present value decrease of approximately $7.70 million is expected to result from allocations under **Alternative 1**. Decreases in net economic value would be estimated at approximately $8.77 million if a 3 percent discount rate were used instead. Anticipated decreases in net present value for the commercial sector are presented in Table 5.5.3.1.

Table 5.5.3.1: Expected Changes in Net Present Values in the Commercial Sector Allocation Alternatives (2008-2013)

	Commercial Allocation (%)		**Net Present Value Change**	
	Gag Grouper	**Red Grouper**	**7% discount rate**	**3% discount rate**
Alternative 1	35	77	-$7,692,000	-$8,774,000
Alternative 2	41	76	$0	$0
Preferred Alternative 3	39	76	-$2,786,000	-$3,175,000

For the recreational sector, this alternative would correspond to a 65 percent share of the gag resource and to a 23 percent share of the red grouper TAC. For gag grouper, recreational landings and target effort for the charter, private, and headboat sectors are presented in Table 5.5.3.2. Consumer and producer surplus measures as well as nominal and discounted aggregate economic values in the recreational sector are provided in Table 5.5.3.3. Tables 5.5.3.4 and 5.5.3.5, present the same information for red grouper.

Table 5.5.3.2: Gag Grouper - Recreational Landings and Target Effort for the Charter, Private, and Headboat Sectors

GAG	Year	TAC	Recreational		Charter			Private			Headboat		
			Allocation	Quota	Landings		Target	Landings		Target	Landings		Target
		(MP)		(MP)	Pounds	Fish	Effort	Pounds	Fish	Effort	Pounds	Fish	Effort
Alternative 1	2008	3.13	0.65	2.03	457,763	57,695	12,610	1,511,634	212,906	154,910	65,104	9,435	4,280
	2009	3.38	0.65	2.20	494,325	62,303	13,617	1,632,371	229,911	167,283	70,304	10,189	4,622
	2010	3.63	0.65	2.36	530,888	66,911	14,624	1,753,109	246,917	179,656	75,504	10,943	4,964
	2011	3.63	0.65	2.36	530,888	66,911	14,624	1,753,109	246,917	179,656	75,504	10,943	4,964
	2012	3.63	0.65	2.36	530,888	66,911	14,624	1,753,109	246,917	179,656	75,504	10,943	4,964
	2013	3.63	0.65	2.36	530,888	66,911	14,624	1,753,109	246,917	179,656	75,504	10,943	4,964
Alternative 2	2008	3.13	0.59	1.85	415,508	52,369	11,446	1,372,098	193,253	140,610	59,094	8,564	3,885
	2009	3.38	0.59	1.99	448,695	56,552	12,360	1,481,691	208,689	151,841	63,814	9,248	4,195
	2010	3.63	0.59	2.14	481,883	60,735	13,274	1,591,283	224,124	163,072	68,534	9,933	4,506
	2011	3.63	0.59	2.14	481,883	60,735	13,274	1,591,283	224,124	163,072	68,534	9,933	4,506
	2012	3.63	0.59	2.14	481,883	60,735	13,274	1,591,283	224,124	163,072	68,534	9,933	4,506
	2013	3.63	0.59	2.14	481,883	60,735	13,274	1,591,283	224,124	163,072	68,534	9,933	4,506
Preferred Alternative 3	2008	3.13	0.61	1.91	429,593	54,144	11,834	1,418,610	199,804	145,377	61,098	8,855	4,017
	2009	3.38	0.61	2.06	463,905	58,469	12,779	1,531,917	215,763	156,989	65,978	9,562	4,338
	2010	3.63	0.61	2.21	498,218	62,794	13,724	1,645,225	231,722	168,600	70,858	10,269	4,658
	2011	3.63	0.61	2.21	498,218	62,794	13,724	1,645,225	231,722	168,600	70,858	10,269	4,658
	2012	3.63	0.61	2.21	498,218	62,794	13,724	1,645,225	231,722	168,600	70,858	10,269	4,658
	2013	3.63	0.61	2.21	498,218	62,794	13,724	1,645,225	231,722	168,600	70,858	10,269	4,658

Table 5.5.3.3: Allocation Alternatives and Recreational Surpluses and Economic Value – Gag Grouper

GAG	Year	Recreational Allocation	Charter Surplus		Private Surplus	Headboat Surplus		Economic Value (EV)	Discounted EV 7%	Discounted EV 3%
			Consumer	Producer	Consumer	Consumer	Producer			
Alternative 1	2008	0.65	$215,779	$1,891,470	$796,269	$35,288	$282,486	$3,221,292	$3,221,292	$3,221,292
	2009	0.65	$233,013	$2,042,546	$859,869	$38,107	$305,048	$3,478,584	$3,251,013	$3,377,266
	2010	0.65	$250,248	$2,193,622	$923,468	$40,925	$327,611	$3,735,875	$3,263,058	$3,521,421
	2011	0.65	$250,248	$2,193,622	$923,468	$40,925	$327,611	$3,735,875	$3,049,587	$3,418,855
	2012	0.65	$250,248	$2,193,622	$923,468	$40,925	$327,611	$3,735,875	$2,850,081	$3,319,277
	2013	0.65	$250,248	$2,193,622	$923,468	$40,925	$327,611	$3,735,875	$2,663,627	$3,222,599
Total			**$1,449,785**	**$12,708,506**	**$5,350,011**	**$237,096**	**$1,897,978**	**$21,643,377**	**$18,298,659**	**$20,080,709**
Alternative 2	2008	0.59	$195,861	$1,716,873	$722,767	$32,031	$256,410	$2,923,942	$2,923,942	$2,923,942
	2009	0.59	$211,505	$1,854,004	$780,496	$34,589	$276,890	$3,157,484	$2,950,919	$3,065,518
	2010	0.59	$227,148	$1,991,134	$838,225	$37,148	$297,370	$3,391,025	$2,961,853	$3,196,367
	2011	0.59	$227,148	$1,991,134	$838,225	$37,148	$297,370	$3,391,025	$2,768,087	$3,103,269
	2012	0.59	$227,148	$1,991,134	$838,225	$37,148	$297,370	$3,391,025	$2,586,997	$3,012,882
	2013	0.59	$227,148	$1,991,134	$838,225	$37,148	$297,370	$3,391,025	$2,417,754	$2,925,128
Total			**$1,315,959**	**$11,535,413**	**$4,856,164**	**$215,211**	**$1,722,780**	**$19,645,527**	**$16,609,552**	**$18,227,105**
Preferred Alternative 3	2008	0.61	$202,500	$1,775,072	$747,268	$33,117	$265,102	$3,023,059	$3,023,059	$3,023,059
	2009	0.61	$218,674	$1,916,851	$806,954	$35,762	$286,276	$3,264,517	$3,050,950	$3,169,434
	2010	0.61	$234,848	$2,058,630	$866,640	$38,407	$307,450	$3,505,975	$3,062,255	$3,304,718
	2011	0.61	$234,848	$2,058,630	$866,640	$38,407	$307,450	$3,505,975	$2,861,920	$3,208,464
	2012	0.61	$234,848	$2,058,630	$866,640	$38,407	$307,450	$3,505,975	$2,674,692	$3,115,014
	2013	0.61	$234,848	$2,058,630	$866,640	$38,407	$307,450	$3,505,975	$2,499,712	$3,024,285
Total			**$1,360,567**	**$11,926,444**	**$5,020,780**	**$222,506**	**$1,781,180**	**$20,311,477**	**$17,172,588**	**$18,844,973**

Table 5.5.3.4: Red Grouper - Recreational Landings and Target Effort for the Charter, Private, and Headboat Sectors

RED	Year	TAC	Recreational		Charter			Private			Headboat		
		(MP)	Allocation	Quota (MP)	Landings Pounds	Landings Fish	Target Effort	Landings Pounds	Landings Fish	Target Effort	Landings Pounds	Landings Fish	Target Effort
	2008	7.57	0.23	1.74	423,087	66,592	10,731	1,274,485	190,222	110,298	43,528	7,914	2,680
	2009	7.57	0.23	1.74	423,087	66,592	10,731	1,274,485	190,222	110,298	43,528	7,914	2,680
	2010	7.57	0.23	1.74	423,087	66,592	10,731	1,274,485	190,222	110,298	43,528	7,914	2,680
Alternative 1	2011	7.57	0.23	1.74	423,087	66,592	10,731	1,274,485	190,222	110,298	43,528	7,914	2,680
	2012	7.57	0.23	1.74	423,087	66,592	10,731	1,274,485	190,222	110,298	43,528	7,914	2,680
	2013	7.57	0.23	1.74	423,087	66,592	10,731	1,274,485	190,222	110,298	43,528	7,914	2,680
	2008	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2009	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
Alternative 2	2010	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2011	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2012	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2013	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2008	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
Preferred	2009	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
Alternative 3	2010	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2011	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2012	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796
	2013	7.57	0.24	1.82	441,482	69,488	11,197	1,329,898	198,492	115,093	45,420	8,258	2,796

Table 5.5.3.5: Allocation Alternatives and Recreational Surpluses and Economic Value – Red Grouper

RED	Year	Recreational Allocation	Charter Surplus		Private Surplus	Headboat Surplus		Economic Value (EV)	Discounted EV 7%	Discounted EV 3%
			Consumer	Producer	Consumer	Consumer	Producer			
Alternative 1	2008	0.23	$249,055	$1,609,609	$711,429	$29,599	$176,874	$2,776,566	$2,776,566	$2,776,566
	2009	0.23	$249,055	$1,609,609	$711,429	$29,599	$176,874	$2,776,566	$2,594,921	$2,695,695
	2010	0.23	$249,055	$1,609,609	$711,429	$29,599	$176,874	$2,776,566	$2,425,160	$2,617,180
	2011	0.23	$249,055	$1,609,609	$711,429	$29,599	$176,874	$2,776,566	$2,266,505	$2,540,951
	2012	0.23	$249,055	$1,609,609	$711,429	$29,599	$176,874	$2,776,566	$2,118,229	$2,466,943
	2013	0.23	$249,055	$1,609,609	$711,429	$29,599	$176,874	$2,776,566	$1,979,653	$2,395,090
Total			**$1,494,330**	**$9,657,652**	**$4,268,574**	**$177,592**	**$1,061,247**	**$16,659,395**	**$14,161,034**	**$15,492,425**
Alternative 2	2008	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,897,286	$2,897,286
	2009	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,707,744	$2,812,899
	2010	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,530,602	$2,730,970
	2011	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,365,049	$2,651,427
	2012	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,210,326	$2,574,201
	2013	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,065,725	$2,499,224
Total			**$1,559,301**	**$10,077,549**	**$4,454,164**	**$185,314**	**$1,107,388**	**$17,383,717**	**$14,776,731**	**$16,166,008**
Preferred Alternative 3	2008	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,897,286	$2,897,286
	2009	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,707,744	$2,812,899
	2010	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,530,602	$2,730,970
	2011	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,365,049	$2,651,427
	2012	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,210,326	$2,574,201
	2013	0.24	$259,884	$1,679,592	$742,361	$30,886	$184,565	$2,897,286	$2,065,725	$2,499,224
Total			**$1,559,301**	**$10,077,549**	**$4,454,164**	**$185,314**	**$1,107,388**	**$17,383,717**	**$14,776,731**	**$16,166,008**

Using a yearly discount rate of 7 percent over the 6-year period and given the reductions needed in gag harvest, decreases in net present economic value expected to result from the allocation considered under **Alternative 1** are estimated at $6.6 million, approximately. With a 3% discount rate, net present value changes associated with the allocation are estimated at $7.6 million, approximately. Given existing data limitations, these values are approximations of expected welfare effect of the proposed allocation. Welfare estimates, i.e., consumer and producer surplus estimates, presented in this amendment must be treated with caution and are only provided as approximations for the magnitude of the expected effects. The ordinal ranking of alternative allocations considered under this action constitutes the primary purpose of these estimates. Aggregate changes in economic values expected to result from the alternative reallocation of gag and red grouper are summarized in Table 5.5.3.6.

Table 5.5.3.6: Aggregate Changes in Economic Values Resulting from Gag and Red Grouper Reallocation Alternatives (2008-2013)

	Discount Rate 7%			Discount Rate 3%		
	Recreational	**Commercial**	**Total**	**Recreational**	**Commercial**	**Total**
Alternative 1	$1,073,410	-$7,692,000	**-$6,618,590**	$1,180,020	-$8,774,000	**-$7,593,980**
Alternative 2	$0	$0	$0	$0	$0	$0
Preferred Alternative 3	-$52,661	-$2,786,000	**-$2,838,661**	-$55,716	-$3,175,000	**-$3,230,716**

Alternative 2 would allocate gag and red grouper resources based landings during 2001-2005. Corresponding recreational/commercial proportions for gag and red would be 59:41 and 24:76, respectively. **Alternative 2** is used as a baseline because it parallels current harvesting patterns. Therefore, changes in economic values are not anticipated from this alternative.

Preferred Alternative 3 would allocate gag and red grouper TACs using the longest existing data series. **Preferred Alternative 3** would base reallocation of gag and red grouper on landings from 1986 to 2005. Recreational/commercial proportions for gag and red would be 61:39 and 24:76, respectively. Changes in net present value based on a 7 or 3 percent discount rate were estimated at about -$2.84 million and -$3.23 million, approximately.

<u>Summary</u>

Action 5 considers alternative reallocations of the gag and red grouper TACs between the recreational and the commercial sectors. **Alternative 1** reverts to the repartition of the gag and red grouper resources set in Amendment 1 to the Reef Fish FMP and grant 65 percent of the gag TAC to the recreational sector and 35 percent to the commercial sector. Under this alternative, the red grouper TAC will be allocated as follows: 23 percent to the recreational sector and 77 percent to the commercial sector. **Alternative 1** is associated with changes in economic benefits due to discrepancies observed between the specified allocation and recreational and commercial recorded landings. Under **Alternative 1**, aggregate decreases in net present value based on a 7 percent discount rate, are estimated at $ 6.6 million, approximately. **Alternative 2** would allocate gag and red grouper based on observed landings during 2001-2005. The allocation corresponding

to current landings is used as a benchmark in this analysis and thus, is not associated with changes in economic value. **Preferred Alternative 3** would reallocate gag and red grouper based on the longest existing data series (1986-2005). For gag and red grouper, recreational/commercial splits would be 61:39 and 24:76, respectively. Anticipated changes in net present value based on a 7 percent discount rate are estimated at about -$2.84 million under **Preferred Alternative 3**.

5.5.3.2 Direct and Indirect Effects on the Social Environment

Alternative 1 would revert to the TAC allocation between the recreational and commercial fisheries as specified in Amendment 1 to the reef fish FMP as the average share during the years 1981 through 1987. The recreational to commercial proportions would be gag 65:35, red grouper 23:77. **Alternative 1** would be set allocations according to the share of landings for 1986 and 1987, which are different than the average landings for 2001-2005.

Alternative 1 would provide an additional six percent of gag allocation to the recreational fishery over what the average landings were in 2001-2005. This would benefit the recreational fishermen and fishing dependent businesses involved in the gag grouper fishery because they would have more fish to harvest than the average share they harvested for 2001-2005. Communities along the west coast of Florida would benefit the most because they have the largest share of recreational fishermen who target gag grouper. By reverting to the average share for gag for 1986 through 1987, the commercial sector would lose six percent of the average share they had been harvesting during 2001 through 2005. This could have some negative impacts on the commercial fishermen and fishing-dependent businesses involved in the gag grouper fishery because they would receive a smaller share than they have been harvesting in 2001 through 2005. For the commercial sector, this would have a negative impact on communities such as Madeira Beach, St. Petersburg, and Panama City, Florida that depend on this fishery.

Alternative 1 would have minimal impact of commercial or recreational fishermen and businesses involved in the red grouper fishery because the shares of the average amount that was harvested in 2001 through 2005 was almost the same as the shares for harvest in 1986-1987 with a gain of one percent of the share for the commercial sector and a loss of one percent for the recreational sector.

Alternative 2 would establish the allocation of TAC between the recreational and commercial fisheries as the recent five-year average share during the years of 2001 through 2005. The recreational: commercial shares would be 59:41 for gag grouper and 24:76 for red grouper.

Alternative 2 would have no direct or indirect impacts on the commercial or recreational fishermen, the fishing-dependent businesses, and communities that are involved with the gag and red grouper fisheries because both sectors would continue to have the same share as the average they had been harvesting.

Preferred Alternative 3 would establish the allocation of TAC between the recreational and commercial fisheries as the average share during the years 1986 through 2005. The recreational: commercial shares would be 61:39 for gag grouper and 24:76 for red grouper. This alternative may have a slight impact on the commercial fishermen and fishing-dependent businesses that are involved with the commercial gag grouper fishery because their share would be two percent less than what their recent average had been. It would have a small benefit for the recreational sector for gag grouper because their share would be two percent higher than it had been in the years 2001 through 2005.

Summary

The differences in these three alternatives are small and any changes to the allocations would have minimal impacts on the recreational or commercial fisheries. **Alternative 2** would have the least impacts on the commercial or recreational fisheries because the allocation would be based on the recent landings for 2001- 2005 so each sector could continue to harvest what they had been harvesting. **Alternative 1** would have the most negative impacts on the commercial fishery because they would lose six percent of the average gag grouper share they harvested in 2001-2005. Although the three alternatives do not change the share allocation very much, in the long term, any shift in allocation could have a negative impact on the sector that loses shares. The cumulative impacts, when they are combined with other actions in the reef fish fishery, can lead to a loss of income and possibly a loss of jobs for the commercial sector. A loss of shares for the recreation sector can have a negative impact on the recreational fishery when combined with other regulations in the reef fish fishery.

5.5.4 Direct and Indirect Effects on Administrative Environment

NMFS monitors harvest to ensure landings for each sector of a fishery remain within the allocation. Action 3 would establish a gag TAC within the shallow-water grouper aggregate, and thus would require separate quota monitoring of this species for the first time. NMFS already monitors red grouper, and changes in allocation would not require any new administrative action. If landings for one or both sectors of either fishery exceed the allocation, any accountability measures established through Action 6 would be triggered.

5.6 Action 6. Shallow-water Grouper Annual Catch Limits and Accountability Measures

The reauthorized Magnuson-Stevens Act, as amended through January 12, 2007, requires the Council specify annual catch limits (ACLs) and accountability measures (AMs) by 2010 for each stock/stock complex undergoing overfishing. These regulatory provisions will reduce the likelihood overfishing will occur by ensuring AMs are implemented if ACLs are exceeded. NOAA Fisheries Service is currently drafting guidelines for implementing ACLs and AMs; proposed guidelines were published in early June 2008 for public review and comment. Below is a discussion of the physical, biological, social/economic, and administrative consequences associated with alternatives in Action 6.

5.6.1. Direct and Indirect Effects on Physical Environment

Action 6 has no direct effect on the physical environment. Indirect effects on the physical environment may include reductions in fishing effort and habitat-gear interactions if AMs are implemented to constrain harvest. Impacts to the physical environment resulting from commercial quotas and seasonal closures are summarized in sections 5.8.1 and 5.9.1, and are incorporated here by reference.

5.6.2 Direct and Indirect Effects on Biological/Ecological Environment

Gag are undergoing overfishing, requiring the Council implement management measures to end overfishing. Red grouper are not undergoing overfishing and are not overfished. The status of the remaining species in the SWG fishery is unknown. Action 6 includes five ACL/AM alternatives. With the exception of **Alternative 1** (no action), all of the alternatives are intended to prevent or reduce the likelihood of overfishing SWG species.

Alternative 1 would maintain status quo regulations and would not require AMs to ensure harvest is constrained at or near target levels. The Council could implement management measures through framework action to constrain harvest if landings overages occur, but the measures would likely not take effect until several years after the overage because of the time it takes to draft and implement regulatory measures. By not specifying AMs, landings could exceed target fishing mortality and landings levels. If management measures in Actions 7-9 do not adequately reduce or constrain fishing mortality, then overfishing may occur. In particular, if recreational fishing effort increases again in the future, then the Council's preferred recreational management alternative in Action 9 may not sufficiently constrain harvest to achieve the Council's fishery management goals. By exceeding target/threshold landings levels and fishing mortality rates, maximum and optimum yield will not likely be achieved and additional harvest modifications may be required after the next stock assessment(s) if overfishing has not ended or been prevented. **Alternative 1** is the least conservative of any of the alternatives considered in Action 7, and would require the Council to approve AMs in a subsequent amendment by 2010 to meet the reauthorized Magnuson-Stevens Act mandate.

Alternatives 2 and **3** propose mechanisms for implementing AMs for each sector if the ACL (in lbs) for a sector, as summarized in Tables 6.1 or 6.2, is exceeded. The ACLs triggering AMs in **Alternative 2** are based on the yield at F_{OY} for gag and equilibrium OY for red grouper. In **Alternative 3**, ACLs are based on the yield at F_{MSY} for gag and equilibrium MSY for red grouper). After the next red grouper stock assessment, it is the Council's intent to set red grouper ACLs at either equilibrium MSY (**Alternative 2**) or equilibrium OY (**Alternative 3**) levels or the yield at F_{MSY} (**Alternative 2**) or yield at F_{OY} (**Alternative 3**), whichever is less. No recreational ACL would be established for the entire recreational SWG fishery since gag and red grouper represent a majority of SWG landings (95 percent by number during 2004-2006) and other SWG species are infrequently landed. In **Alternative 2**, the commercial ACL for the entire SWG fishery would be the sum of annual yields at F_{OY} for gag and red grouper plus 0.68 million pounds for other SWG (2001-04 average landings from Turner 2006). In **Alternative 3**, the ACL for the entire commercial SWG fishery would be the annual yield at F_{MAX} for gag plus the annual yield at F_{MSY} for red grouper plus 0.68 million pounds for other SWG. The SEFSC would estimate red grouper, gag, and SWG (commercial only) landings by sector and provide this information to the AA annually to determine if landings exceeded the ACLs triggering AMs. If a sector's landings are determined to exceed the ACLs specified in Tables 6.1 and 6.2, the AA would issue a notice maintaining the target landings level/quota in the following fishing year. The commercial grouper fishery would continue to be closed when quotas are met, as specified in Action 8. The AA could also issue a notice reducing the length of the recreational SWG fishing season if an ACL(s) is exceeded in the prior fishing year. The main difference between these two alternatives is that **Alternative 3** provides a buffer between the target landings/quota and the ACL. For this reason, **Alternative 2** is more conservative and would have the highest likelihood of preventing or ending overfishing of SWG species of any of the alternatives in Action 6. **Alternative 2** would allow landings to exceed the target catch level/quota as long as landings do not exceed the ACL.

Alternative 4 is similar to the preferred ACL/AM approved for gray triggerfish in Amendment 30A to the Reef Fish FMP. ACLs would be based on yield at F_{OY} for gag and equilibrium OY for red grouper (similar to **Alternative 2**) and there would be no buffer between the ACL and annual catch target/quota. However, **Alternative 4** would allow landings to be averaged over multiple years, unlike **Alternatives 2** and **3**. Multiyear landings averages will allow year-to-year fluctuations to occur, without necessarily triggering AMs. Because recruitment of grouper is highly variable from year-to-year, averaging landings across several years will allow managers to account for this variability. If average landings do exceed the ACL, then the AA would not increase the target catch level/quota in the following year for the sector experiencing the overage. Additionally, commercial landings would be constrained by quotas and the AA would reduce the length of the recreational SWG 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. Because **Alternative 4** ACLs are based on the yield at F_{OY} for gag and equilibrium OY for red grouper, this alternative is the second most conservative of any of the alternatives considered in Action 6. Only **Alternative 2** is more conservative and would provide greater biological benefits.

Alternative 5 is similar to **Alternative 4**. The main difference is that ACLs for **Alternative 5** are based on the yield at F_{MAX} for gag and equilibrium MSY for red grouper. Because **Alternative 5** allows multiyear averaging of landings data and provides a buffer between the annual catch target or quota and ACL, it is less conservative than **Alternatives 2-4**. **Alternative 5** would have the lowest probability of triggering AMs of any of the alternatives considered, except **Alternative 1**. It would therefore have the second greatest likelihood of allowing overfishing. If overages occur, AMs would be the same as those described for **Alternative 4**. Overall, **Alternative 2** would provide the greatest benefit to the biological environment, followed by **Alternatives 4**, **3**, **5**, and **1**.

5.6.3 Direct and Indirect Effects on Economic/Social Environment

5.6.3.1 Direct and Indirect Effects on the Economic Environment

In principle, the no-action alternative (**Alternative 1**) does not have direct economic effects in the sense that it does not by itself trigger any change in management actions. This, of course, does not mean that no corrective actions will be undertaken in the event actual harvests deviate from the target harvests substantially enough to prevent the stock to rebuild to its target biomass level. Any corrective actions, however, would be done through existing mechanisms to change regulatory measures. **Alternative 1** then may be considered to have indirect economic impacts as it allows regulatory changes that can alter the economic conditions in the fishery. All the other 4 alternatives would have direct economic effects on fishing participants.

For the commercial sector, the regulatory type under **Alternatives 2** to **5** would be that of quota closures. Thus, the nature of impacts on the commercial sector would be similar to those measures under this amendment that would implement quotas and quota closures. Estimates of the impacts of quota closures for the commercial sector are presented as part of the analysis of the economic effects of alternatives under Action 8, in conjunction with other pertinent alternatives in this amendment. The interim ACLs under **Alternative 2** and **Alternative 4** would equal those of the respective species commercial quota. The interim ACLs for **Alternative 3** would be higher than the quota for the respective species. Under **Alternative 5**, the ACLs for gag would be higher than the gag quota, but the ACLs for red grouper and shallow-water grouper would be similar to the respective quotas. **Alternatives 2** and **4** then may be considered more stringent than the other alternatives, and between the two, **Alternative 2** would be more stringent as it would not provide a buffer between the ACLs and the respective quotas but require an annual evaluation of ACL. Therefore, there is a good possibility that the economic implications of **Alternatives 2** and **4** would those as described in the discussion of the economic impacts of Action 8. **Alternatives 3** and **5**, on the other hand, would possibly provide slightly less adverse short-run economic impacts than **Alternatives 2 and 4**. On the other hand, the probability of generating more benefits in the future would greater under **Alternatives 2** and **4** because they minimize the probability of overfishing.

For the recreational sector, the general regulatory nature of the alternatives would be that of quota closures under **Alternatives 2 and 3** and shorter seasons the following year under **Alternatives 4 and 5**. The ACLs for **Alternative 2** would equal the target catch for gag and red grouper; the ACLs for **Alternatives 3 and 5** would be higher than target catches. The ACLs for Alternative 4 would equal the target catch for red grouper and the first year target catch for gag but would be higher in subsequent years than target catches for gag. **Alternatives 2 and 3** (more for **Alternative 2** than **Alternative 3**) would very likely bring about more adverse short-run economic impacts on fishery participants. The saving factor of **Alternative 3**, relative to **Alternative 2**, is the provision for higher ACLs than target catches. With higher ACLs, however, there is a higher probability that more stringent measures may be adopted over time.

Summary

This action considers several scenarios for the establishment of interim annual catch limits and accountability measures in the recreational and commercial grouper fisheries. In the commercial sector, Alternatives 2 and 4 may be more stringent than the other alternatives. Alternative 2 is expected to be the most restrictive because it would not provide a buffer between the ACL and the respective quotas and require an annual evaluation of ACL. Alternatives 3 and 5, on the other hand, are anticipated to result in less adverse short-run economic impacts than Alternatives 2 and 4. However, the probability of generating more benefits in the future would greater under Alternatives 2 and 4 because they minimize the probability of overfishing. In the recreational sector, Alternatives 2 and 3 are anticipated to result in more adverse short-run economic impacts on fishery participants. The saving factor of Alternative 3, relative to Alternative 2, is the provision for higher ACLs than target catches. Higher ACLs are associated with a higher probability that more restrictive measures may be implemented in the future.

5.6.3.2 Direct and Indirect Effects on the Social Environment

There are generally two types of effects that may ensue under **Alternatives 2 to 5**. The first one relates to the rippling effects of changes in the harvest sector on the supporting industries, such as fish dealers/processors and marinas, and on fishing communities. In the short term, losses in the harvest sector will translate into adverse economic consequences on supporting industries and fishing communities. Over the long-term as the stock recovers beyond the overfishing threshold, these adverse economic impacts may be partly, if not fully, compensated by future benefits from a recovered fish stock. For supporting industries, this compensation may be true at the industry level, but those booted out of the business would not likely be compensated. The case with fishing communities may be somewhat different, because the outgoing fishery dependent segment may be replaced by other dependencies and developments in the area. In addition, the fishery dependent segment of the area's population may have already dispersed into other areas or are engaged in other activities whose viability they deem to be more sustainable over the long term. The second type of effects would occur if fishing participants shift effort to other fisheries. In addition to increasing fishing pressure on other fish stock that may also be subject to rebuilding schedules, effort shifts can reduce the benefits derived by the usual participants in that fishery. It is likely that this shift in benefits away from the usual participants in the indirectly affected fishery may result in net losses to the industry, because the new entrants may not be as efficient (commercial and for-hire) or may not derive the same angler benefits as the usual participants.

5.6.4 Direct and Indirect Effects on Administrative Environment

Alternatives in Action 7 would directly affect the administrative environment. **Alternative 1** would not require AMs for grouper. By not imposing AMs, the administrative environment may be negatively affected if harvest is not sufficiently constrained and overfishing of SWG species occurs. This could increase the burden on Council staff and NOAA Fisheries Service to develop amendments in the future to address overfishing and constrain harvest. **Alternatives 2-5** would all provide a procedure for implementing AMs. Each of these alternatives would require NOAA Fisheries Service to monitor landings on an annual or multiyear basis. Currently, NOAA Fisheries Service monitors annual quotas for several commercial species, but recreational landings are not monitored. Therefore, **Alternatives 2-5** would increase the burden on NOAA Fisheries Service to collate and verify recreational landings information. Additionally, **Alternative 2** through **5** would require the AA issue notices if a sector's ACL is exceeded. Currently, *Federal Register* rules and Fishery Bulletins are published by the AA to inform commercial fishermen of quota closures. Filing AM notifications is expected to increase the burden on the AA and Southeast Regional Office. Negative effects on the administrative environment, from greatest to least are **Alternative 1**, **Alternative 5**, **Alternative 3**, **Alternative 4**, and **Alternative 2**.

5.7 Action 7. Shallow-water Grouper, Red Grouper, and Gag Commercial Quotas

The grouper quotas discussed in this section apply to both the interim rule and the subsequent rulemaking from Amendment 30B. Discussions of short-term effects apply to the interim rule as this action would cover the time period between January 1, 2009, and the implementation of rulemaking via Amendment 30B (anticipated to be effective in the summer of 2009 assuming Amendment 30B is approved). Discussions of both short- and long-term effects apply to Amendment 30B. This action addresses long-standing grouper management.

5.7.1. Direct and indirect effects on physical environment

Section 3.2 and GMFMC (2004a) describe the physical environment inhabited by groupers, particularly for red grouper and gag. Groupers are carnivorous bottom dwellers, generally associated (as adults) with hard-bottomed substrates, and rocky reefs. Eggs and larvae for all species 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 2004a). 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 2004a). 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).

The commercial grouper fishery primarily uses various forms of vertical lines (rod-and-reel, electric or hydraulic reels, hand lines) and longlines. For red grouper, vertical lines have accounted for a lower percentage of the landings over time. In the late 1980s, vertical lines accounted for approximately 50 percent of the harvest, but have only accounted for 20-30 percent of annual landings since 1993. Conversely, harvest from longlines has increased from approximately 40 percent of landings in the late 1980’s to approximately 60 percent of the harvest in recent years. Red grouper have also been caught with fish traps, which on average have accounted for 13 percent of the harvest between 1986 and 2005. For gag, most commercially caught fish have been landed with vertical gear. Between 1986 and 2004, vertical lines caught between 49 and 64 percent of the annual harvest. This compares to between 19 and 41 percent of the annual harvest caught with longlines over the same period. Additionally, some grouper are harvested by spearfishing, but this gear type harvests minimal numbers of fish.

Vertical gear and longlines can damage habitat through snagging or entanglement. Longlines can also damage hard bottom structures during retrieval as the line sweeps across the seafloor (Barnette 2001). Anchoring over hard-bottom areas can also affect benthic habitat by breaking or destroying hard bottom structures. However, these gears are not believed to have much negative impact on bottom structures and are considerably less destructive than other commercial gears, such as traps and trawls (Barnette 2001). Fish traps have been used to harvest both species, but particularly red grouper. This gear can cause significant damage to corals and other epibenthic organisms. However, this gear was retired from use in the fishery in February 2007.

The effects of the methods to calculate the commercial quota (**Alternatives 1-3**) on the physical environment are expected to be minor for the same reasons described above and in Section 5.1.1; however, the alternatives are expected to differ to some extent. This is because there is an associated level of effort that would allow each quota to be harvested. Alternatives that reduce the quota would likely have a lower level of fishing effort. Therefore, lower levels of effort would result in greater benefits to the physical environment because fishing related interactions with habitat would be reduced. However, a shift to a reduced commercial allocation (**Action 5**) would be accompanied with an increase in the recreational allocation. Consequently recreational effort would increase with an increased recreational share of TAC and create more recreational gear interactions with the physical environment. These effects on the physical environment are discussed in more detail in Section 5.5.1.

Although alternatives in this action would dictate how quotas are set, the actual quota for **Alternative 2 and Preferred Alternative 3** would be set through decisions made in **Actions 3 and 5** for gag, and **Actions 4 and 5** for red grouper. For gag, the actual quota could range from 1.18 to 1.68 mp for 2009, the first year of the TACs to end overfishing (Table 5.7.1). Quotas would then increase through 2011 as stock biomass increases toward its OY or MSY level. Provided that allocations are adhered to during the 2009-2011 period, further quota increases could be implemented through a subsequent amendment until the equilibrium quota is achieved. This equilibrium quota would range between 1.69 to 2.03 mp depending on the allocation chosen in **Action 5**. For red grouper, the quota could range between 4.99 and 5.94 mp depending on the selected **Action 5** allocation alternative (Table 5.7.2). The "other" shallow-water grouper species allowance is either 0.32 mp, which is the average landings from 1999-2001 (**Alternative 2**), or 0.41 mp, the average from the baseline years of 2001-2004 (**Preferred Alternative 3**).

The "other" shallow-water grouper allowance in **Alternative 2** and ***Preferred*** **Alternative 3** is not a quota. Exceeding this allowance will not result in any quota closure action as long as the shallow-water aggregate quota has not been reached. However, exceeding the "other" shallow-water grouper allowance infers that either or both of the gag and red grouper landings will be below their quotas when the aggregate shallow-water grouper quota is reached.

For 2009, the total grouper quota for shallow-water species would range from 6.49 to 8.20 mp (Table 5.7.3). This quota could increase to between 6099 and 8.38 once the gag stock reaches its OY or MSY equilibrium level.

Given that potential quotas under **Alternative 2** and **Preferred Alternative 3** are below the current 8.80 mp quota provided in the no action **Alternative 1**, **Alternative 1** would negatively affect the physical environment more than **Alternative 2** and **Preferred Alternative 3**. This is because more effort could be directed towards grouper with a higher quota. The potential quotas for **Preferred Alternative 3** are slightly greater than those of **Alternative 2** because of the additional 110,000 pounds in the other shallow-water grouper allowance. Therefore, **Preferred Alternative 3** would have more negative effects on the physical environment than **Alternative 2**.

Table 5.7.1. Range of possible commercial gag quotas (mp) based on proposed TACs from Action 3 and the low (35%) and high (41%) commercial allocation percentage from Action 5.

	Alternative 1 No Action		Alternative 2 F_{OY} annual increase		Alternative 3 F_{OY} 3-yr step increase		Alternative 4 F_{MAX} annual increase		Alternative 5 F_{MAX} 3-yr step increase	
Year	35%	41%	35%	41%	35%	41%	35%	41%	35%	41%
2009	undefined	undefined	1.18	1.39	1.10	1.28	1.49	1.74	1.44	1.68
2010	undefined	undefined	1.27	1.48	1.10	1.28	1.54	1.80	1.44	1.68
2011	undefined	undefined	1.34	1.57	1.34	1.57	1.58	1.85	1.58	1.85
Equilibrium yield	1.59	1.86	1.69	1.98			1.73	2.03		

Table 5.7.2. Range of possible commercial red grouper quotas (mp) based on proposed TACs from Action 4 and the low (35%) and high (41%) commercial allocation percentage from Action 5. Quota is calculated as TAC * percent allocation.

	Alternative 1		Alternative 2		Alternative 3	
Allocation	76%	77%	76%	77%	76%	77%
Quota	4.99	5.05	5.75	5.89	5.87	5.94

Table 5.7.3. Range of possible total commercial grouper quotas (mp) based on proposed TACs from Actions 3, 4, and 5. The quota is the sum of the red grouper and gag quotas, plus the other shallow water grouper allowance for Alternatives 2 and 3. High and low quotas use either the highest or lowest respective red grouper and gag quotas provided in Tables 5.7.1 and 5.7.2.

	Alternative 1 No action	Alternative 2 Other grouper species = 0.32 mp		Alternative 3 Other grouper species = 0.41 mp	
Quota		Low	High	Low	High
2009	8.80	6.49	8.01	6.49	8.10
2010	8.80	6.49	8.05	6.49	8.15
2011	8.80	6.49	8.11	6.49	8.20
Equilibrium yield	8.80	6.99	8.29	7.08	8.38

5.7.2 Direct and indirect effects on biological/ecological environment

Grouper demonstrate the typical life history pattern for managed reef fish species as summarized in Section 3.3, Table 3.3.2.1, and GMFMC (2004a). In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Juvenile and adult grouper are typically demersal, and are usually 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. Most grouper are protogynous hermaphrodites.

For red grouper, females mature on average at 380 mm (15.0 inches) TL and 3.5 years (Fitzhugh et al. 2006a). The reported size and age of 50 percent transition from females to males of 765 mm (30.1 inches) TL and 10.5 years, respectively. Red grouper have been aged up to 28-years old, but begin to recruit to the fishery at around ages 4 and 5 (Lombardi-Carlson et al. 2006b). The most recent red grouper stock assessment indicated the Gulf of Mexico stock was not overfished nor undergoing overfishing (SEDAR 12 2007).

Gag females mature on average at 585 mm (23.0 inches) TL which corresponds to an age of maturity of 3.7 years (SEDAR 10 2006). SEDAR 10 (2006) used a size and age of 50 percent transition from females to males of 1,025 mm (40.4 inches) TL and 10.5 years, respectively. Gag have been aged to over 30 years, but become fully recruited to the fishery between ages 3 and 6 (Lombardi-Carlson et al. 2006a). The Gulf of Mexico gag stock appears to be undergoing overfishing.

Gag and red grouper are components the shallow-water grouper aggregate, which is managed as a unit. This unit consists of groupers in the *Epinephelus* and *Mycteroperca* genera which share similar habitat and biological characteristics and are targeted as part of the overall shallow-water grouper fishery. Direct effects of **Alternative 2** and **Preferred Alternative 3** on the biological and ecological environment would be to increase the abundance and sustainability of gag as a result of reduced fishing mortality, while maintaining the red grouper stock at or near its optimum yield biomass level. As a result of reduced fishing mortality over habitat preferred by grouper, other shallow-water grouper species and other reef fish that occupy the same habitat as gag and red grouper may also benefit from increased survival.

Indirect effects of these alternatives on the biological and ecological environment are not well understood. Changes in the population size structure as a result of shifting the fishing selectivities and increases in stock abundance could lead to changes in the abundance of other reef fish species that compete with shallow water grouper species 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 less food and/or shelter are less available.

5.7.3 Direct and Indirect Effects on Economic/Social Environment

5.7.3.1 Direct and Indirect Effects on the Economic Environment

The current commercial quota regime consists of a red grouper quota and an overall shallow-water grouper quota (**Alternative 1**). Both quota alternatives to the current regime would establish also a quota for gag in addition to the red grouper quota (**Alternatives 2 and 3**). In these two alternatives, the overall shallow-water grouper quota would not be a pre-set number but would be calculated as the sum of the red grouper and gag quotas, plus the “other” shallow-water grouper allowance. In other words, these two alternatives would set two commercial quotas, each for red grouper and gag, plus an allowance for "other" shallow-water grouper, with the third quota (that for all shallow-water grouper) merely calculated as the sum of the two sub-quotas and "other" shallow-water grouper allowance.

Explicitly stated in the two alternatives to the current quota regime is the dependence of the two sub-quotas on the chosen TAC and commercial/recreational allocation ratio. As intimated in the discussions for setting TACs and allocations, the actual economic effects would also depend on the specific regulatory measures adopted for the subject fisheries. Hence, estimation of the economic effects of the quota alternatives was undertaken by assuming not only specific TAC and allocation ratio but also specific management measures contained in other sections of this amendment.

The modeling of various commercial quotas presented some unique problems for the economic model used in this amendment. Some inconsistencies would occur when combining commercial quotas with other actions in this amendment. This was the case with **Alternative 1**, the no action alternative, which would not provide any gag quota. But without such quota, it would be inconsistent with **Preferred Alternative 2** of **Action 3**, which would set a TAC to be allocated according to the alternatives under **Action 5**. Also, under the no action alternative, the current red grouper quota would be maintained, and this would be inconsistent with **Action 4's Preferred Alternative 2**, which would set a TAC to be allocated according to the alternatives under **Action 5**. To resolve this problem, the no action alternative (**Alternative 1**) in this section was considered to be identical to the baseline where all alternatives were no action alternatives.

Being considered similar to the baseline case, **Alternative 1** would have no economic effects (Table 5.7.3.1). **Alternatives 2 and 3** would have negative effects, but the economic model could not distinguish the effects of one alternative from those of the other. **Alternatives 2 and 3** are identical with respect to gag and red grouper quotas; they differ only in the provision for the "other" shallow-water grouper allowance. In principle, **Alternative 3** may be expected to provide larger benefits or lower losses than **Alternative 2**, because it would set the quota for other shallow-water grouper at a higher level. But the fishery would never close on the basis of the "other" shallow-water grouper allowance. Either the red or gag quota would be more binding than the "other" shallow-water grouper allowance. Hence, the model estimated identical effects for **Alternatives 2 and 3**. Losses from either alternative would be about $22.9 million using a 3 percent discount factor.

The distribution of effects by gear type shown in Table 5.7.3.1 follows about the same pattern as that of previous actions. The longline sector would bear the largest cost of all gear users, followed by hook and line, and then by other gear users. Thus, the burden of effects from the commercial quotas in conjunction with other Actions in this amendment would disproportionately fall on the longline sector.

Table 5.7.3.1. Net present values of the effects of alternatives to set commercial red grouper, gag, and shallow-water grouper quotas. Baseline numbers are in absolute values and those for each alternative are differences from the baseline. Numbers are in thousand 2005 dollars.

	Hook and Line	Longline	Other Gears	Total
		3% Discount Rate		
Baseline	122,586	62,855	11,707	197,148
Alternative 1	0	0	0	0
Alternative 2	-9,737	-10,638	-2,565	-22,940
Alternative 3	-9,737	-10,638	-2,565	-22,940
		7% Discount Rate		
Baseline	107,912	55,343	10,303	173,558
Alternative 1	0	0	0	0
Alternative 2	-8,760	-9,448	-2,274	-20,482
Alternative 3	-8,760	-9,448	-2,274	-20,482

No positive effects would result from **Alternatives 2 and 3** on any fishing area in the Gulf (see Table 5.7.3.2). Most of the losses would be incurred by West-Central Florida, followed by Northwest Florida, then by the Rest of the Gulf ($380 thousand), and lastly by South Florida ($229 thousand). Based on model results, the effects of the various quota alternatives would be proportionately shared by all areas.

Table 5.7.3.2. Net present values of the effects of alternatives to set commercial red grouper, gag, and shallow-water grouper quotas. Baseline numbers are in absolute values and those for each alternative are differences from the baseline. Numbers are in thousand 2005 dollars.

	Rest of Gulf	Northwest FL	West-Cent FL	South FL	Total
			3% Discount Rate		
Baseline	74,331	39,227	49,667	33,923	197,148
Alternative 1	0	0	0	0	0
Alternative 2	-701	-6,756	-15,194	-290	-22,941
Alternative 3	-701	-6,756	-15,194	-290	-22,941
			7% Discount Rate		
Baseline	65,380	34,560	43,761	29,858	173,559
Alternative 1	0	0	0	0	0
Alternative 2	-624	-6,051	-13,515	-295	-20,485
Alternative 3	-624	-6,051	-13,515	-295	-20,485

Summary

Explicitly stated in the two alternatives to the current quota regime would be the dependence of the two sub-quotas on the chosen TAC and commercial/recreational allocation ratio. The actual economic effects would also depend on the specific regulatory measures adopted for the subject fisheries. Hence, evaluation of the economic effects of the quota alternatives was undertaken by assuming not only specific TAC and allocation ratio but also specific management measures contained in other sections of this amendment. Using this approach necessitated the consideration of the no action alternative (**Alternative 1**) as equivalent to the baseline scenario wherein all alternatives were assumed to be the no action alternative. Model results for **Alternatives 2 and 3** were identical because the two alternatives would differ only on the level set for the "other" shallow-water grouper allowance, which would not be binding. Total losses from **Alternative 2 or 3** would amount to $22.9 million using a 3 percent discount factor.

5.7.3.2 Direct and Indirect Effects on the Social Environment

Alternative 1 is no action. With this action there would be no adjustment to the red-grouper or shallow-water grouper quotas and do not specify a quota for gag grouper. The shallow water grouper quota would remain 8.80 mp and the red grouper would remain 5.31 mp. In the short term, this alternative would not have any impacts on the recreational or commercial red or gag grouper fishery, because it would not adjust the red grouper or shallow water grouper quotas and it would not set a quota for the gag grouper.

Alternative 2 would set the commercial gag and red grouper quotas by multiplying the TAC for each year by each species' commercial allocation. The allowance for the commercial "other" shallow-water grouper will be 0.32 mp which is the average landings for the baseline years used in Secretarial Amendment 1 of 1999-2001. The aggregate commercial shallow-water grouper quota for each year is the sum of the gag and red grouper quotas, plus the "other" shallow-water grouper allowance. For this alternative, the quotas will be based on the TACs chosen in other actions.

If the aggregate quota decreases, there would be negative impacts on the gag and red grouper fisheries because there would be less fish to harvest. When combined with other reductions in the reef fish fishery, fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries may be negatively impacted due to a reduction in catch. This could cause a reduction in profits for the fishermen, and possibly a loss of jobs in the processing sector. For the commercial sector, this would negatively impact communities such as Madeira Beach, St. Petersburg, and Panama City, Florida.

If the aggregate quota increases, then fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries would benefit from an increase in fish to harvest. This could increase the income for the fishermen and for the processing sector in communities such as Madeira Beach, St. Petersburg, and Panama City, Florida.

Preferred Alternative 3 would set the commercial gag and red grouper quotas by multiplying the TAC for each year by each species' commercial allocation. The allowance for the commercial "other" shallow-water grouper will be 0.41 mp which is the average landings for the baseline years of 2001-2004. The aggregate commercial shallow-water grouper quota for each year is the sum of the gag and red grouper quotas, plus the “other” shallow-water grouper allowance. **Alternative 3** would have a .68 mp allowance for “other” shallow-water grouper. This allowance is higher than the allowance set for **Alternative 2.** As in **Alternative 2**, if the aggregate quota decreases, there would be negative impacts on the gag and red grouper fisheries because there would be less fish to harvest. When combined with other reductions in the reef fish fishery, fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries may be negatively impacted due to a reduction in catch. This could cause a reduction in profits for the fishermen, and possibly a loss of jobs in the processing sector for communities such as Madeira Beach, St. Petersburg, and Panama City, Florida which are substantially involved in this fishery.

If the aggregate quota increases, then fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries would benefit from an increase in fish to harvest. This could increase the income for the fishermen and for the processing sector.

Summary
Alternative 1 in the short term, this alternative would not have any impacts on the recreational or commercial red or gag grouper fisheries, because it would not adjust the red grouper or shallow water grouper quotas and it would not set a quota for the gag grouper. If the aggregate quota decreases for **Alternative 2** and preferred A**lternative 3**, there would be negative impacts on the gag and red grouper fisheries because there would be less fish to harvest. When combined with other reductions in the reef fish fishery, fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries may be negatively impacted due to a reduction in catch. This could cause a reduction in profits for the fishermen, and possibly a loss of jobs in the processing sector.

If the aggregate quota increases, then fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries would benefit from an increase in fish to harvest. This could increase the income for the fishermen and for the processing sector.

5.7.4 Direct and Indirect Effects on Administrative Environment

Section 1.4 outlines the history of management of grouper in the Gulf. Size limits, commercial Gulf reef fish permits, trip limits, quotas, season closures, and area closures are currently used to regulate the commercial harvest of red snapper. The purpose of setting quotas would constrain the commercial shallow-water grouper harvest to its allocation under the TACs selected in Actions 3 and 4. **Alternative 2** and **Preferred Alternative 3** would require administrators to make minor adjustments to the Reef Fish FMP which fall within the scope and capacity of the current management system and are not expected to significantly affect the administrative environment.

Alternative 1 would continue the current quotas and not change current management practices. **Alternative 2** and **Preferred Alternative 3** would require a new segment of the grouper fishery to monitored-gag. This would entail in-season monitoring of trip ticket data for this category and would increase the administrative burden of grouper management. However, this increase should be minimal because these types of activities already take place and the system for monitoring grouper quotas already exists.

Although the "other" shallow-water grouper species allowance is lower in **Alternative 2** than **Preferred Alternative 3**, exceeding this allowance will not result in any quota closure action as long as the shallow-water aggregate quota has not been reached. However, exceeding the "other" shallow-water grouper allowance infers that either or both of the gag and red grouper landings will be below their quotas when the aggregate shallow-water grouper quota is reached. **Alternative 2** increases the likelihood of the aggregate shallow-water grouper quota being reached even if the individual species quotas have not been. Thus the chance activities associated with quota closures such as filing a *Federal Register* notice, sending Fishery Bulletins, and sending press releases to inform the public are greater. Consequently, the adverse effects to the administrative environment from **Alternative 2** are greater than **Preferred Alternative 3**.

5.8 Action 8. Application of Quota Closures

Alternative 1, no action, closes the commercial SWG fishery when either the red grouper or SWG quotas are reached. No measures are specified for the gag quota, meaning that fishing for gag could continue after the gag quota is filled and until one of the other quotas is filled. In the past, the red grouper quota has been filled before the SWG has been reached. However, with the possibility the red grouper commercial quota may increase while the commercial gag quota is reduced, the reverse may occur. Therefore, this alternative could allow for commercial overfishing of gag. Based on applying quotas of 1.32 mp (2009) for gag, 5.75 mp for red grouper, and 7.64 mp for SWG to 2004-2006 landing data, it is likely the SWG quota will be filled prior to the red grouper quota (Table 5.8.1). This is because gag landed in excess to this species' quota would be added to the SWG quota.

Alternative 2 closes the commercial SWG fishery when either of three quotas is reached, the red grouper quota, the gag quota, or the SWG quota. This is a logical extension of **Alternative 1** to incorporate the gag quota. However, while this would stop commercial overfishing of either gag or red grouper, it would likely result in the fishery not being able to fill the quota for the other species (Table 5.8.1). **Preferred Alternative 3** and **Alternative 4** address the under harvest of SWG species described in the previous alternative by limiting the harvest of the commercial fishery through trip limits. **Preferred Alternative 3** uses a trigger based on a certain percentage of the total quota being filled, after which time an incidental harvest trip limit applied to the species whose harvest first reaches the trigger. **Alternative 4** uses a gag trip limit (the likely "weak link" species) to allow the SWG fishery to stay open longer.

This action only applies to Amendment 30B and subsequent rulemaking, not the interim rule.

Table 5.8.l. Shallow-water grouper and red grouper harvests and cumulative percent landings for bimonthly intervals. Shaded cells indicate when the shallow-water grouper quota of 7.75 mp GW (2009) and the gag (1.32 mp GW) and red grouper quota (5.75 mp GW) quotas are met. See text for details of the analyses.

Year	2004						2005						2006					
Bimonthly	S-W Grouper		Gag		Red		S-W Grouper		Gag		Red		S-W Grouper		Gag		Red	
Interval	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %	Harvest	Cumm %
Jan 1-15	448,494	6%	175,520	13%	233,094	4%	514,634	7%	172,982	13%	295,890	5%	352,958	5%	108,085	8%	213,488	4%
Jan 16-31	926,888	12%	362,741	27%	481,727	8%	1,063,577	14%	357,496	27%	611,506	11%	729,447	10%	223,375	17%	441,208	8%
Feb 1-14	1,219,860	16%	450,419	34%	660,970	11%	1,482,570	19%	462,638	35%	888,100	15%	889,424	12%	263,084	20%	547,251	10%
Feb 15-28	1,512,832	20%	538,097	41%	840,213	15%	1,901,562	25%	567,780	43%	1,164,693	20%	1,049,401	14%	302,793	23%	653,294	11%
Mar 1-15	1,709,836	22%	633,999	48%	923,796	16%	2,146,818	28%	643,499	49%	1,312,421	23%	1,228,787	16%	354,482	27%	765,040	13%
Mar 16-31	1,919,972	25%	736,295	56%	1,012,951	18%	2,408,425	32%	724,266	55%	1,469,998	26%	1,420,132	19%	409,616	31%	884,236	15%
Apr 1-15	2,386,823	31%	896,067	68%	1,278,517	22%	2,864,433	37%	856,908	65%	1,752,817	30%	1,751,387	23%	481,596	36%	1,114,056	19%
Apr 16-30	2,853,673	37%	1,055,838	80%	1,544,083	27%	3,320,442	43%	989,549	75%	2,035,635	35%	2,082,643	27%	553,576	42%	1,343,875	23%
May 1-15	3,301,757	43%	1,211,184	92%	1,796,976	31%	3,832,159	50%	1,127,478	85%	2,363,920	41%	2,466,978	32%	628,217	48%	1,619,394	28%
May 16-31	3,779,713	49%	1,376,886	104%	2,066,730	36%	4,377,990	57%	1,274,602	97%	2,714,091	47%	2,876,935	38%	707,833	54%	1,913,281	33%
Jun 1-15	4,305,248	56%	1,522,592	115%	2,399,828	42%	4,844,746	63%	1,381,083	105%	3,032,863	53%	3,272,572	43%	780,119	59%	2,201,452	38%
Jun 16-30	4,830,784	63%	1,668,298	126%	2,732,927	48%	5,311,503	70%	1,487,563	113%	3,351,634	58%	3,668,209	48%	852,404	65%	2,489,623	43%
Jul 1-15	5,317,843	70%	1,766,663	134%	3,078,310	54%	5,818,998	76%	1,653,184	125%	3,648,382	63%	3,996,131	52%	908,252	69%	2,732,537	48%
Jul 16-31	5,837,372	76%	1,871,586	142%	3,446,719	60%	6,360,326	83%	1,829,845	139%	3,964,913	69%	4,345,914	57%	967,823	73%	2,991,646	52%
Aug 1-15	6,322,494	83%	1,964,934	149%	3,795,356	66%	6,972,771	91%	1,988,838	151%	4,363,906	76%	4,738,188	62%	1,009,163	76%	3,307,699	58%
Aug 16-31	6,839,957	90%	2,064,504	156%	4,167,235	72%	7,626,046	100%	2,158,430	164%	4,789,498	83%	5,156,615	67%	1,053,259	80%	3,644,823	63%
Sep 1-15	7,143,458	94%	2,147,660	163%	4,360,592	76%	7,951,615	104%	2,267,986	172%	4,976,562	87%	5,428,879	71%	1,085,079	82%	3,861,057	67%
Sep 16-30	7,446,959	97%	2,230,817	169%	4,553,949	79%	8,277,185	108%	2,377,541	180%	5,163,626	90%	5,701,143	75%	1,116,899	85%	4,077,291	71%
Oct 1-15	8,104,679	106%	2,474,168	187%	4,909,833	85%	8,458,311	111%	2,423,353	184%	5,282,833	92%	5,910,988	77%	1,141,515	86%	4,243,860	74%
Oct 16-31	8,806,248	115%	2,733,742	207%	5,289,443	92%	8,651,512	113%	2,472,220	187%	5,409,988	94%	6,134,822	80%	1,167,773	88%	4,421,533	77%
Nov 1-15	9,147,863	120%	2,818,417	214%	5,516,006	96%	8,655,590	113%	2,475,204	188%	5,410,720	94%	6,323,225	83%	1,198,598	91%	4,562,358	79%
Nov 16-30	9,489,477	124%	2,903,091	220%	5,742,569	100%	8,659,668	113%	2,478,188	188%	5,411,451	94%	6,511,628	85%	1,229,423	93%	4,703,183	82%
Dec 1-15	9,495,075	124%	2,906,103	220%	5,744,658	100%	8,666,495	113%	2,482,562	188%	5,413,297	94%	6,754,701	88%	1,276,159	97%	4,877,906	85%
Dec 16-31	9,501,046	124%	2,909,314	220%	5,746,886	100%	8,673,777	114%	2,487,228	188%	5,415,266	94%	7,013,979	92%	1,326,011	100%	5,064,276	88%

5.8.1. Direct and indirect effects on physical environment

Section 3.2 and GMFMC (2004a) describe the physical environment inhabited by groupers, particularly for red grouper and gag. Groupers are carnivorous bottom dwellers, generally associated (as adults) with hard-bottomed substrates, and rocky reefs. Eggs and larvae for all species 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 2004a). 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 estuarine dependent and are found in seagrass beds (GMFMC 2004a). Adult gag are associated with hard bottom substrates, including offshore reefs and wrecks, coral and live bottoms, 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).

The fishing gears used in the commercial grouper fishery are discussed in Section 5.7.1. While there is potential for damage to the bottom habitat from vertical gear, longlines, and anchors from snagging, entanglement or by breaking or destroying hard bottom structures, these gears are not believed to have much negative impact on bottom structures and are considerably less destructive than other commercial gears, such as traps and trawls (Barnette 2001). Trawling and other net capture of reef fish was prohibited in 1990 under Amendment 1. Fish traps have been used to harvest both species, but particularly red grouper. This gear can cause significant damage to corals and other epibenthic organisms. However, this gear was retired from use in the fishery in February 2007.

The effects of the application of commercial quota closures (**Alternatives 1-4**) on the physical environment are expected to be minor because current fishing practices have minor impacts as described in section 5.1; however, the alternatives are expected to differ to some extent. This is because there is an associated level of fishing effort needed to fill a quota. Alternatives that close the grouper fishery before a quota is filled would likely have a lower level of fishing effort associated with them. Therefore, lower levels of effort would result in greater benefits to the physical environment because fishing related interactions with habitat would be reduced.

Table 5.8.2 ranks the estimated times to filling gag, red grouper, and total SWG quotas based on 2004-2006 gag and red grouper landings data based on information presented in Tables 2.8.3 and 5.8.1. Lower ranks indicate earlier fishery closures. Based on these analyses, **Preferred Alternative 3** and **Alternative 4** would allow the commercial grouper fishery to stay open the longest for the entire Gulf of Mexico under more restrictive trip limits. If sufficiently restrictive, the fishery could stay open until the red grouper quota is filled, particularly **Alternatives 4ai** and **4b**. Under **Alternative 1**, the SWG quota would have been met before the red grouper quota in 2004 and 2005, thus the fishery would close earlier under this scenario as the overharvest of gag would contribute to the SWG total. Under **Alternative 2**, the fishery would have closed in early May for 2004 and 2005, and late November in 2006. This alternative, because the fishing season would be the shortest, would have the least impact on and would be most beneficial for the physical environment.

Table 5.8.2. Ranking of quota closure dates for Alternatives 1-4 from Action 8 based on 2004-2006 landings data with respective gag, red grouper, and SWG quotas of 1.32 (2009), 5.75, and 7.64 mp GW. Note that under Alternative 1, there is not a gag quota, so landed gag would be counted toward the shallow-water quota until the fishery is closed. Alternatives within boxes would close the fishery at about the same time (within days) with the exception of 2006 where most alternatives would not close the fishery.

Rank	2004	2005	2006
1	2	2	2
2	3c	3c	3c
3	4d	4d	1
4	3b	1	3a
5	1	3b	3b
6	3a	4c	4ai
7	4c	4aii	4aii
8	4aii	3a	4b
9	4ai	4ai	4c
10	4b	4b	4d

5.8.2 Direct and indirect effects on biological/ecological environment

Grouper demonstrate the typical life history pattern for managed reef fish species as summarized in Section 3.3, Table 3.3.2.1, and GMFMC (2004a). In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Juvenile and adult grouper are typically demersal, and are usually 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. Most grouper are protogynous hermaphrodites.

For red grouper, females mature on average at 380 mm (15.0 inches) TL and 3.5 years (Fitzhugh et al. 2006). The reported size and age of 50 percent transition from females to males of 765 mm (30.1 inches) TL and 10.5 years, respectively. Red grouper have been aged up to 28-years old, but begin to recruit to the fishery at around ages 4 and 5 (Lombardi-Carlson et al. 2006a). The most recent red grouper stock assessment indicated the Gulf of Mexico stock was not overfished nor undergoing overfishing (SEDAR 12 2007).

Gag females mature on average at 585 mm (23.0 inches) TL which corresponds to an age of maturity of 3.7 years (SEDAR 10 2006). SEDAR 10 (2006) used a size and age of 50 percent transition from females to males of 1,025 mm (40.4 inches) TL and 10.5 years, respectively. Gag have been aged to over 30 years, but become fully recruited to the fishery between ages 3 and 6 (Lombardi-Carlson et al. 2006b). The Gulf of Mexico gag stock has been determined to be undergoing overfishing.

The effects of the different commercial quota closures (**Alternatives 1-4**) on the biological/ecological environment are expected to differ to some extent. This is because there is an associated level of F associated with each quota to be harvested. Alternatives that close the fishery sooner would likely have a lower level of F associated with it. Therefore, lower levels of F would result in greater benefits to the biological/ecological environment because fewer fish would be removed from the population.

As discussed in Section 5.8.1, the effects of the different alternatives were compared for season length through 2004-2006 landings data using commercial quotas for gag and red grouper of 1.32 (2009) and 5.75 mp, respectively, and an allowance for other shallow-water species of 0.68 mp. Based on these analyses, **Preferred Alternative 3** and **Alternative 4** under the assumption only non-gag targeted trips would be made, would allow the commercial grouper fishery to stay open the longer than **Alternative 2** for the entire Gulf of Mexico (Table 5.8.2). This is because the trigger to close the fishery would be the red grouper quota rather than gag quota. Reducing gag harvest from the catch once the incidental harvest target is met, or gag trip limits are implemented, postpones when the SWG quota would met. Under 2004-2006 fishery conditions, the shallow-water quota would not have been filled under **Alternative 2** until after the red grouper quota was filled, unlike **Alternative 1**. Because the harvest of red grouper and other SWG species would continue after the gag trigger is met under **Preferred Alternative 3** or the trip limit is met under **Alternative 4**, this would result in gag bycatch. As illustrated in SERO (2008), this bycatch is greater under scenarios where the season length is extended. With an estimated discard mortality rate of 67 percent for this species, this could adversely affect the gag stock. If not taken into affect, this bycatch could lead to further overfishing for this species. This effect may be minimized if commercial fishermen can target other grouper species other than gag as indicated in public testimony.

For **Alternative 1**, the SWG quota would have been met before the red grouper quota under 2004 and 2005 conditions, thus the fishery would have closed sooner under this scenario than **Preferred Alternative 3** and **Alternative 4** if trips landing gag are reduced (Table 5.8.3). However, because fishing for gag would be allowed beyond when the gag quota was filled (early May for 2004 and 2005, and late November for 2006), this would result in overfishing for this species. **Alternative 1** would be beneficial for red grouper because the fishery could close before this species' quota is filled, reducing the chance for overfishing.

Under **Alternative 2**, the fishery would have closed in early June under 2004 conditions, late June under 2005 conditions, and late November under 2006 conditions. This alternative would protect gag from overfishing, and because the red grouper quota would not be filled, would benefit the red grouper stock. Because all grouper fishing would be halted, bycatch could be reduced if the overall number of reef fish trips were reduced as a result of the closure. However, if reef fish fishing were to continue as commercial fisherman targeted other reef fish species, bycatch of grouper species would increase and result in overfishing. Discard mortality rates are estimated at 67 percent for gag by all gear types, 45 percent for red grouper caught with longlines, and 10 percent for red grouper caught with handlines (SEDAR 10 2006; SEDAR 12 2007).

Indirect effects of these alternatives on the biological and ecological environment are not well understood. Changes in the population size structure as a result of shifting the fishing selectivities and increases in stock abundance could lead to changes in the abundance of other reef fish species that compete with red snapper 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 less food or shelter are available.

5.8.3 Direct and Indirect Effects on Economic/Social Environment

5.8.3.1 Direct and Indirect Effects on the Economic Environment

Alternatives in this section share the common provision of fishery closure once the quota is reached. They differ mainly on whether to close only the fishery whose quota is reached or the entire shallow-water grouper fishery when one or more sub-quotas are reached and in the timing of the closure.

Alternative 1, which is the current regime, would close the entire shallow-water grouper fishery when either the red grouper quota or the overall shallow-water grouper quota is reached. **Alternative 2** would add to the current regime the consideration of gag quota for closure of the entire shallow-water grouper fishery. **Preferred Alternative 3** would provide for closure of a fishery whose quota is 80 percent taken, but would allow incidental harvest of the closed fishery until either the gag, red grouper, or shallow-water grouper quota is taken, upon which the shallow-water grouper fishery would close. Options for incidental harvest in the form of trip limits include 100 pounds (**Alternative 3a**), 200 pounds (**Preferred Alternative 3b**), and 500 pounds (**Alternative 3c**). The incidental harvest provision would apply only if the quota for the subject species is projected to be taken prior to the end of the fishing year. **Alternative 4** is similar to **Alternative 2**, but would provide for a gag trip limit commencing at the start of the fishing year. Options for trip limits include 300 pounds with sub-options of either 15 percent (**Alternative 4ai**) or 20 percent (**Alternative 4aii**) of the grouper caught in a trip, 300 pounds (**Alternative 4b**), 500 pounds (**Alternative 4c**), and 1,000 pounds (**Alternative 4d**). The percent sub-option would apply if harvests of the subject species exceed 300 pounds, with the base for the percent being the harvest of all grouper in a trip.

A fishery closure would have direct effects on the commercial sector, but in evaluating its economic effects the current model also took into account other relevant actions in this amendment, such as TAC, allocations, quotas, and size limit. Model results presented in Table 5.8.3.1 show the differing economic effects of the various alternatives. Among the alternatives, **Alternative 1** would result in the largest positive effects of about $5.3 million under a 3 percent discount rate, or $4.4 million under a 7 percent discount rate. Although **Alternative 1** is a no action alternative, it differs from the baseline by assuming the preferred alternatives for all other relevant Actions in this amendment. Specifically, it assumes the preferred TAC for gag and red grouper, preferred allocation ratio for gag and red grouper, preferred commercial quota for red, gag, and shallow-water grouper, and 18-inch size limit for red grouper. The positive result indicates that given the above-mentioned preferred alternatives in this amendment, the commercial fishery would be better off if the current quota closure were maintained. Although model simulation of **Alternative 1** indicates that for 2009 the gag quota would be reached between the first week of July and the last week of August, the entire shallow-water grouper fishery would remain open longer, since reaching the gag quota would not trigger a fishery-wide closure. Under this alternative, the shallow-water grouper quota would be reached around the second week of November. This relatively late closure, however, would not to negate the positive effects of an increase in the quota and reduction in size limit for red grouper. Model simulations of all alternatives also indicate that the gag quota would be the limiting factor in any potential quota closure.

All other alternatives would provide for a shallow-water grouper closure upon reaching the gag quota in addition to quotas for red grouper and shallow-water grouper. With the gag quota being the limiting factor, all other alternatives would impose trip limits in order to slow down the harvest of gag. All these other alternatives would result in overall negative economic effects. One exception is **Alternative 4c**, and more will be discussed about this alternative below. In the meantime, it is instructive to consider the alternatives in sequence.

Alternative 2 would result in the largest negative effects of about $15.4 million under a 3 percent discount rate, or $13.9 million under a 7 percent discount rate. Similar to case with Alternative 1, model simulation of Alternative 2 assumed the preferred alternatives for all other relevant Actions. With fishery-wide closure around July or August upon reaching the gag quota, the large negative economic effects of **Alternative 2** could be expected.

Under **Alternative 3a**, no fishery-wide closure would result as the gag quota would not be reached. For 2009, the 100-pound trip limit for gag would commence around May or June upon reaching 80 percent of the gag quota. This relatively low trip limit would not allow reaching the gag quota during the fishing year. However, it would be constraining enough on vessel catch and profitability as to result in overall negative effects of about $6.1 million under a 3 percent discount rate, or $5.6 million under a 7 percent discount rate. **Preferred Alternative 3b** is similarly structured as **Alternative 3a** but with a higher gag trip limit of 200 pounds. Again the trip limit would start around May or June upon reaching 80 percent of the gag quota. The higher trip limit for gag would improve the performance of the fishery so as to result in lower negative effects of about $5.1 million under a 3 percent discount rate, or $4.8 million under a 7 percent discount rate. This would be the case despite the expected fishery-wide closure upon reaching the gag quota sometime the first week of October or the first week of December. **Alternative 3c** is also similarly structured as the other two but now with a 500-pound trip limit. As with the other two alternatives, the trip limit would start around May or June. Under this much higher trip limit, a fishery-wide closure would ensue upon reaching the gag quota as early as the first week of August or as late as the second week of October. Hence, this alternative would result in larger negative effects of about $10.3 million under a 3 percent discount rate, or $9.5 million under a 7 percent discount rate.

All sub-options of **Alternative 4** would result in lower negative effects than the other alternatives, except **Alternative 1**. **Alternative 4** would provide for the same closure trigger as **Alternative 2** so that the significantly lower negative effects of **Alternative 4** can mainly be ascribed to the gag trip limit provision. Both **Alternative 4ai** and **Alternative 4aii** would constrain the gag harvest so that the gag quota would not trigger a fishery-wide closure. In both alternatives, the shallow-water grouper quota would be met. Fishery-wide closure would occur late in the first week of December for **Alternative 4ai** and early in the second week of December for **Alternative 4aii**. This closure difference of a few days would not result in substantial difference in vessel profitability but the difference in trip limits would. This generally explains why the adverse economic effects of **Alternative 4aii**, which would allow a higher trip limit, would be lower than those of **Alternative 4ai**. **Alternative 4b** would substantially constrain gag harvest so that the gag quota would not trigger a closure. However, the shallow-water grouper quota would be met sometime late in the second week or early in the third week of December. This relatively late closure of, or conversely longer open season for, the fishery would not compensate for the constraining effects of the gag trip limit so that **Alternative 4b** would result in larger economic loss than either **Alternative 4ai** or **Alternative 4aii**. **Alternative 4c** is different from the other sub-options of **Alternative 4** as it would result in positive economic effects of about $420 thousand under a 3 percent discount rate, or $159 thousand under a 7 percent discount rate. This alternative would still result in fishery-wide closure because of the shallow-water grouper quota (not gag quota) being reached in the first week of December. Benefits derived from a higher gag trip limit of 500 pounds would outweigh the negative effects of a relatively early closure. **Alternative 4d** would provide on average the highest trip limit among the **Alternative 4** sub-options. This alternative would trigger a fishery-wide closure due to the gag quota being met as early as the third week of August or as late as the third week of November. The relatively substantial negative effects of an early fishery-wide closure would outweigh the benefits of a higher gag trip limit.

Several generalizations can be made on the basis of the overall economic impacts of the various alternatives. First and quite obvious, the fishery would be better off if no closures were to occur, or if the closure were to occur, it should happen very late in the fishing year. Simulation results would show this to be the case with **Alternative 1** in which the closure trigger would only involve the red grouper and shallow-water grouper quotas. It should be noted that part of the reason for either trigger not to result in an early fishery closure would be the increase in red grouper quota. Second, a partial fishery closure as in **Alternatives 3 and 4** would provide a better economic scenario than a total fishery closure as in **Alternative 2**. Third, if the limiting gag quota were included as one of the closure triggers, some form of trip limits (or other measures) to slow down the harvest of gag would result in lower economic losses. Fourth, introduction of measures to slow down the harvest of gag early in the fishing year would produce lower economic losses than when such measures were introduced later in the year. Fifth, there appears to be some gag trip limit levels, such as the 500 pounds, that would tend to minimize the sum of negative effects from the gag trip limit and fishery closure. A relatively low trip limit, such as 100 pounds, would be too limiting as to result in larger economic losses although no fishery closure or a closure very late in the fishing year would occur. On the other hand, a relatively high trip limit, such as 1,000 pounds, would likely result in early fishery closure and thus larger economic losses.

Based on total economic effects, the various alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4c**, **Alternative 4d**, **Alternative 4aii**, **Alternative 4ai**, **Alternative 4b**, **Preferred Alternative 3b**, **Alternative 3a**, **Alternative 3c**, and **Alternative 2**. The use of either a 3 percent or 7 percent discount rate would not affect the ranking of alternatives.

As can be partly inferred from Table 5.8.3.1, the distributional pattern of effects by gear type would not be totally similar to that of the previous Actions. **Alternative 1** would provide the largest benefits, in dollar terms, to hook-and-line vessel trips, next to longline vessel trips, and then to trips with other gear types. Relative to the baseline, the effects would be only 1.7 percent for hook-and-line vessel trips whereas they would be 2.8 percent and 13.1 percent for longline and other gear trips, respectively. Without quota closure under **Alternative 1**, benefits from a higher red grouper quota and lower size limit would benefit most those trips using other gear types. It is highly possible in this situation that the lower gag quota would constrain the harvest of hook-and-line vessel trips more than trips using longline or other gear types, particularly that hook-and-line vessels harvested more gag than vessels using longlines or other gear types.

Alternative 2 would result in more losses, in dollar terms, to longline vessel trips, next to hook-and-line vessel trips, and last to vessel trips using other gear types. Relative to the baseline, losses would be 4.3 percent for hook-and-line vessel trips, 13.7 percent for longline vessel trips, and 13.9 percent for vessel trips using other gear types. With the gag quota triggering a fishery-wide closure around July or August, practically all vessel trips using any gear type would be significantly affected. While the losses from forgoing harvest of red grouper and other shallow-water grouper would be shared by all gear types, the heaviest toll would fall on longline vessel trips. These vessel trips would have to forgo harvest of red grouper more than trips using other gear types.

Although **Alternative 3a** would not result in fishery-wide closure, the 100-pound trip limit commencing May or June would be particularly limiting to longline vessel trips than to trips using other gear types. Longline vessel trips would lose more than others both in dollar and percentage terms. The trip limit would be beneficial to hook-and-line vessel trips and more so to trips using other gear. Positive results for other gear trips would come from more profitable trips, since vessel trips using hook-and-line and longline would be constrained by the trip limit. The higher trip limit under **Preferred Alternative 3b** would be more beneficial to hook-and-line vessel trips than other vessel trips. The effects on longline vessel trips would be a slight reduction in losses and the positive effects on other gear vessel trips would also be relatively small, relative to the effects of **Alternative 3a**. The higher trip limit under **Alternative 3c** would lead to an early closure of the shallow-water grouper fishery, and this would negatively affect longline vessel trips more than others. The negative effects on longline vessel trips would only be slightly lower than those of **Alternative 2**. This longer closure would also result in slightly negative impacts on trips using other gear types.

The distributional effects of all **Alternative 4** sub-options, with the possible exception of **Alternative 4d**, would generally be different from those of the other alternatives. Both **Alternatives 4ai and 4aii** would result in more losses to the hook-and-line vessel trips than to longline vessel trips. In both alternatives, more longline vessel trips would avail of the percent rather than the fixed pound trip limit. A 20 percent trip limit would even positively affect longline vessel trips, but hook-and-line vessel trips would still lose big under this higher percent trip limit. **Alternative 4b** would result in about the same percentage loss to both hook-and-line and longline vessel trips, indicating the highly constraining effects of a 300-pound trip limit on both types of trips. A higher fixed trip limit under **Alternative 4c** would reduce the negative effects of trip limits on hook-and-line vessel trips more than on longline vessel trips.

Alternative 4d would trigger a fishery-wide closure due to the gag quota being met as early as the third week of August or as late as the third week of November. Although the total effects of this alternative would be negative, the negative effects would only fall on longline vessel trips. The negative effects of fishery closure would not totally negate the relatively large positive effects of a high trips limit on hook-and-line vessel trips. Under all sub-options of **Alternative 4**, vessel trips using other gear types would positively benefit from the gag trip limit, indicating these vessel trips' highly competitive status under a gag trip limit.

Several general conclusions can be inferred from resulting distributional effects of the various alternatives. First, a long fishery closure would affect longline vessel trips more than trips using other gear types. Second, relatively low trip limits on gag would adversely affect hook-and-line vessel trips than trips using other gear types. Third, a variable trip limit, such as the percentage-based trip limit, would be more beneficial to longline vessel trips than hook-and-line vessel trips. Fourth, some form of trip limits on gag that would result in no fishery closure or closure very late in the fishing year would benefit trips using other gear types more than hook-and-line or longline vessel trips.

Table 5.8.3.1. Net present values of the effects of alternatives on the application of quota closures. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Hook and Line	Longline	Other Gears	Total
		3% Discount Rate		
Baseline	122,586	62,855	11,707	197,148
Alternative 1	2,076	1,741	1,528	5,345
Alternative 2	-5,184	-8,617	-1,623	-15,424
Alternative 3a	-1,198	-5,685	812	-6,071
Alternative 3b	-461	-5,512	833	-5,140
Alternative 3c	-2,864	-7,379	-87	-10,330
Alternative 4ai	-3,887	-157	1,661	-2,383
Alternative 4aii	-3,897	712	1,655	-1,530
Alternative 4b	-3,843	-1,980	1,663	-4,160
Alternative 4c	-292	-1,051	1,763	420
Alternative 4d	657	-3,013	1,276	-1,080
		7% Discount Rate		
Baseline	107,912	55,343	10,303	173,558
Alternative 1	1,644	1,456	1,332	4,432
Alternative 2	-4,767	-7,689	-1,456	-13,912
Alternative 3a	-1,222	-5,067	703	-5,586
Alternative 3b	-607	-4,920	719	-4,808
Alternative 3c	-2,740	-6,616	-105	-9,461
Alternative 4ai	-3,541	-195	1,451	-2,285
Alternative 4aii	-3,551	567	1,447	-1,537
Alternative 4b	-3,498	-1,787	1,453	-3,832
Alternative 4c	-398	-982	1,539	159
Alternative 4d	362	-2,769	1,099	-1,308

The geographic distributions of the effects of the various alternatives are presented in Table 5.8.3.2. **Alternative 1**, which would result in overall positive economic effects, would result in positive economic effects for all areas in Florida, but not in other areas. The largest positive effects of approximately $3.0 million, using a 3 percent discount rate, would occur in West-Central Florida, which would benefit most from the increase in red grouper quota and reduction in size limit for red grouper. The second area to benefit the most would be South Florida and the third one would be Northwest Florida. The slightly negative effects on other areas would possibly come from losing other species on trips which would become unprofitable when the shallow-water grouper fishery closed toward the end of the fishing year.

Alternative 2, which would result in an early fishery closure, would result in large negative effects on all areas, with West-Central Florida being hit hard the most. South Florida would come in next as the hardest hit area, followed by Northwest Florida, and lastly by areas outside of Florida. This distribution of effects would closely follow the importance of shallow-water grouper, particularly red grouper, in the respective areas.

Alternative 3a, which would not result in fishery-wide closure, would result in relatively large negative effects on all areas in Florida due to the low gag trip limit. Areas outside of Florida would slightly benefit from the non-closure of the shallow-water grouper fishery. P**referred Alternative 3b** would result in lower negative effects on all areas in Florida, relative to Alternative 3a, because of higher gag trip limit. Closure of the shallow-water grouper fishery late in the year would not totally negate the positive impacts of a relatively higher trip limit on areas outside of Florida. An early fishery closure under **Alternative 3c** would totally negate the positive effects of a higher trip limit, and this would be true for all areas.

As noted earlier, the overall negative effects of a gag trip limit implemented at the start of the fishing year would be lower than those when a trip limit was adopted late in the fishing year. This result is also true for the various geographic areas. Relative to all **Alternative 3** options, **Alternative 4ai** would result in lower negative effects on Northwest Florida and West-Central Florida. The negative effects on these two areas would be even lower under **Alternative 4aii**. Both **Alternative 4ai** and **Alternative 4aii** would result in positive effects on South Florida and areas outside of Florida. The negative effects of **Alternative 4b** on Northwest Florida and West-Central Florida would also be lower than those of any options for **Alternative 3**. South Florida and areas outside of Florida would still experience positive effects under **Alternative 4b**. A relatively higher trip limit under **Alternative 4c** would result in much lower negative effects on both Northwest Florida and West-Central Florida, and positive effects on South Florida and areas outside of Florida. The effects of an early fishery closure triggered by the gag quota under **Alternative 4d** would be reflected in the negative effects on all areas, except on areas outside of Florida. A somewhat interesting case is presented by the effects of the various Alternative 4 options on South Florida and areas outside of Florida. All Alternative 4 sub-options, except **Alternative 4d**, would result in positive effects on both areas. But in moving from one alternative to another, the positive effects would rise in one area but fall on the other. No ready explanation can be provided here.

Table 5.8.3.2. Net present values of the effects of alternatives on the application of quota closures. Baseline numbers are in absolute values and those for each alternative are differences from the baseline. Numbers are in thousand 2005 dollars.

	Rest of Gulf	Northwest FL	West-Cent FL	South FL	Total
			3% Discount Rate		
Baseline	74,331	39,227	49,667	33,923	197,148
Alternative 1	-80	574	2,965	1,886	5,345
Alternative 2	-444	-3,690	-7,237	-4,053	-15,424
Alternative 3a	120	-1,233	-3,380	-1,578	-6,071
Alternative 3b	48	-883	-2,815	-1,489	-5,139
Alternative 3c	-225	-2,518	-4,865	-2,722	-10,330
Alternative 4ai	213	-2,368	-1,305	1,076	-2,384
Alternative 4aii	197	-2,297	-727	1,298	-1,529
Alternative 4b	230	-2,468	-2,457	535	-4,160
Alternative 4c	195	-646	-179	1,050	420
Alternative 4d	24	-441	-636	-27	-1,080
			7% Discount Rate		
Baseline	65,380	34,560	43,761	29,858	173,559
Alternative 1	-77	404	2,484	1,621	4,432
Alternative 2	-399	-3,360	-6,528	-3,626	-13,913
Alternative 3a	99	-1,175	-3,088	-1,423	-5,587
Alternative 3b	32	-887	-2,603	-1,351	-4,809
Alternative 3c	-207	-2,336	-4,457	-2,462	-9,462
Alternative 4ai	179	-2,151	-1,231	917	-2,286
Alternative 4aii	165	-2,090	-726	1,112	-1,539
Alternative 4b	195	-2,237	-2,236	445	-3,833
Alternative 4c	164	-646	-250	890	158
Alternative 4d	11	-507	-722	-92	-1,310

Summary

Although by itself a fishery closure would have direct effects on the commercial sector, evaluation of its economic effects would still have to consider other relevant actions in this amendment, such as TACs, allocations, quotas, and size limit. Based on simulation results of the various alternatives several generalizations can be made. First, the fishery would be economically better off if no closures were to occur, or if a closure were to occur, it should happen very late in the fishing year as in **Alternative 1**. Second, a partial fishery closure as in **Alternatives 3 and 4** would provide a better economic scenario than a total fishery closure as in **Alternative 2**. Third, if the limiting gag quota were included as one of the closure triggers, some form of trip limits (or other measures) to slow down the harvest of gag would result in lower economic losses. Fourth, introduction of measures to slow down the harvest of gag early in the fishing year would produce lower economic losses than when such measures were introduced later in the year. Fifth, there appears to be some gag trip limit levels, such as the 500 pounds, that would tend to minimize the sum of negative effects from the gag trip limit and fishery closure.

Based on total economic effects, the various alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4c**, **Alternative 4d**, **Alternative 4aii**, **Alternative 4ai**, **Alternative 4b**, **Preferred Alternative 3b**, **Alternative 3a**, **Alternative 3c**, and **Alternative 2**. The use of either a 3 percent or 7 percent discount rate would not affect the ranking of alternatives.

5.8.3.2 Direct and Indirect Effects on the Social Environment

Alternative 1 is no action. The commercial shallow-water grouper fishery closes when either the red grouper quota or the shallow-water grouper quota is reached, whichever comes first. In the short term, this alternative will not have any impacts on the commercial shallow-water grouper fishery because it does not change the way closures are determined now. If the red grouper allocation increases while the gag allocation decreases, gag grouper may continue to be undergoing overfishing and the stocks would not be rebuilt. This could require stricter regulations in the future, such as long closures, reduced TACs, etc., to correct for the overfishing which would have a negative impact on the fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries. Negative impacts could include loss of income for the captain and crew, and loss of jobs in the processing sector in communities such as Madeira Beach, St. Petersburg, and Panama City, Florida which are substantially involved in this fishery.

With Alternative 2 the commercial shallow-water grouper fishery would close when either the red grouper quota, gag quota, or shallow-water grouper quota is reached. This alternative includes the gag grouper quota as a trigger for closure. This may cause an early closure of the shallow-water grouper even if the red grouper or shallow-water grouper quota has not been met. If there is an early closure, due to quota for gag grouper being met, then fishermen will miss out on the opportunity to harvest the rest of the quota for red grouper or shallow-water grouper. This will result in a reduction in harvest which could lead to a loss of income for the captain and crew as well as processors and dealers of grouper in communities such as Madeira Beach, St. Petersburg, and Panama City, Florida which are substantially involved in this fishery.

Alternative 3: when 80 percent of the gag or red grouper quota is reached or projected to be reached, the directed fishery for the applicable species would be closed; however, and incidental harvest trip limit would be allowed until either the gag, red grouper, or shallow-water grouper quota is reached or projected to be reached, upon which the shallow-water grouper fishery would close. The incidental harvest trip limit provision would not be implemented unless the quota for the applicable species is projected to be harvested prior to the end of the fishing year. If implemented, the incidental harvest trip limit would be: Option A: 100 pounds, Preferred Option B: 200 pounds, or Option C: 500 pounds.

This alternative would allow fishermen to continue to harvest incidental catch of gag or red grouper at a given level once 80 percent of the gag or red grouper quota is reached and the harvest of that species closed. This alternative would only be applicable if it is projected that the quota would be reached before the end of the year. This would allow fishermen to continue to harvest a certain amount of the applicable species of the fish they catch while fishing for other species in the complex. This would provide more income for the fishermen and more fish for the processors to process. It would also prevent the waste of fish that would be returned to the water but would not survive. Option A would be the least beneficial to the fishermen and processing sector in the short term because they would be allowed to keep less incidental catch than with Option B or C. Under Option A, the quota may be reached slower than under Option B or C. Preferred Option B would allow fishermen to keep 200 pounds which is more than A but less than C. Option C would allow fishermen to keep the most incidental catch, but the quota could be reached sooner than in Option A or B.

Summary
In the short term, Alternative 1 will not have any impacts on the commercial shallow-water grouper fishery because it does not change the way closures are determined now. Alternative 2 would close the shallow-water grouper fishery if the quota of any of the individual species is met. This would prevent fishermen from harvesting at the optimum yield and could reduce the income they would have made if they could have harvested the full quota of the other species. This could have a negative impact on the processors and dealers who would have less fish from the other species in the shallow-water grouper complex. Alternative 3 would allow fishermen to continue to harvest incidental catch of gag or red grouper at a given level once 80 percent of the gag or red grouper quota is reached and the harvest of that species closed. This alternative would only be applicable if it is projected that the quota would be reached before the end of the year. This would allow fishermen to continue to harvest a certain amount of the applicable species of the fish they catch while fishing for other species in the complex. Option A would allow fishermen to keep 100 pounds of incidental catch, less than Preferred Option B or Option C. The quota may be met slower under Option A. Preferred Option B would allow fishermen to keep 200 pounds, more than Option A, but less than Option C. Option C would allow fishermen to keep 500 pounds of incidental catch but the quota could be met sooner under this option than under Option A or Preferred Option B.

5.8.4 Direct and Indirect Effects on Administrative Environment

Section 1.4 outlines the history of management of grouper in the Gulf. Size limits, commercial Gulf reef fish permits, trip limits, quotas, season closures, and area closures are currently used to regulate the commercial harvest of red snapper. The purpose of applying quota closures would be to constrain the commercial SWG harvest to its allocation under the TACs selected in Actions 3 and 4. **Alternatives 1-4** would require administrators to make minor adjustments to the Reef Fish FMP. These alternatives fall within the scope and capacity of the current management system which monitors quotas and closes fisheries as quotas are met. These actions are not expected to significantly affect the administrative environment.

Alternative 1 would continue the current quotas and not change current management practices; therefore, no changes from current quota monitoring would be needed. **Alternative 2, Preferred Alternative 3**, and **Alternative 4** would require additional monitoring of the SWG complex by breaking out gag landings. This would entail inseason monitoring of trip ticket data for these two categories and would increase the administrative burden of grouper management. However, this increase should be minimal because these types of activities already take place and the system for monitoring grouper quotas already exists. **Preferred Alternative 3** and **Alternative 4** would require increased enforcement to ensure commercial fishermen were restricting their landings of incidental harvest grouper once the trigger has been met.

Because **Alternative 2, Preferred Alternative 3**, and **Alternative 4** would require monitoring gag landings and this species is more likely to reach its respective quota, there is a greater chance this segment of the fishery may need to be closed. Thus the chance activities associated with quota closures such as filing a *Federal Register* notice, sending Fishery Bulletins, and sending press releases to inform the public are greater. Consequently, the adverse effects to the administrative environment from these alternatives are greater than **Alternative 1**.

5.9 Action 9. Recreational Harvest of Gag and Red Grouper

5.9.1 Direct and Indirect Effects on Physical Environment

Fishery management actions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat, either through gear impacts to bottom habitat or through the incidental harvest of bottom habitat. 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 (see Table 3.2.2.1).

The primary effects of the recreational grouper fishery 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. **Alternative 1** would maintain status quo regulations, which include minimum size limits, bag limits, and a closed season. Direct effects resulting from **Alternative 1** include physical damage to habitat associated with hook-and-line tear-offs and abrasions, and anchoring (Barnette 2001). Long-term indirect effects would result if hook-and-line gear is not removed and causes marine life to become entangled or overgrown with algae (Hamilton 2000; Barnette 2001). In the short-term, the effects of **Alternative 1** are not likely to be different than current fishery conditions.

Alternative 2 would modify gag, red grouper, and aggregate grouper bag limits and establish a three-month closed season during winter and early spring. This alternative could result in short-term beneficial effects to the physical environment if anglers stop fishing once reaching their gag bag limit or aggregate bag limit. Because the grouper aggregate bag limit would be reduced to three, fishing effort may be slightly reduced for those trips that typically catch 3 or more grouper per angler. Extension of the closed season would likely deter recreational effort because few reef fish species (e.g., vermilion snapper, greater amberjack, gray snapper) would be available to target when the grouper fishery is closed. Overall, the benefits to the physical environment of **Alternative 2** are expected to be small and unquantifiable when compared to **Alternatives 1.**

Alternative 3 would modify the gag and red grouper bag limits, reduce the aggregate bag limit, and close the recreational grouper fishery for three months. Effects on the physical environment for this alternative are expected to be similar to **Alternative 2**. Few trips on average harvest more than three grouper per angler per trip, so the aggregate bag limit is not expected to be a limiting factor affecting effort. Similar to the closed season in **Alternative 2**, recreational effort may be reduced because few species would be available to target. The benefits of **Alternative 3** to the physical environment are small and similar to **Alternative 2**.

Alternative 4 would modify gag, red grouper, and aggregate grouper bag limits and establish the third longest recreational closed season of the alternatives proposed. The gag bag limit would be two fish and is expected to affect 2-4 percent of all trips (SERO 2007). Because few trips are expected to be affected by this bag limit, effort and habitat interactions are not likely to be greatly reduced. The 4 ½ month closed season is expected to significantly deter recreational fishing effort. As mentioned above, few reef fishes would be available to target during the closed season. **Alternative 4** is expected to provide greater benefit to the physical environment than **Alternatives 1-3,** and **7**, but slightly less benefits than **Alternatives 5** and **6**. However, benefits are expected to be small and unquantifiable relative to the status quo because the recreational grouper fishery represents only a small portion of the overall reef fishery and vertical line gear has less impacts than other, less selective gear types (e.g., longlines, traps, trawls).

Alternatives 5 would not specify species specific bag limits for red grouper or gag, but would reduce the aggregate grouper bag limit to three and extend the closed season from January 1 to May 21. As mentioned above, the lower aggregate bag limit may reduce effort and corresponding impacts to the physical environment for those trips that typically harvest three or more fish. However, a relatively small number of trips would be affected by this action. The 141 day closed season would deter fishing trips from occurring, especially since few other species are open during the late winter and spring. This would reduce fishing effort and habitat-gear interactions. Benefits to the physical environment would be small because of the dominant geartype used (i.e., vertical line gear) and the percentage of effort/landings the grouper fishery represents relative to overall Gulf-wide fishing effort/landings.

Alternative 6 would reduce the aggregate grouper bag limit to three, reduce the gag size limit to 20 inches TL, eliminate the red grouper bag limit, and establish a five-month closed season (Dec 1 – Apr 30). The lower gag bag limit and aggregate grouper bag limit would reduce fishing effort and habitat-gear interactions if fishermen stop fishing once obtaining their bag limits. However, because few trips currently harvest the three fish aggregate bag limit, this action is not expected to greatly reduce fishing effort. The one fish gag bag limit may deter recreational anglers from conducting fishing trips, especially private anglers. If this occurs than fishing effort and habitat-gear interactions would be reduced. Similarly, the long closed season would deter effort and benefit the physical environment. **Alternative 6** has the longest closed season of any of the alternatives considered. Because this closed season occurs more during winter than **Alternatives 4** or **5**, it may have slightly less benefits because fishing effort is lower in winter and increases in late spring through summer. Overall, benefits to the physical environment are expected to be similar for all alternatives considered. Alternatives with the longest grouper closed seasons are expected to have the greatest benefits to the physical environment.

Preferred Alternative 7 would reduce the aggregate grouper bag limit to four, establish a bag limit of two gag, increase the red grouper bag limit to two, and establish a February 1 to March 31 closure for the recreational SWG fishery. The lower gag bag limit and aggregate grouper bag limit may reduce fishing effort and habitat-gear interactions if fishermen stop fishing once obtaining their bag limits. However, similar to the other alternatives this action is not expected to greatly reduce fishing effort because few trips currently harvest four fish per angler. Extension of the closed season would deter effort and benefit the physical environment. **Alternative 7(a)** and **Preferred Alternative 7(e)** would extend the existing closed season by 17 to 31 days, while **Alternatives 7(b-d)** would establish 61-62 day closed seasons during summer or fall. **Alternative 7(b)**, which would establish a June-July closed season is likely to affect fishing effort the most, since recreational effort peaks during the summer months. Therefore, this alternative would likely have the greatest benefit to the physical environment relative to the other sub-options in **Alternative 7**. With the exception of **Alternative 1**, **Alternative 7(a-e)** has the shortest closed seasons of any of the alternatives considered. Overall, benefits to the physical environment are expected to be greater than **Alternative 1**, but less than **Alternatives 2-6**. Alternatives with the longest grouper closed seasons are expected to have the greatest benefits to the physical environment.

5.9.2 Direct and Indirect Effects on the Biological / Ecological Environment

Alternative 1 would maintain status quo recreational regulations, which include a 20-inch TL red grouper minimum size limit, 22-inch TL gag minimum size limit, one red grouper bag limit, 5-grouper aggregate bag limit, and February 15 to March 15 recreational grouper closure. Gag fishing mortality has been stable and well above F_{MAX} since the early 1980s. High fishing mortality rates and lower gag recruitment in the 1980s resulted in SSB remaining relatively low when compared to historical levels. Beginning in the mid-1990s, multiple strong year-classes of gag entered the fishery allowing SSB to increase until 2003 when SSB began to decline. SSB currently is 99 percent of SSB at Fmax. In contrast, the latest red grouper stock assessment indicates fishing mortality is close to the fishing mortality rate producing OY and SSB has increased, due once again to strong recruitment, since the early 1990s. Landings, abundance indices indicate red grouper catch rates and landings have declined since 2004/2005. SSB in 2005 was well above MSST and 1.27 times greater than SSB at F_{MSY}.

The 20-inch red grouper size limit and 5-fish aggregate bag limit were implemented in 1990. The 22-inch gag minimum size limit was implemented in 2000 to reduce fishing mortality in the recreational fishery. In 2005, the one-red grouper bag limit was first implemented through temporary regulations to reduce recreational harvest after very high landings were reported in 2004. The February 15 to March 15 recreational grouper closure was implemented in 2006 and the fishery was closed for the first time in 2007. The closure applies to gag, black, and red grouper and is intended to reduce fishing mortality and minimize bycatch, especially since these three species co-occur with one another and are commonly caught on the same fishing trips. The closure was estimated to reduce gag harvest by 8 percent and red grouper harvest by 4-5 percent. Maintaining status quo gag regulations will allow overfishing to continue, potentially resulting in decreases in population abundance and less fish for anglers to catch and land. Overfishing will also reduce the size and age distribution of fish in the population. In comparison, maintaining red grouper regulations may result in forgone recreational yield since current regulations may prevent anglers from harvesting TAC necessary to achieve OY. Although this would provide a net biological benefit to the stock and reduce the likelihood of overfishing occurring, recreational red grouper anglers would experience economic losses. Under status quo conditions, dead discards in both the directed gag and red grouper recreational fisheries would remain high. During 2000-2004, an average of 561 thousand gag and 271 thousand red grouper were discarded dead by recreational anglers (SEFSC 2007; SEDAR 12 2007).

Alternative 2 would eliminate the recreational red grouper bag limit, establish a one gag grouper bag limit, establish a three month recreational closure (January 15 to April 15), and reduce the grouper aggregate bag limit to three fish. **Alternative 2** is estimated to reduce gag harvest by 45 percent. This reduction would end overfishing of gag immediately and reduce harvest to the Council's target fishing mortality level (F_{OY}). This reduction in fishing mortality would allow SSB to gradually increase over time to SSB_{OY}. Reducing fishing mortality would allow more gag to survive to older ages and larger sizes. Red grouper harvest would increase by 14 percent, increasing the probability recreational anglers would harvest their portion of the TAC. The three month closure would include important spawning seasons for gag and red grouper, as well as black grouper. Gag spawn in the Gulf of Mexico from mid-January until mid-April, with a peak in spawning during March (SEDAR 10 2006). Red grouper spawn from February until mid-July, with peak spawning occurring in March, April and May (Fitzhugh et al. 2006). The closure would protect all eight shallow-water grouper species during peak spawning periods for gag and red grouper. Prohibiting fishing during the spawning season would allow more fish to successfully spawn and reproduce before being harvested. The lower gag bag limit would also reduce fishing mortality. It is estimated a one-fish gag bag limit would reduce harvest by 26.3 percent. This bag limit would affect 14-17 percent of fishing trips, which reported landing on average greater than one gag per angler per trip (SERO 2007). The three grouper aggregate bag (includes shallow- and deep-water grouper) limit is only expected to affect a small percentage of all trips (4-7 percent; SERO 2007) because few trips currently retain 3 or more grouper per angler. Eliminating the red grouper bag limit will reduce bycatch for those trips that discard red grouper after the bag limit is met. Similarly, discards are expected to increase for gag if anglers continue fishing after the one fish bag limit is met. Extending the closed season may also negatively affect bycatch if trips continue targeting other reef fishes co-occurring in similar areas as shallow-water grouper. Collectively, the measures proposed in **Alternative 2** are estimated to increase gag dead discards (relative to status quo) by as much as 9.2 percent and decrease red grouper dead discards (relative to status quo) by 3 percent.

Alternative 3 would double the recreational red grouper bag limit to two fish per angler, establish a one gag grouper bag limit, reduce the aggregate grouper bag limit to three fish, eliminate the red grouper bag limit, and establish a three month recreational closure (February 1 to April 30). **Alternative 3** is estimated to reduce gag harvest by 46 percent and increase red grouper harvest by 8 percent. Like **Alternative 2**, this alternative would end overfishing of gag, allowing SSB to increase and the size and age-structure of the population to expand. The closure would protect all eight shallow-water grouper species during peak spawning periods for gag and red grouper (see **Alternative 2** discussion above). The one gag bag limit would affect a small percentage of trips (14-17 percent; SERO 2007) that currently land greater than one fish per angler. A three grouper aggregate bag limit is only expected to affect a small percentage of all trips (4-7 percent; SERO 2007) because few trips currently retain 3 or more grouper per angler.

The elimination of the red grouper bag limit would allow red grouper harvest to expand and increase the likelihood that anglers harvest OY. However, the increase in harvest resulting from the bag limit is partially offset by an extension to the closed season, which would apply to red grouper in addition to other shallow-water grouper species. **Alternative 3** is slightly more conservative than **Alternative 2** and would constrain recreational red grouper harvest more, especially during high periods of recruitment. The more restrictive measures would therefore increase the likelihood that overfishing would not occur, but may result in some forgone yield if they are not liberal enough to allow OY to be met. Collectively, the measures proposed in **Alternative 3** are estimated to increase bycatch (relative to status quo) of gag by as much as 9.4 percent and decrease bycatch of red grouper by 1 percent.

Alternative 4 would establish a two gag grouper bag limit, reduce the aggregate grouper bag limit at three fish, eliminate the red grouper bag limit, and establish a 4½ month recreational shallow-water closure (January 1 to May 15). **Alternative 4** is estimated to reduce gag harvest by 45 percent and reduce red grouper harvest by 21 percent. This alternative would end overfishing of gag, allowing SSB to increase and the size and age-structure of the population to expand. The two gag bag limit would allow recreational anglers to retain on average more fish per trip, but would require a longer closed season to achieve the necessary reductions in harvest. Approximately 2-4 percent of trips during 2003-05 landed on average more than 2 gag per angler (SERO 2007). There would be only a small effect on fishing trips from the aggregate bag limit, since few trips harvest on average more than 3 grouper per angler. Elimination of the red grouper bag limit would allow harvest to expand and increase the likelihood that anglers harvest OY. However, this increase in harvest would be offset entirely by extension of the closed season, resulting in a net reduction in total harvest. Relative to the other alternatives in Action 9, **Alternative 4** is the most environmentally conservative for red grouper. The alternative would likely result in forgone yield, would have the highest probability of preventing red grouper overfishing, and would potentially prevent OY from being achieved in the recreational fishery on a continuing basis. The seasonal closure would be the longest of any of the alternatives in Action 9 and provide the longest period of protection for shallow-water grouper. The closure would cover nearly the entire spawning season for all three species. Overall, the measures in **Alternative 4** are estimated to increase gag dead discards by as much as 9.2 percent and increase red grouper dead discards by 2 percent.

Alternative 5 would maintain the gag minimum size limit at 22-inches TL, reduce the aggregate grouper bag limit to three fish, eliminate the red grouper bag limit, and expand the recreational closure from January 1 through May 21. **Alternative 6** would reduce the gag minimum size limit to 20-inches TL, establish a one gag bag limit, reduce the aggregate grouper bag limit to three fish, and expand the recreational closed season from December 1 through April 30. Both alternatives would reduce gag harvest by 45 percent or more. **Alternative 6** would allow a 1 percent increase in recreational red grouper harvest, while **Alternative 5** would decrease red grouper harvest by 5 percent. These alternatives would result in closed seasons of 141 and 151 days, respectively. The closed seasons would occur during critical spawning seasons for both gag and red grouper. Both gag and red grouper spawn during late winter and spring. Establishing a closed season during this time would reduce recreational shallow-water grouper landings and discards and allow more grouper to survive and spawn before being harvested. Because gag aggregate to spawn, the spawning closure would also protect gag during a vulnerable life history stage. Applying the closure to all shallow-water grouper rather than a single species will reduce bycatch and help the Council to better achieve the objectives of National Standard 9. If the closure is only applied to a single species, such as gag, then bycatch may compromise the Council's ability to control fishing mortality and end overfishing. For example, in November-December 2005 when only the red grouper recreational fishery was closed, MRFSS estimated nearly 100,000 red grouper were released by recreational anglers, resulting in 10,000 dead discards.

Lowering the gag minimum size limit is estimated to reduce gag discards by approximately 14 percent. However, the decrease in discards would allow CPUE to increase, especially in those sectors that on average harvest less than the proposed gag bag limit. The lower minimum size limit combined with a one fish gag bag limit is estimated to reduce gag recreational harvest by 9 percent. Ortiz (2007) estimated that lowering the minimum size limit by 2-inches would decrease dead discards per recruit (in pounds) by 50 percent or more and decrease yield-per-recruit by 6 percent. These decreases are based on lowering both the commercial and recreational minimum size limit of 20-inches TL. Gag are mature by 3.7 years of age and 23 inches TL (58.5 cm TL). Therefore, lowering the minimum size limit may reduce the number of gag that reach sexual maturity and spawn. Ortiz (2007) estimated that reducing the gag minimum size limit to 20-inches fishery wide would reduce SPR from 35.8 percent (status quo) to 33.2 percent.

The lower aggregate bag limit is estimated to affect a small fraction of trips, but would provide additional protection for shallow-water grouper species without species-specific bag limits. Both **Alternatives 5** and **6** would eliminate the red grouper bag limit and **Alternative 5** would not specify a gag bag limit. Lowering the aggregate bag limit from five to three fish would allow the Council to constrain fishing mortality, especially for gag and red grouper, which represent approximately 90 percent or more of the shallow-water grouper landings.

Preferred Alternative 7 would reduce the aggregate grouper bag limit to four fish, increase the red grouper bag limit to two fish, establish a two gag bag limit, and establish a 45-62 day closed season. Proposed closed seasons would either be during late winter and early spring (**Alternative 7(a)** and **Preferred Alternative 7(e)**), during summer (**Alternative 7(b)**), or during late fall and early winter (**Alternatives 7(c)** and **7(d)**). **Preferred Alternative 7(e)** would extend the existing closed season to include February 1 through March 31. The closed season would also be applied to all SWG and not just gag, black grouper, and red grouper. The two month closure would include important spawning seasons for gag, black grouper, and red grouper. Gag spawn in the Gulf of Mexico from mid-January until mid-April, red grouper spawn during March through May, and black grouper spawn during December through March. Applying the closure to all shallow-water grouper rather than a single species will reduce bycatch and help the Council to better achieve the objectives of National Standard 9. The effects of the two gag bag limit would be similar to those described in **Alternative 4** and the effects of the two red grouper bag limit would be similar to those described in **Alternative 3**. Reducing the aggregate bag limit from 5 to 4 is estimated to affect only 2-4 percent of all angler trips. **Alternative 7** would end overfishing of gag, but would result in the smallest reduction (23-26 percent) of any of the alternatives considered in Action 9, except **Alternative 1**. The Council expects additional reductions from reduced fishing effort will contribute toward meeting the 41 percent F_{OY}

reduction target. In 2007, offshore fishing effort in the EEZ off West Florida had declined by 12 percent relative to the 2004-06 baseline and 25 percent relative to the 2004 West Florida EEZ effort level.

During the June 2008 Council meeting, the Council requested NOAA Fisheries Service prepare an interim rule for 2009 to address gag overfishing. The Council requested the interim rule be based on the preferred management measures for gag in **Preferred Alternative 7(e)**. A two fish gag bag limit and a seasonal closure from February 1 to March 31 would be implemented under the interim rule. These regulations are estimated to reduce gag harvest by approximately 26 percent. The seasonal closure would only pertain to gag from February 1-14 and March 15-31. From February 15-March 14, the existing recreational seasonal closure for red grouper, black grouper, and gag would remain in place. Because interim regulations would only pertain to gag for approximately half of the seasonal closure, bycatch of gag may be higher than described above if fishermen choose to fish for red grouper, black grouper, or other shallow water grouper during early February or late March when gag is closed. The interim rule would not include measures for adjusting the red grouper bag limit or the aggregate bag limit; therefore, effects on the biological environment would be similar to those described in **Alternative 1** (no action).

5.9.3 Direct and Indirect Effects on Economic/Social Environment

5.9.3.1 Direct and Indirect Effects on the Economic Environment

Action 9 considers recreational management measures that would reduce recreational gag grouper landings by at least 46 percent. Adjustments to recreational red grouper landings considered could increase landings by as much as 14 percent or decrease landings by up to 21 percent. Measures under consideration include adjustments to the minimum size limit, species-specific and aggregate bag limits, and to the recreational fishing season, including seasonal closures. The expected economic effects of these measures are analyzed in this section.

The evaluation of economic impacts expected to result from recreational management measures considered in this amendment relies on computed changes in economic values. Changes in economic values resulting from recreational management measures are composed of producer surplus changes affecting charterboat and headboat operators, consumer surplus changes experienced by for-hire consumers and, consumer surplus changes in the private recreational sector. Expected changes in consumer and producer surpluses were estimated based on methods and assumptions detailed in the evaluation of alternative gag and red grouper allocations (Section 5.5.3.1). Therefore, the same limitations apply. However, it is worth reemphasizing that these estimated changes in economic value are approximations for the welfare changes expected to result from management alternatives considered. These estimates are exclusively presented for the purpose of ranking the management alternatives under consideration.

Alternative 1 would maintain existing gag and red grouper regulations. Minimum size limits for red and gag (20 inch TL and 22 inch TL, respectively), the February 15 to March 15 recreational closure for gag, red grouper, and black grouper, the recreational bag limit for red grouper of 1 fish per person per day within the 5-grouper aggregate bag limit would remain in effect (336 day season). As the no action alternative, **Alternative 1** is not associated with changes in economic value.

Alternative 2 would reduce gag landings by 45 percent and increase red grouper landings by 14 percent, yielding a 274 day recreational season. **Alternative 2** would implement a gag bag limit of 1 fish per person per day within the aggregate bag limit, an aggregate grouper bag limit of 3 fish per person, and a January 15 through April 15 closed season on shallow-water grouper. Relative to the status quo, the decrease in gag harvest is expected to result in a $2.80 million decrease in economic value. Gains in economic value expected from the 14 percent increase in red grouper harvest are estimated at $ 0.35 million, approximately. For gag grouper, expected changes in recreational landings and effort for the charter, private, and, headboat sectors are presented in Table 5.9.3.1; corresponding consumer and producer surplus measures and changes in economic values are provided in Table 5.9.3.2. Tables 5.9.3.3 and 5.9.3.4, present the same information for red grouper. Aggregate net changes in surpluses and economic values expected to result from management alternatives considered in this action are provided in Table 5.9.3.5. Net changes in economic value expected from **Alternative 2** are estimated at $2.42 million, approximately.

Table 5.9.3.1: Gag Recreational Landings and Target Effort for the Charter, Private and Headboat Sectors for Management Alternatives in Action 9

GAG	Charter			Private			Headboat		
	Landings		Target	Landings		Target	Landings		Target
	Pounds	Fish	Effort	Pounds	Fish	Effort	Pounds	Fish	Effort
Alternative 1	**779,400**	**98,233**	**21,470**	**2,573,752**	**362,500**	**263,754**	**110,848**	**16,065**	**7,287**
Alternative 2	428,670	54,028	11,808	1,415,564	199,375	145,065	60,966	8,836	4,008
Alternative 3	420,876	53,046	11,594	1,389,826	195,750	142,427	59,858	8,675	3,935
Alternative 4	428,670	54,028	11,808	1,415,564	199,375	145,065	60,966	8,836	4,008
Alternative 5	428,670	54,028	11,808	1,415,564	199,375	145,065	60,966	8,836	4,008
Alternative 6	420,876	53,046	11,594	1,389,826	195,750	142,427	59,858	8,675	3,935
Alternative 7-a	600,138	75,639	16,532	1,981,789	279,125	203,091	85,353	12,370	5,611
Alternative 7-b	576,756	72,692	15,888	1,904,576	268,250	195,178	82,028	11,888	5,393
Alternative 7-c	584,550	73,675	16,102	1,930,314	271,875	197,816	83,136	12,049	5,466
Alternative 7-d	576,756	72,692	15,888	1,904,576	268,250	195,178	82,028	11,888	5,393
Alternative 7-e	576,756	72,692	15,888	1,904,576	268,250	195,178	82,028	11,888	5,393

Table 5.9.3.2: Consumer and Producer Surpluses, and Economic Value Associated with Gag Management Alternatives (Action 9)

GAG	Charter		Private	Headboat		Economic Value (EV)
	Surplus		Surplus	Surplus		
	Consumer	Producer	Consumer	Consumer	Producer	
Alternative 1	$367,391	$3,898,307	$1,355,751	$60,083	$480,968	$6,162,501
Alternative 2	$202,065	$2,144,069	$745,663	$33,046	$264,533	$3,389,376
Difference 2	-$165,326	-$1,754,238	-$610,088	-$27,037	-$216,436	-$2,773,125
Alternative 3	$198,391	$2,105,086	$732,106	$32,445	$259,723	$3,327,750
Difference 3	-$169,000	-$1,793,221	-$623,645	-$27,638	-$221,245	-$2,834,750
Alternative 4	$202,065	$2,144,069	$745,663	$33,046	$264,533	$3,389,376
Difference 4	-$165,326	-$1,754,238	-$610,088	-$27,037	-$216,436	-$2,773,125
Alternative 5	$202,065	$2,144,069	$745,663	$33,046	$264,533	$3,389,376
Difference 5	-$165,326	-$1,754,238	-$610,088	-$27,037	-$216,436	-$2,773,125
Alternative 6	$198,391	$2,105,086	$732,106	$32,445	$259,723	$3,327,750
Difference 6	-$169,000	-$1,793,221	-$623,645	-$27,638	-$221,245	-$2,834,750
Alternative 7-a	$279,217	$2,962,714	$1,030,371	$45,663	$365,536	$4,683,501
Difference 7-a	-$88,174	-$935,594	-$325,380	-$14,420	-$115,432	-$1,479,000
Alternative 7-b	$271,870	$2,884,747	$1,003,256	$44,461	$355,917	$4,560,251
Difference 7-b	-$95,522	-$1,013,560	-$352,495	-$15,622	-$125,052	-$1,602,250
Alternative 7-c	$275,543	$2,923,731	$1,016,813	$45,062	$360,726	$4,621,876
Difference 7-c	-$91,848	-$974,577	-$338,938	-$15,021	-$120,242	-$1,540,625
Alternative 7-d	$271,870	$2,884,747	$1,003,256	$44,461	$355,917	$4,560,251
Difference 7-d	-$95,522	-$1,013,560	-$352,495	-$15,622	-$125,052	-$1,602,250
Alternative 7-e	$271,870	$2,884,747	$1,003,256	$44,461	$355,917	$4,560,251
Difference 7-e	-$95,522	-$1,013,560	-$352,495	-$15,622	-$125,052	-$1,602,250

Table 5.9.3.3: Red Grouper Recreational Landings and Target Effort for the Charter, Private and Headboat Sectors for Management Alternatives in Action 9

RED	Charter			Private			Headboat		
	Landings		Target	Landings		Target	Landings		Target
	Pounds	Fish	Effort	Pounds	Fish	Effort	Pounds	Fish	Effort
Alternative 1	381,510	60,048	9,676	1,149,240	171,528	99,459	39,250	7,136	2,417
Alternative 2	434,921	68,455	11,031	1,310,134	195,542	113,383	44,745	8,135	2,755
Alternative 3	412,031	64,852	10,450	1,241,179	185,251	107,415	42,390	7,707	2,610
Alternative 4	301,393	47,438	7,644	907,900	135,507	78,572	31,008	5,638	1,909
Alternative 5	362,435	57,046	9,192	1,091,778	162,952	94,486	37,288	6,780	2,296
Alternative 6	385,325	60,649	9,773	1,160,732	173,244	100,453	39,643	7,208	2,441
Alternative 7-a	453,997	71,457	11,515	1,367,596	204,119	118,356	46,708	8,492	2,876
Alternative 7-b	358,619	56,445	9,096	1,080,286	161,237	93,491	36,895	6,708	2,272
Alternative 7-c	434,921	68,455	11,031	1,310,134	195,542	113,383	44,745	8,135	2,755
Alternative 7-d	453,997	71,457	11,515	1,367,596	204,119	118,356	46,708	8,492	2,876
Alternative 7-e	446,367	70,256	11,321	1,344,611	200,688	116,367	45,923	8,350	2,827

Table 5.9.3.4: Consumer and Producer Surpluses, and Economic Value Associated with Red Grouper Management Measures (Action 9)

Red Grouper	Charter		Private	Headboat		Economic Value (EV)
	Surplus		Surplus	Surplus		
	Consumer	Producer	Consumer	Consumer	Producer	
Alternative 1	$224,580	$1,451,430	$641,516	$26,690	$159,493	$2,503,709
Alternative 2	$256,021	$1,654,631	$731,328	$30,427	$181,822	$2,854,229
Difference 2	$31,441	$203,200	$89,812	$3,737	$22,329	$350,519
Alternative 3	$242,547	$1,567,545	$692,837	$28,825	$172,252	$2,704,006
Difference 3	$17,966	$116,114	$51,321	$2,135	$12,759	$200,297
Alternative 4	$177,418	$1,146,630	$506,798	$21,085	$125,999	$1,977,930
Difference 4	-$47,162	-$304,800	-$134,718	-$5,605	-$33,493	-$525,779
Alternative 5	$213,351	$1,378,859	$609,440	$25,356	$151,518	$2,378,524
Difference 5	-$11,229	-$72,572	-$32,076	-$1,335	-$7,975	-$125,185
Alternative 6	$226,826	$1,465,945	$647,931	$26,957	$161,088	$2,528,747
Difference 6	$2,246	$14,514	$6,415	$267	$1,595	$25,037
Alternative 7-a	$267,250	$1,727,202	$763,404	$31,761	$189,796	$2,979,414
Difference 7-a	$42,670	$275,772	$121,888	$5,071	$30,304	$475,705
Alternative 7-b	$211,105	$1,364,345	$603,025	$25,089	$149,923	$2,353,487
Difference 7-b	-$13,475	-$87,086	-$38,491	-$1,601	-$9,570	-$150,223
Alternative 7-c	$256,021	$1,654,631	$731,328	$30,427	$181,822	$2,854,229
Difference 7-c	$31,441	$203,200	$89,812	$3,737	$22,329	$350,519
Alternative 7-d	$267,250	$1,727,202	$763,404	$31,761	$189,796	$2,979,414
Difference 7-d	$42,670	$275,772	$121,888	$5,071	$30,304	$475,705
Alternative 7-e	$262,759	$1,698,174	$750,574	$31,227	$186,607	$2,929,340
Difference 7-e	$38,179	$246,743	$109,058	$4,537	$27,114	$425,631

Table 5.9.3.5: Aggregate (Red and Gag) Changes in Surpluses and Economic Value (Relative to Alternative 1) in the Recreational Sector – Action 9

Red and Gag	Charter Surplus		Private Surplus	Headboat Surplus		Economic Value (EV)
	Consumer	Producer	Consumer	Consumer	Producer	
Alternative 1	$0	$0	$0	$0	$0	$0
Alternative 2	-$133,885	-$1,551,038	-$520,276	-$23,301	-$194,107	-$2,422,606
Alternative 3	-$151,034	-$1,677,107	-$572,324	-$25,503	-$208,486	-$2,634,454
Alternative 4	-$212,488	-$2,059,039	-$744,806	-$32,642	-$249,929	-$3,298,904
Alternative 5	-$176,555	-$1,826,810	-$642,164	-$28,372	-$224,410	-$2,898,311
Alternative 6	-$166,754	-$1,778,707	-$617,230	-$27,371	-$219,651	-$2,809,713
Alternative 7-a	-$45,504	-$659,822	-$203,492	-$9,349	-$85,128	-$1,003,295
Alternative 7-b	-$108,997	-$1,100,646	-$390,986	-$17,223	-$134,622	-$1,752,473
Alternative 7-c	-$60,407	-$771,377	-$249,126	-$11,284	-$97,913	-$1,190,106
Alternative 7-d	-$52,852	-$737,788	-$230,607	-$10,551	-$94,748	-$1,126,545
Alternative 7-e	-$57,343	-$766,817	-$243,437	-$11,085	-$97,938	-$1,176,619

Alternatives 3 to **7** consider several management scenarios combining gag grouper decreases with red grouper increase or decreases, resulting in recreational season length ranging from 214 days under **Alternative 6** to 320 days under **Alternative 7 (option a)**. Due to the large decrease in gag considered in all the alternatives, all net changes in economic values are negative. Aggregate losses in economic value corresponding to these management scenarios vary from $3.3 million under **Alternative 4** to $1.13 million under **Alternative 7 (option d)**. In selecting a preferred alternative for this action (**Alternative 7 – option e**), the Council accounted for several considerations, including, required reductions in gag harvest levels and associated socio-economic effects on the recreational sector, possible increases in red grouper harvests, and expected recreational season length. In addition, the length and timing of the closure were considered.

Preferred Alternative 7 – option e would reduce gag landings by 26 percent and increase red grouper landings by 17 percent, yielding a 306 day recreational season. **Preferred Alternative 7 – option e** would implement a gag bag limit of 2 fish per person per day within the aggregate bag limit, a red grouper bag limit of 2 fish per person per day within the aggregate bag limit; and an aggregate grouper bag limit of 4 fish per person, per day. **Preferred Alternative 7-option e** would also implement a February 1 through March 31 closed season for shallow-water grouper. Relative to the status quo, **Preferred Alternative 7 – option e** is expected to result in a $1.80 million decrease in short term economic value.

Summary

In addition to the status quo, gag and red grouper recreational management measures under this action consider several adjustments to gag and red minimum size limits, species-specific and aggregate bag limit changes, season length and format modifications. Anticipated decreases in gag landings vary from 46 to 23 percent. For red grouper, fluctuations in landings range from a 19 percent increase to a 21 percent reduction. In selecting **Alternative 7 – option e** as the preferred alternative for this action, the Council considered several factors such as required reductions in gag harvest levels and associated socio-economic effects on the recreational sector, possible increases in red grouper harvests, expected recreational season length, and, the length and timing of the recreational shallow water grouper closure. **Preferred Alternative 7 – option e** would reduce gag landings by 26 percent and increase red grouper landings by 17 percent, yielding a 306 day recreational season. Within the 4 fish per person per day aggregate grouper limit, **Preferred Alternative 7 – option e** would implement a gag bag limit of 2 fish per person per day and a red grouper bag limit of 2 fish per person per day. **Preferred Alternative 7-option e,** which is expected to result in a $1.80 million decrease in short term economic value, would also establish a February 1 through March 31 closed season for shallow-water grouper.

5.9.3.2 Direct and Indirect Effects on the Social Economic Environment

Action 1 would maintain the size limits and bag limits now in place. In the short term this alternative would not have any impacts on the recreational fishermen who target gag and red grouper because it would not change the rules they are currently under. In the long term, Alternative 1 may allow overfishing of gag grouper to continue which could require stricter regulations in the future, such as long closures, reduced TACS, etc., to correct for the overfishing which would have a negative impact on then fishermen, fishing-dependent businesses, and fishing communities involved in these fisheries.

Alternatives 2-10 offer various management options for reducing overfishing in gag grouper and for managing red grouper in the recreational fisheries. Bag limits, size limits, and closures are incorporated to achieve OY in the fisheries. When comparing each alternative, there will be some recreational fishermen who support one alternative over another, depending on how often they fish, the season they fish, and what they target. Some fishermen may prefer a larger bag limit with some restrictions on individual species, while others may prefer a smaller total bag limit with a higher bag limit on a preferred species. Due to the differences in opinions among recreational fishermen it is not possible to fully describe the social impacts of any one alternative as compared to another. During the closed season there may not be many other reef fish species to fish for. If recreational fishermen choose not to fish during the closed season there could be a negative impact on the businesses such as charter boats, bait and tackle shops, marinas, hotels, and other businesses that cater to recreational fishermen because they would not have as much business from recreational fishermen as they may if the season for gag, black, and red grouper were not closed. This would have the most impact in communities along the west coast of Florida which has the most recreational fishermen who target these species.

Summary

In the short term Alternative 1 would not have any impacts on the recreational fishermen who target gag and red grouper because it would not change the rules they are currently under. For Alternatives 2-10, there will be some recreational fishermen who support one alternative over another, depending on how often they fish, the season they fish, and what they target. During the closed season there may not be many other reef fish species to fish for. If recreational fishermen choose not to fish during the closed season there could be a negative impact on the businesses such as charter boats, bait and tackle shops, marinas, hotels, and other businesses that cater to recreational fishermen because they would not have as much business from recreational fishermen as they may if the season for gag, black, and red grouper were not closed.

5.9.4 Direct and Indirect Effects on Administrative Environment

All of the alternatives in Action 9 end gag overfishing and are therefore expected to benefit the administrative environment by complying with the mandates of the M-SFCMA. Alternatives in Action 9 that allow an increase in red grouper harvest may negatively affect the administrative environment if F is increased and not offset by other proposed management measures. Alternatives that maintain red grouper landings at or below current levels and consistent with F_{OY} would benefit the administrative environment by allowing the Council to manage red grouper to achieve F_{OY}. The following discussion summarizes the effects to the administrative environment as they pertain to law enforcement, monitoring, and implementation of management measures.

Alternative 1 (status quo/no action) would maintain status quo regulations, which include a one red grouper daily bag limit, 20-inch red grouper minimum size limit, 22-inch gag minimum size limit, five grouper daily bag limit, captain and crew grouper bag limit prohibition, and February 15 to March 15 recreational seasonal closure. The MRFSS, Texas Parks and Wildlife Department (TPWD), and the SEFSC's Headboat Survey monitor recreational landings. Monitoring recreational landings and enforcing bag limits, size limits, and closed seasons are routine fishery management actions that affect the administrative environment.

Alternatives 2-7 would not change how landings are monitored and therefore would not represent an additional administrative burden for MRFSS, TPWD or the SEFSC's headboat survey. **Alternative 2** would establish a gag bag limit of one, eliminate the red grouper bag limit, and expand the recreational closed season by two additional months. Specifying a gag bag limit would result in a new regulation to enforce, but may reduce the burden on enforcement by making it easier and faster to determine compliance with regulations (less fish to count and measure). Eliminating the red grouper bag limit would reduce the number of regulations to enforce and may increase compliance with the bag limit restriction since fewer anglers would harvest the aggregate bag limit. Expanding the recreational closure may reduce the overall burden on enforcement by making it simpler to determine whether or not anglers are complying with regulations (less fish to count and measure; either you possess shallow-water grouper during the closure or you do not possess shallow-water grouper during the closure). However, if states do not implement compatible regulations, then compliance with the closure may be greatly reduced. The increase in red grouper harvest proposed in **Alternative 2** is the second greatest of any of the alternatives considered and may therefore result in accountability measures being triggered more often (see Action 6). This alternative would also have the second highest probability of allowing overfishing of red grouper and could therefore result in more restrictive management measures in the future to constrain red grouper harvest.

Alternative 3 would establish a one gag bag limit, two red grouper bag limit, an aggregate bag limit of three, and a three month closed season. **Alternative 4** would establish a gag bag limit of two, eliminate the red grouper bag limit, and establish a 4 ½ month closed season. Impacts to the administrative environment resulting from both of these alternatives are expected to be similar to those described for **Alternative 2**. All of these management measures are commonly used to regulate reef fish harvest in the Gulf of Mexico. Closed seasons and lower bag limits may make it easier and faster to determine compliance. Red grouper harvest would be decreased (**Alternative 4**; -21 percent) or only be increased by a small percentage (8 percent); therefore reducing the likelihood that accountability measures will be triggered (see Action 6) or overfishing will occur. The small red grouper harvest increase relative to most of the other alternatives in Action 9 would therefore benefit the administrative environment, but result in some forgone yield.

Alternative 5-6 would both decrease the aggregate bag limit to three fish and establish lengthy closed seasons (141-151 days). **Alternative 5** would not specify species specific bag limits for red or gag grouper, while **Alternative 6** would set the gag bag limit at one fish and eliminate the red grouper bag limit. Effects on the administrative environment resulting from the gag bag limit and closed seasons would be similar to those described for **Alternatives 2** and **3**. Both alternatives would end overfishing of gag and maintain red grouper landings at or near status quo levels, thereby benefiting the administrative environment by not increasing red grouper F and fulfilling the MSFCMA mandate to end overfishing.

Alternatives 7(a-e) would decrease the aggregate bag limit, increase the red grouper bag limit, implement a two gag bag limit, and establish a 45-62 day closed season. The closed seasons would be shorter than those proposed for **Alternatives 2-6**, and slightly longer than the status quo closed season of February 15 to March 15. Affects on enforcement and monitoring would be similar to those described above for other alternatives. Because **Alternatives 7(a-e)** only reduce gag harvest by 23-26 percent and rely on additional reductions in harvest to occur from fall offs in effort, these alternatives have a higher probability of not ending overfishing. **Alternatives 7(a-e)** would also result in some of the greatest increases in red grouper harvest. Greater increases in red grouper harvest will increase the probability that overfishing occurs and F_{OY} is not achieved.

Overall, **Alternatives 2-7** are not expected to significantly effect the administrative environment. **Alternatives 1** and **7** would have the greatest effects on the administrative environment, while **Alternatives 2-6** would have lesser effects. Size limits, bag limits, and closed seasons are currently used to manage the harvest of many recreational fish species and therefore changes to these regulations would not represent a significant burden on enforcement. However, more restrictive management measures could increase the rate of non-compliance, therefore resulting in an increased burden on enforcement.

Interim regulations are expected to benefit the administrative environment by addressing gag overfishing at the start of the 2009 fishing year. However, because interim regulations will differ from more permanent regulations ultimately implemented in this amendment, angler confusion and decreased compliance with regulations could occur. Bag limits and seasonal closures are currently used to manage the harvest of groupers; therefore changes to these types of regulations should not represent a significant burden on enforcement.

5.10 Action 10. Alternatives to Reduce Discard Mortality of Grouper

The alternatives in this action address methods to reduce the number and mortality of grouper caught but not retained by fishers. **Alternative 1** would make no changes. **Alternative 2** would require pamphlets or placards describing proper handling, venting, and release methods on board fishing vessels. **Preferred Alternative 3** would reduce or eliminate commercial size limits for all species in the shallow-water grouper commercial fishery or just red grouper.

5.10.1 Direct and Indirect Effects on Physical Environment

The alternatives in this action would have no direct effect on the physical environment. **Preferred Alternative 3** may have indirect physical effects. Reduction or omission of commercial minimum size limits could result in decreased effort because fishermen might reach the shallow-water grouper or red grouper quota sooner; however, if fishermen only keep larger fish, effort would not be reduced. Reduced effort would mean fewer impacts of fishing gear on the bottom habitat. Anchors or weights on bottom longlines can impact and damage the bottom habitat. In addition, lines can drag across the surface for considerable distances during retrieval, dislodging lightweight organisms such as invertebrates. Both longlines and handlines can become entangled in coral reef and other hard bottom and cause physical damage (Barnette, 2001).

5.10.2 Direct and Indirect Effects on the Biological / Ecological Environment

Alternative 1 is the No Action alternative and does not propose any bycatch reduction measures. However when Amendment 27 to the Reef Fish FMP is implemented, circle hooks, venting tools, and dehooking devices will be required for all reef fish. Each of these instruments is expected to reduce discard mortality. The analyses in this section are based on estimated mortality rates before passage of Amendment 27. Based on published studies to-date, the effects of the new regulations may differ among species.

Circle hooks are similar to traditional J hooks, but the tip of the hook curves inward toward the shank. Ideally, after the fish swallows the hook it slides out of the stomach and esophagus without catching, then hooks in the corner of the mouth around the lower jaw. Cooke and Suski (2004) found circle hooks had a lower overall mortality for all species they studied, because circle hooks were more likely to hook in the jaw than in the gut. Likewise, Bacheler and Buckel (2004) found significantly lower gut-hooking with circle hooks (< 1 percent) than with J hooks (15 percent) and groupers were less likely to bleed when hooked in the jaw (5 percent) than when hooked in the gut (40 percent). If bleeding is a predictor of post-release mortality, then grouper would be more likely to survive when circle hooks are used because they would be more likely to be jaw-hooked and therefore less likely to bleed. Burns et al. (2002) found significantly higher survival when circle hooks were used for red grouper than when J-hooks were used, but found no significant difference in gag survival. The difference between species is likely due to feeding behavior; red grouper tend to swallow prey whole if possible (Burns et al. 2004), which increases the chance of gut-hooking with J-hooks.

Fish with swim bladders can experience air expansion problems, 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 (Rummer and Bennett 2005). If the bladder bursts, the gas can be retained in the body cavity and continue to cause damage. Venting tools release gas from expanded or ruptured swim bladders in fish raised from depth. A hypodermic needle or any sharp, hollow instrument can be effective if used properly. The most obvious sign of bladder expansion and rupture is distention of the stomach out of the mouth. In a study by Bacheler and Buckel (2004), even in shallow water (< 38m) 75 percent of red grouper had distended stomachs, and in deeper water (> 41m) 95 percent had distended stomachs. No gag had distended stomachs in shallow water (< 24m), but over 60 percent had distended stomachs in deeper water (> 36m). 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. Venting tools are designed to release gases and allow the fish to swim normally. However, venting increases handling time, and increases risk of further injury and infection if not done properly.

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. Amendment 27 (pages 30-34 and 257-259) contains further discussion of the impacts of venting tools and dehooking devices on survival of fish.

Alternatives 2 and 3 for this action would have direct effects on the biological environment. **Alternative 2** would not require any new gear but would require instructions on board fishing vessels explaining how to properly handle, vent, and release fish. Fishers may or may not read the instructions on the placards or pamphlets, but would have the information if desired. Some vessels already have venting tools on board; pamphlets or placards would help with their proper use. Information aboard vessels should increase proper handling and release techniques, and thus increase survival of released fish.

Preferred Alternative 3 could reduce shallow-water grouper or red grouper discard mortality by decreasing or removing the commercial minimum size limit and thereby decreasing the number of fish released after catch. Coggins et al. (2007) found minimum size limits did not help fisheries for long-lived low-productivity species, such as groupers, achieve sustainability if discard mortality exceeded five percent. Rudershausen et al. (2007) also concluded minimum size limits are only moderately effective for reef fish caught in shallower portions of their depth ranges, and nearly ineffective in deep waters.

Little data on discard rate and release mortality are available for shallow-water grouper species except for red grouper and gag. In 2006, red grouper dominated the commercial shallow-water grouper landings by weight (75.8 percent). Gag (18.0 percent), black (2.9 percent), scamp (3.4 percent), yellowfin (< 0.1 percent), and others (< 0.1 percent) composed the rest of the landings. Landings for only the longline fishery were even more skewed toward red grouper (82.3 percent), than gag (12.2 percent), black (3.2 percent), scamp (3.2 percent), yellowfin (< 0.1 percent), and others (< 0.1 percent). Therefore this discussion will mainly focus on red grouper, with some information on gag.

SEDAR 12 (2007) estimated 10 percent release mortality for all gear used in the commercial red grouper fisheries, except commercial longline release mortality was estimated at 45 percent. The commercial sector lands approximately three times more red grouper than the recreational sector. Therefore, changes to the minimum size for the commercial sector would have a larger impact than equivalent changes for the recreational sector. Long-term equilibrium analyses indicate commercial red grouper landings would increase and dead discards would decrease if the minimum size was lowered from the current 20 inches (Table 5.10.1).

Table 5.10.1. Percent change in red grouper landings and dead discards for the commercial sector if the minimum size limit is decreased from 20 inches. Modified from Walter 2007.

		Equilibrium		
Mode		18 inches	16 inches	14 inches
longline	landings	7.68%	14.45%	19.54%
	discard dead	-20.26%	-40.53%	-57.24%
handline	landings	17.12%	37.11%	55.13%
	discard dead	-15.38%	-33.75%	-50.68%
		2005, only		
longline	landings	81.88%	111.80%	120.69%
	discard dead	-66.00%	-90.12%	-97.28%
handline	landings	97.98%	130.61%	140.41%
	discard dead	-67.97%	-90.61%	-97.41%

Yield per recruit (YPR) analyses balance natural and fishing mortality to predict a harvest size that maximizes the per capita harvest. Analyses conducted by SEFSC (Walter 2007) predict YPR will increase as minimum size decreases for the entire red grouper commercial sector (**Preferred Alternative 3, Option e, Suboption i)**, with a maximum YPR realized at 10 inches (Figure 5.10.1). However, YPR increases are accompanied by SPR decreases (Figure 5.10.2). If the minimum size limit was changed to 18 inches, YPR would increase 2.6 percent and SPR would decrease 1.5 percent; if the limit was changed to 16 inches, YPR would increase 4.3 percent and SPR would decrease 2.9 percent; if the limit was changed to 14 inches, YPR would increase 5.1 percent and SPR would decrease 4.1 percent; and if the size limit was eliminated, YPR would increase 4.5 percent and SPR would decrease 6.4 percent.

Alternative 3, Suboption ii would only change the minimum size limit for the longline portion of the commercial sector. Longline landings make up 61 percent of the total commercial red grouper landings and have the highest estimated release mortality (45 percent versus 10 percent; SEDAR 12). When minimum size is kept at 20 inches for all other gear in both the recreational and commercial sectors, YPR is still maximized at a commercial longline size limit of 10 inches (Figure 5.10.1). In this case, if the minimum size limit was changed to 18 inches, YPR would increase 2.0 percent and SPR would decrease 0.7 percent; if the limit was changed to 16 inches, YPR would increase 3.4 percent and SPR would decrease 1.3 percent; if the limit was changed to

14 inches, YPR would increase 4.2 percent and SPR would decrease 1.8 percent; and if the size limit was eliminated, YPR would increase 4.6 percent and SPR would decrease 2.7 percent.

Currently, SPR is near SPR_{OY} (Figure 5.10.2). At reduced size limits for the entire commercial red grouper sector and assuming the current F, SPR would decrease below SPR_{OY} but remain above SPR_{MSY}; however, with no size limits SPR could fall below SPR_{MSY}. For the commercial longline sector, SPR would remain above SPR_{MSY} at all reduced size limits and no size limit if F remains at current levels.

Figure 5.10.1. Minimum size limit versus yield per recruit for red grouper.

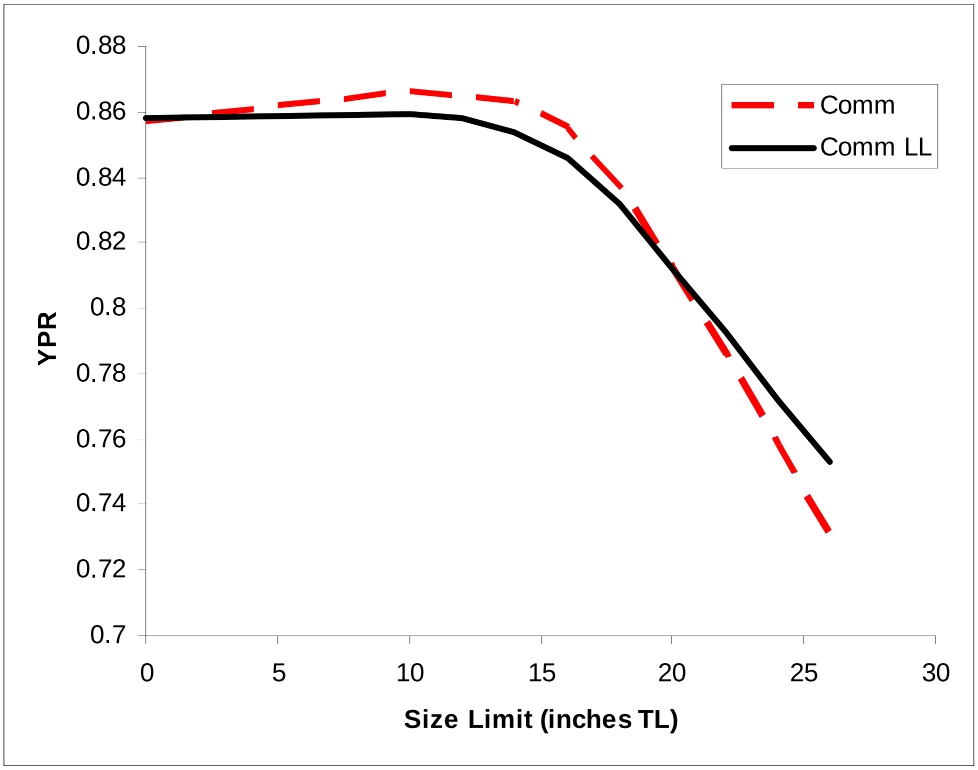
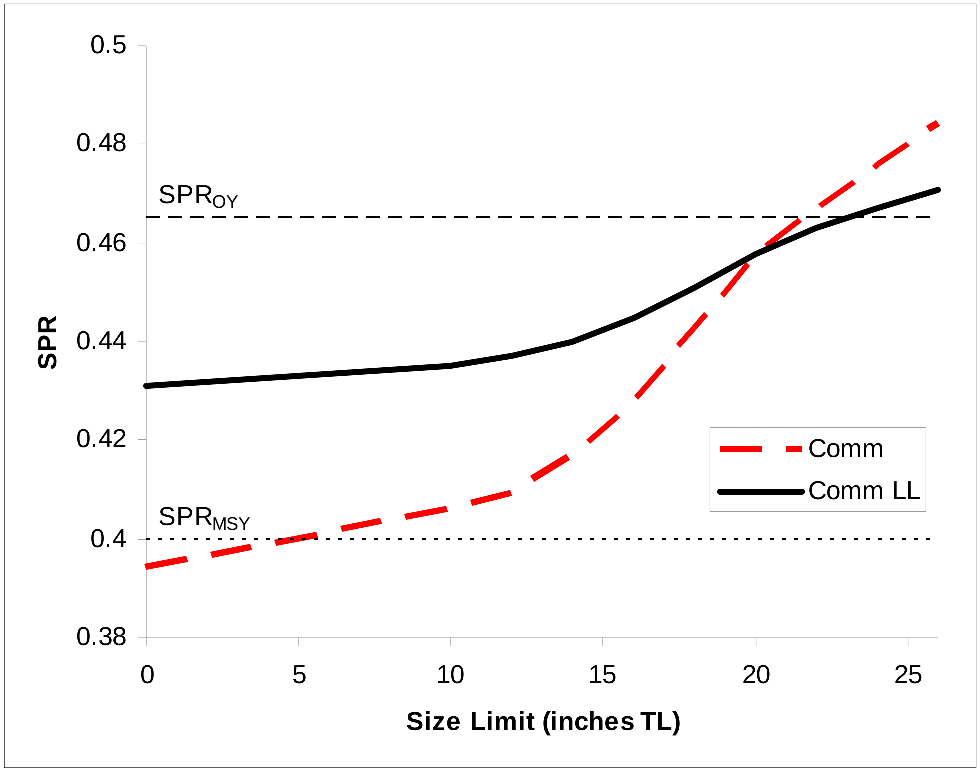


Figure 5.10.2. Minimum size limit versus spawning potential ratio for red grouper.



YPR for gag would also increase as the commercial minimum size decreases, but the increase is less than one percent for each option and suboption under **Preferred Alternative 3** (Ortiz 2007). Likewise, all decreases in SPR would be less than one percent. These small changes in YPR and SPR for the commercial gag fishery are due to the very low rate of dead discards for the gag commercial sector.

YPR analyses contain some assumptions that do not hold for the grouper fisheries in the Gulf of Mexico. All YPR analyses assume constant recruitment; however, grouper recruitment fluctuates from year to year. When a cohort from a high-recruitment year enters the fishery, higher proportions of small fish would be landed. YPR analyses also assume the fishery is regulated by a constant F policy. Because the commercial shallow-water grouper fishery is regulated through a quota, results will be somewhat different. Finally, mortality rates are assumed to be constant, when in reality they will vary with size of fish and depth of capture.

Commercial quotas are based on weight, so greater numbers of fish may be landed under a lower minimum size limit because average weight per fish would be less. If the Council chooses Alternative 2 for Action 8 (Application of Quota Closures), the red grouper fishery would close when the gag quota is reached, even if the red grouper quota has not been reached. In this case, a lower minimum size limit could allow commercial fishermen to land more red grouper before that fishery closes.

Minimum size limits should also be considered relative to the size at which the fish become reproductively mature. **Alternative 3, Option a** would decrease the minimum size limit for three of five species that currently have size limits. Eighteen inches is lower than the size of 50 percent maturity for black grouper (~33 inches; NMFS 2005b), gag (~23 inches; SEDAR 10 2006), and yellowfin grouper (~20 inches; Cummings, 2007). **Alternative 3, Option b** would standardize size limits for all five species. Sixteen inches is below the size of maturity for three species and above the size of maturity for red grouper (~15 inches; Fitzhugh et al. 2006) and scamp (~14 inches; NMFS 2005b). **Alternative 3, Option c** would decrease the size limit for all five species, and bring the size limit for all five below the size at maturity. **Alternative 3, Option d** would allow capture of any size shallow-water grouper regardless of reproductive status. **Alternative 3, Option e** would maintain the minimum size limit above the size of maturity for red grouper.

The alternatives in this action could have an indirect effect on the ecological environment because groupers are apex predators within their food web. Increases or decreases in their population sizes may affect populations of their prey and competitors. Options in **Preferred Alternative 3** could change the size structure of the grouper population, as well as change the size of the reproductive portion of the population.

5.10.3 Direct and Indirect Effects on Economic/Social Environment

5.10.3.1 Direct and Indirect Effects on the Economic Environment

Alternative 1, no action, has no direct or indirect economic impacts. It should just be recognized that this alternative imbeds whatever measures to reduce discard mortality that were proposed in other amendments but not yet implemented.

The direct economic effects of **Alternative 2** come in the form of increasing fishing operations due to the cost of having on board fishing vessels the necessary instruction materials for venting, handling, and release of fish. Additional costs can also arise from exposing fishing vessels to possible enforcement actions for not complying with this additional requirement. The first type of cost may be partly mitigated if the agency rather than the industry shoulder the burden of developing and producing the required information materials. This is especially true for some fishing vessels which already carry some type of informational materials for properly releasing fish. These two types of costs to the industry cannot be quantified.

Alternative 3 applies only to the commercial sector of the shallow-water grouper fishery, and thus direct impacts of this alternative fall on this sector. All alternatives to the status quo provide for lower size limits, so the general expectation is that the commercial fishery would derive additional benefits from these alternatives. Markets for smaller fish the commercial fishery lost due to the higher size limit now in place could be re-exploited. Although the evidence is weak, Council public hearings of past amendments indicated the market provided some price premium for fish in the lower size category for grouper.

The economic consequences of various options and sub-options under **Alternative 3** are presented in the two tables below. Losses in net revenues would still come from higher size limits because of the other restrictive measures in this amendment. Without the higher size limits, losses would have been higher as the positive effects of lower size limits would partially offset losses from other measures in this amendment.

There are four size limit alternatives and two applicability alternatives, resulting in eight unique combinations. The alternatives are labeled Alternatives 3ai, 3bi, 3ci, 3di, 3aii, 3bii, 3cii, and 3dii. The letters a, b, c, and d refer to size limit of 18 inches, 16 inches, 14 inches, and no size limit, respectively. The two numerals correspond to the applicability of the size limit option to (i) the entire shallow-water grouper fishery, or (ii) only to the longline sector of the shallow-water grouper fishery.

It is apparent from the results presented in Table 5.10.3.1 that losses would decrease by lowering the size limit, regardless of whether the size limit were made applicable to the entire shallow-water grouper fishery or just the longline sector of the fishery. When size limit changes were made applicable to the entire shallow-water grouper fishery and using a 3 percent discount factor, losses would fall from $17.5 million with an 18-size limit (**Alternative 3ai**) down to $11.2 million with no size limit (**Alternative 3di**). When size limit changes were made applicable only to the longline fishery, losses would drop from $18.4 million with an 18-inch size limit (**Alternative 3aii**) to $14.5 million with no size limit (**Alternative 3dii**).

Also apparent from the tabulated results is that the wider the coverage of the size limit reductions the lower would be the losses. For example, **Alternative 3bi**, with a size limit of 16 inches applicable to the entire shallow-water grouper fishery, would result in losses of $12.5 million. In contrast, **Alternative 3bii**, with the same 16-inch size limit but applicable only to the longline sector, would result in losses of $15.5 million. A similar situation would happen when contrasting **Alternative 3ai** with **Alternative 3aii**, or **Alternative 3ci** with **Alternative 3cii**, or **Alternative 3di** with **Alternative 3dii**.

The smallest losses would accrue to **Alternative 3di**, and this is a reasonable expectation since this alternative would provide for no minimum size limit for any grouper species and would apply to the entire shallow-water grouper fishery. The largest losses would come from **Alternative 3aii**, which would provide for an 18-inch size limit but would apply only to the longline segment of the shallow-water grouper fishery. This latter finding deserves additional scrutiny, because it would seem to imply that "benefits" from a size limit change would not be sufficient to offset the "losses" from its restricted applicability. Conversely, it could also imply that the applicability of the size limit change would have more dominant effects than a mere size limit change.

The following discussion focuses only on the results using a 3 percent discount factor reported in Table 5.10.3, although the resulting conclusions would also apply to results using a 7 percent discount factor. **Alternative 3ai**, which would provide for an 18-inch size limit and be applicable to the entire shallow-water grouper fishery, would result in losses lower than **Alternative 3aii**, which would provide the same size limit but applicable only to the longline sector. However, **Alternative 3ai** would result in losses higher than any other size limit alternatives applied only to the longline sector. On the other hand, **Alternative 3bi**, which would provide for a 16-inch size limit applicable to the entire shallow-water grouper fishery, would result in losses lower than any size limit alternatives, including the no size limit option, applied only to the longline sector. The results would indicate that possibly any size limit below 18 inches made applicable to the entire shallow-water grouper fishery would dominate any other lower size limit option made applicable only to the longline fishery. This would be the case even if, as discussed in Section 3.4.1 of this document, the longline fishery historically dominated the red grouper fishery and that harvests of red grouper dominated other shallow-water grouper harvests.

From the standpoint of overall results, the various alternatives may be ranked in descending order as follows: **Alternative 3di**, **Alternative 3ci**, **Alternative 3bi**, **Alternative 3dii**, **Alternative 3cii**, **Alternative 3bii**, **Alternative 3ai**, and **Alternative 3aii**. This ranking would be unaffected by the choice of a discount factor.

The applicability of the size limit would have strong effects on the distribution of economic effects by gear type, as can be gleaned from Table 5.10.3.1. If the size limit were applied only to the longline fishery, this segment would incur substantially lower losses while the hook and line and other gear users would incur large losses. When applied to all shallow-water grouper fishery, the size limit reductions would substantially reduce the losses to gear types other than longlines. The longline sector would still benefit from lower size limits, with losses dropping from $8.8 million with an 18-inch size limit (**Alternative 3ai**) to $6.3 million with no size limit (**Alternative 3di**).

Table 5.10.3.1. Net present values of the effects of alternatives on minimum size limits. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Hook and Line	Longline	Other Gears	Total
		3% Discount Rate		
Baseline	122,586	62,855	11,707	197,148
Alternative 1	-9,737	-10,638	-2,565	-22,940
Alternative 3ai	-6,645	-8,843	-2,037	-17,525
Alternative 3bi	-4,442	-6,862	-1,196	-12,500
Alternative 3ci	-4,014	-6,345	-991	-11,350
Alternative 3di	-3,921	-6,287	-956	-11,164
Alternative 3aii	-9,778	-6,084	-2,574	-18,436
Alternative 3bii	-9,745	-3,168	-2,567	-15,480
Alternative 3cii	-9,729	-2,310	-2,563	-14,602
Alternative 3dii	-9,728	-2,208	-2,563	-14,499
		7% Discount Rate		
Baseline	107,912	55,343	10,303	173,558
Alternative 1	-8,760	-9,448	-2,274	-20,482
Alternative 3ai	-6,049	-7,869	-1,810	-15,728
Alternative 3bi	-4,107	-6,118	-1,069	-11,294
Alternative 3ci	-3,732	-5,662	-890	-10,284
Alternative 3di	-3,651	-5,611	-859	-10,121
Alternative 3aii	-8,796	-5,445	-2,282	-16,523
Alternative 3bii	-8,768	-2,879	-2,275	-13,922
Alternative 3cii	-8,754	-2,125	-2,273	-13,152
Alternative 3dii	-8,753	-2,035	-2,273	-13,061

When looking at the distribution of effects by area, it can be seen from Table 5.10.3.2 that all areas, except South Florida, would incur losses. Fishermen in South Florida would actually gain from all the size limit reduction alternatives even given other restrictive measures in this amendment. This is the case, because gag are not caught frequently in south Florida. Therefore, the benefits of a smaller size limit for red grouper are not commingled with the costs of a more restrictive TAC for gag, as is the case in other regions. These gains would not be negated by the use of a higher discount factor. Among the losers, West-Central Florida would incur the largest losses given any size limit alternative. As with other positive measures in this amendment, the alternatives reducing the size limit would tend to reduce losses forthcoming from other measures in this amendment. But the benefits from size limit reduction would not be sufficient to fully offset losses from other measures in this amendment.

Table 5.10.3.2. Net present values of the effects of alternatives on minimum size limits. Baseline numbers are in absolute values and those for each alternative are <u>differences</u> from the baseline. Numbers are in thousand 2005 dollars.

	Rest of Gulf	Northwest FL	West-Cent FL	South FL	Total
			3% Discount Rate		
Baseline	74,331	39,227	49,667	33,923	197,148
Alternative 1	-701	-6,756	-15,194	-290	-22,941
Alternative 3ai	-792	-5,761	-14,327	3,355	-17,525
Alternative 3bi	-775	-4,953	-12,170	5,400	-12,498
Alternative 3ci	-778	-4,806	-11,683	5,917	-11,350
Alternative 3di	-778	-4,777	-11,607	5,997	-11,165
Alternative 3aii	-689	-6,462	-12,973	1,687	-18,437
Alternative 3bii	-677	-6,225	-11,497	2,919	-15,480
Alternative 3cii	-673	-6,152	-11,060	3,282	-14,603
Alternative 3dii	-673	-6,143	-11,009	3,326	-14,499
			7% Discount Rate		
Baseline	65,380	34,560	43,761	29,858	173,559
Alternative 1	-624	-6,051	-13,515	-295	-20,485
Alternative 3ai	-705	-5,179	-12,756	2,912	-15,728
Alternative 3bi	-691	-4,465	-10,851	4,713	-11,294
Alternative 3ci	-693	-4,336	-10,424	5,168	-10,285
Alternative 3di	-693	-4,311	-10,356	5,238	-10,122
Alternative 3aii	-613	-5,792	-11,563	1,445	-16,523
Alternative 3bii	-603	-5,585	-10,264	2,529	-13,923
Alternative 3cii	-600	-5,521	-9,880	2,848	-13,153
Alternative 3dii	-599	-5,513	-9,836	2,886	-13,062

<u>Summary</u>

The no action alternative (**Alternative 1**) would have no direct or indirect economic impacts, but it should be recognized that this alternative imbeds whatever measures to reduce discard mortality that were proposed in other amendments but not yet implemented. The direct economic effects of Alternative 2 would come in the form of increasing the cost of fishing operations due to the cost of having on board fishing vessels the necessary instruction materials for venting, handling, and release of fish. Additional costs can also arise from exposing fishing vessels to possible enforcement actions for not complying with this additional requirement. These two types of costs to the industry cannot be quantified, but the first type of cost would be mitigated if the agency rather than the industry were to shoulder the burden of developing and producing the required information materials. The economic consequences of various options and sub-options under Alternative 3 were estimated using the same economic model. From the standpoint of overall results, the alternatives may be ranked in descending order as follows: **Alternative 3di**, **Alternative 3ci**, **Alternative 3bi**, **Alternative 3dii**, **Alternative 3cii**, **Alternative 3bii**, **Alternative 3ai**, and **Alternative 3aii**. This ranking would be unaffected by the choice of a discount factor. At a 3 percent discount factor, the losses from each size limit option would be $17.5 million for **Alternative 3ai**, $12.5 million for **Alternative 3bi**, $11.4 million for **Alternative 3ci**, $11.2 million for **Alternative 3di**, $18.4 million for Alternative 3aii, $15.5 million for **Alternative 3bii**, $14.6 million for **Alternative 3cii**, and $14.5 million for **Alternative 3dii**.

5.10.3.2 Direct and Indirect Effects on the Social Environment

Alternative 1 would be no action. There would be no short term impact on the recreational or commercial fishermen, fishing-dependent businesses, or communities involved in this fishery because there would be no changes to the regulations currently in place.

Alternative 2 would require pamphlets or prominently displayed placards that provide instructions on venting and proper handling and release methods on board reef fish fishing vessels. This alternative would not have any impact on the recreational or commercial fishermen fishing-dependent businesses, or communities involved in this fishery because it would not directly change the way they fish.

Alternative 3 would reduce the red grouper minimum size limit from 20 inches TL:
(a) 18 inches TL for black, gag, red, and yellowfin grouper. This would allow fishermen to keep more of the fish they catch making for a more satisfying experience for the recreational fisherman and possibly reducing the time that commercial fishermen would need to fish each trip because presumably, they could keep more of the fish they caught. Fishermen have complained about throwing back fish that are too small but then don't survive when returned to the water. In the long term, keeping smaller fish may harm the stock because the fish would not grow to be as large and commercial fishermen would need to catch more fish to make up the same weight as they would have if the limit was left at 20 inches. Taking smaller fish may also reduce the number of potential breeding fish which in the long run could harm the stock. If the stocks are reduced, it may be necessary to put stricter regulations in place in the future to rebuild the stock which would have a negative impact on the recreational and commercial fishermen in that they would be able to keep less of the fish they catch.

Suboption (b) would reduce the minimum size to 16 inches for black, gag, red, and yellowfin grouper, and scamp. This would allow fishermen to keep more of the fish they catch making for a more satisfying experience for the recreational fisherman and possibly reducing the time that commercial fishermen would need to fish each trip because presumably, they could keep more of the fish they caught. Fishermen have complained about throwing back fish that are too small but don't survive when returned to the water. In the long term, keeping smaller fish may harm the stock because the fish would not grow to be as large and commercial fishermen would need to catch more fish to make up the same weight as they would have if the limit was left at 20 inches. Taking smaller fish may also reduce the number of potential breeding fish which in the long run could harm the stock. If the stocks are reduced, it may be necessary to put stricter regulations in place in the future to rebuild the stock which would have a negative impact on the recreational and commercial fishermen.

Suboption (c) would reduce the minimum size to 14 inches for black, gag, red, and yellowfin grouper, and scamp. This would allow fishermen to keep more of the fish they catch making for a more satisfying experience for the recreational fisherman and possibly reducing the time that commercial fishermen would need to fish each trip because presumably, they could keep more of the fish they caught. Fishermen have complained about throwing back fish that are too small but don't survive when returned to the water. In the long term, keeping smaller fish may harm the stock because the fish would not grow to be as large and commercial fishermen would need to catch more fish to make up the same weight as they would have if the limit was left at 20 inches. Taking smaller fish may also reduce the number of potential breeding fish which in the long run could harm the stock. If the stocks are reduced, it may be necessary to put stricter regulations in place in the future to rebuild the stock which would have a negative impact on the recreational and commercial fishermen.

Suboption (d) would eliminate the size limit on any grouper species. This would allow fishermen to keep more of the fish they catch making for a more satisfying experience for the recreational fisherman and possibly reducing the time that commercial fishermen would need to fish each trip because presumably, they could keep more of the fish they caught. Fishermen have complained about throwing out fish that are too small but don't survive when returned to the water. In the long term, keeping smaller fish may harm the stock because the fish would not grow to be as large and commercial fishermen would need to catch more fish to make up the same weight as they would have if the limit was left at 20 inches. Taking smaller fish may also reduce the number of potential breeding fish which in the long run could harm the stock. If the stocks are reduced, it may be necessary to put stricter regulations in place in the future to rebuild the stock which would have a negative impact on the recreational and commercial fishermen in that they would be able to keep less of the fish they catch.

Summary

Alternative 1 would not have any impact on the social environment because there would be no changes made to the size limits. **Alternative 2** would not have any impact on the social environment because it is an administrative action. **Alternative 3** provides various options for reducing size limits which may help to prevent discards and would allow fishermen to catch more keeper fish. Fishermen have complained about throwing back fish that are too small but don't survive when returned to the water. In the long term, keeping smaller fish may harm the stock because the fish would not grow to be as large and commercial fishermen would need to catch more fish to make up the same weight as they would have if the limit was left at 20 inches. Taking smaller fish may also reduce the number of potential breeding fish which in the long run could harm the stock. If the stocks are reduced, it may be necessary to put stricter regulations in place in the future to rebuild the stock which would have a negative impact on the recreational and commercial fishermen in that they would be able to keep less of the fish they catch.

5.10.4 Direct and Indirect Effects on Administrative Environment

Alternative 1 would not have any effect on the administrative environment as it maintains existing gear and size limits with no modifications.

The pamphlets or placards required by **Alternative 2** would need to be designed, produced, and distributed by NMFS. Enforcement would also be required to ensure the informational materials are on board vessels.

Alternative 3, Options a and **e** would have little effect on the administrative environment because a commercial minimum size limit is already in place for each of the five species. **Alternative 3, Options b and c** would result in an improvement in the administrative environment because commercial size limits would be the same for all five species, making law enforcement easier. **Alternative 3, Option d** would eliminate the need for law enforcement concerning commercial size limits. Eliminating size limits for the entire shallow water grouper commercial sector **(Preferred Suboption i)** would require less law enforcement than for just the longline portion (**Suboption ii**).

5.11 Action 11. Creation of Time/Area Closures

5.11.1 Direct and Indirect Effects on Physical Environment

The main impact of area closures on the physical environment is protection from gear impacts on the bottom habitat. A detailed description of the major types of gear used and their potential impacts is provided in Section 5.3.1. To summarize briefly:

Longlines are the dominant gear used in the commercial red grouper fishery. Direct underwater observations have shown that longline gear can be swept across the bottom by currents or by hooked fish (High 1998). However, the use of anchors and weights can reduce the impact of such movements (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).

Bandit gear is the dominant gear used in the commercial gag fishery. In their use, a weighted line is lowered to the bottom, and then the lead is raised slightly off the bottom (Siebenaler and Brady 1952). Thus, 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).

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 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.

Rod and reel is the dominant gear used in the recreational grouper fishery. Fishing line from fishing 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).

Alternative 1 (no action) would continue to allow year-round gear impacts on the bottom habitat in areas that might otherwise be considered for designation as time/area closures. While the immediate impacts from any one piece of gear may be small, over time the cumulative impacts from multiple gear interactions could potentially result in habitat degradation.

Preferred Alternative 2 would reduce gear impacts on the bottom habitat by designating an additional area where the use of gear would be restricted. **Option a** (Snyder Ridge) defines a rectangular shaped area that straddles the 40-fathom contour and encloses about 127 nautical square miles, slightly larger than either of the existing restricted fishing areas (Madison-Swanson – 115 sq. nm, Steamboat Lumps – 104 sq. nm). **Preferred Option b** (Edges 40 Fathom Contour) contains nearly all of Snyder Ridge and is a parallelogram shaped area running from the northern edge of the Steamboat Lumps restricted fishing area northwest along the 40-fathom contour for approximately 37 nm. It encompasses an area of about 390 square nautical miles (sq. nm). The habitat for these areas is similar, consisting of low relief areas scattered with high relief rocky outcrops. Gag and scamp spawning aggregations have been directly observed by scientists in submersibles (personal communication, Chris Koenig), and this has been described as an active region of commercial grouper fishing (personal communication, Chris Koenig). **Option b** covers an area that is three times as large as **Option a**, and would therefore provide three times the protection to the physical environment. **Options i, ii, iii and iv** define the type of fishing restrictions that would apply within the new time/area closure. **Option i** would implement the same restrictions that currently exist for the Madison-Swanson and Steamboat Lumps restricted fishing areas; all fishing prohibited November through April, with surface trolling allowed May through October. **Option ii** would also prohibit all fishing for six months, November through April, but would allow all fishing May through October, thus creating a seasonal area closure. **Preferred Option iii** is similar to **Option ii**, except that it would create the seasonal closure for four month, January through April. **Option iv** would create the shortest time/area closure, two months (March-April), and would encompass only half of the February-March peak gag spawning season. Since **Option i** would prohibit bottom fishing year-round while **Options ii, iii and iv** would allow bottom fishing for six to ten months of the year, **Option i** is more conservative and provides greater protection to the physical environment than **Options ii, iii and iv**. Likewise, **Option ii** is more conservative than **Options iii and iv** since it provides an additional two or four months of protection. **Options i, ii and ii** all provide closed area protection during the peak gag spawning months of February to March, when there is most likely to be additional fishing effort within the area. **Option iv** allows fishing in the area during February, and could concentrate fishing on spawning aggregations during that period. Without repeal of the existing February 15 to March 15 commercial closed season on gag, black grouper and red grouper, all of the options provide more protection than the status quo, by providing additional protections to a portion of the gag spawning aggregations and possibly other spawning aggregations. With the intended repeal of the closed season, spawning aggregations that are outside of the time/area closure will be opened up to fishing. The largest area covered by the time/area closure only covers a portion of the dominant gag spawning grounds identified by Koenig et al. (1996), likely not more than 50 percent of the area. In addition, **Preferred Option**

iii allows reef fish fishing in the area during a portion of the total gag spawning season, and **Option iv** allows reef fish fishing in the area during a portion of the total and peak gag spawning season. Thus **Option iv** is likely to provide less overall protection for spawning gag than the existing closed season. **Options i, ii and iii** could provide protections to spawning gag (in decreasing order of effectiveness) that could be either greater or less than the existing closed season depending upon how successfully they are enforced and complied with relative to the closed season. With all of the options, repeal of the closed season will reduce protection of the offshore male gag population by allowing year-round fishing on them.

Alternative 3 expands the existing Madison-Swanson restricted fishing area by adding an additional 70 sq. nm to the north and west. The total area of the Madison Swanson restricted fishing area would increase from 115 sq. nm to 185 sq. nm, a 61% increase. The habitat is similar to that for the Madison-Swanson area, which is described as an area having rocky ledges with relief up to 5 fathoms, and is characterized by outcrops of limestone and pinnacles (personal communication, Chris Koenig). Arial surveys conducted by University of Miami researchers (Smith and Zurcher 2007) show that this is an area used by both commercial and recreational fishing vessels. In size, the area impacted is less than either option under **Alternative 2**. However, due to its habitat and relatively close proximity to shore compared to the **Alternative 2**, this is likely the most heavily fished area, and therefore would show the greatest reduction in physical impacts from gear interactions.

Alternative 4 creates two cross-sectional restricted fishing areas by extending the existing Madison-Swanson and Steamboat Lumps restricted fishing areas shoreward to the state-federal boundary. This includes approximately two thirds of the Madison-Swanson extension in Alternative 3, but most of the area that would be included in the Madison-Swanson northward extension is mapped as predominately sand or silt bottom in the Environmental Impact Statement for the Council's Generic Essential Fish Habitat Amendment (GMFMC 2004a) (Figure 6). The Steamboat Lumps eastward extension is mapped as predominately sand bottom until about the 20 fathom boundary (approximately half of the extension), and hard bottom from there shoreward. As discussed previously, gear impacts on sandy or muddy habitat areas would be minor. However, on hardbottom habitats there is potential for gear to become entangled. Another consideration is that the areas outside of the Madison-Swanson and Steamboat Lumps restricted fishing areas are not mapped in great detail. Although wide areas are shown as sand or hard bottom in the EFH map (Figure 6), which is only the predominant habitat. In actuality there are likely to be areas of hard bottom scattered within the sand area, and areas of sand or silt scattered within the hardbottom areas. Because of the sheer size of these areas (an additional 1,560 square nm for the two extensions combined) and the large amount of hard bottom east of 20 fathoms in the Steamboat Lumps extension combined with partial protection to hard bottom that would be included in **Alternative 3**, **Alternative 4** will provide protection to more hard bottom habitat than any of the other alternatives, but in doing so, it will also place large expanses of soft bottom off limits to bottom fishing gear, where impacts will be minor.

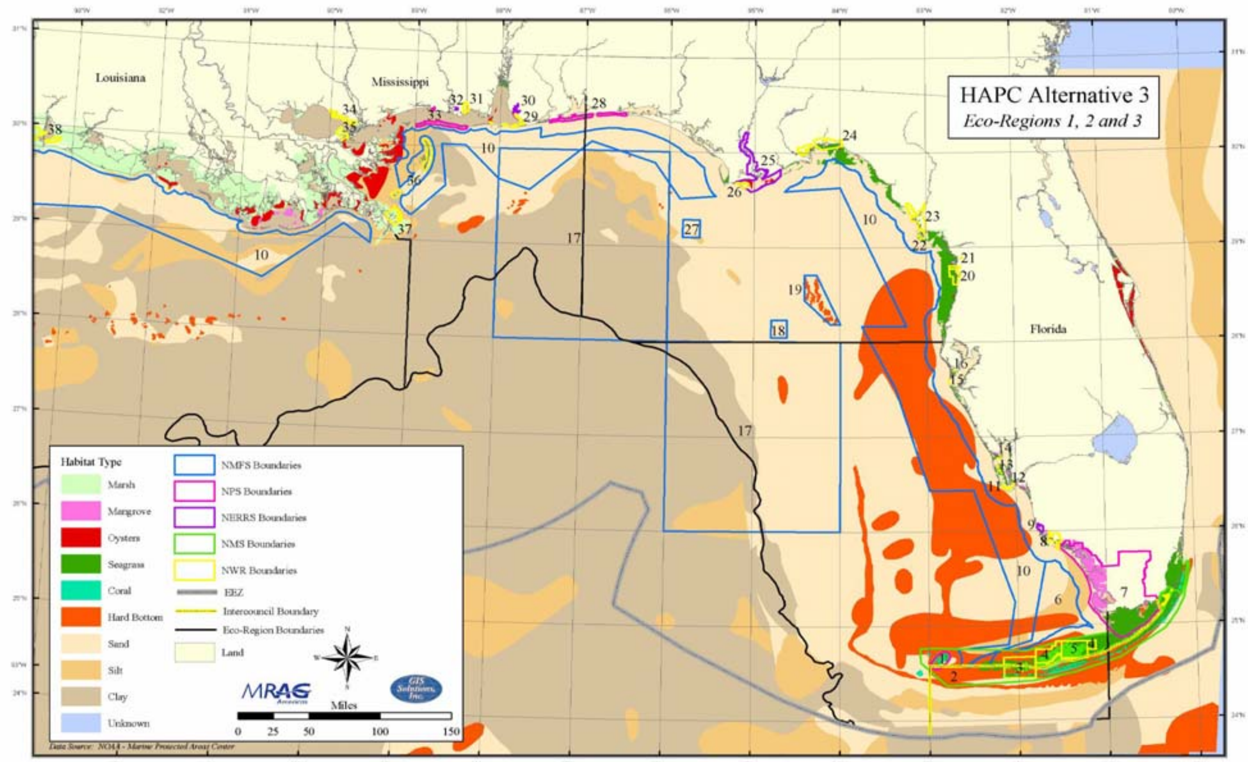


Figure 6. Gulf of Mexico habitat map figure 2.3.15 in volume 1 of the Environmental Impact Statement for the Council's Generic Essential Fish Habitat Amendment (GMFMC 2004a). The boxes labeled 27 and 18 are the Madison-Swanson and Steamboat Lumps restricted fishing areas. Alternative 4 would extend Madison-Swanson northward and Steamboat Lumps eastward to the federal-state boundary. See Figure 2 for an illustration of the extensions.

5.11.2 Direct and Indirect Effects on the Biological / Ecological Environment

The existing Madison-Swanson and Steamboat Lumps restricted fishing areas provide habitat for several reef fish species. In the Madison-Swanson area, gag, red grouper, scamp and red snapper are found on reefs, and the Madison-Swanson restricted fishing area is a known spawning aggregation area for gag and scamp. The Steamboat Lumps restricted fishing area was established as a low relief habitat to contrast with the high relief habitat of Madison-Swanson. Steamboat Lumps has been reported as not containing significant grouper/snapper habitat[8]. However, direct underwater observations by researchers from Florida State University have shown that red grouper in Steamboat Lumps utilize flat areas with veneer of sand over solution holes, which they excavate to form depressions exposing the underlying carbonate rock[9]. Their excavations harbor suites of fish and invertebrate species whose abundances increase as a result, including vermilion snapper *Rhomboplites aurorubens,* black grouper *Mycteroperca bonaci* and

[8] PowerPoint presentation titled "Northeast Gulf of Mexico Marine Reserve Program", given by Chris Gledhill at the October 29 – November 1, 2007 Gulf Council meeting in Biloxi, Mississippi.

[9] 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.

spiny lobster *Panulirus argus* (Coleman and Williams 2002). In this way, red grouper act as ecosystem engineers that alter the habitat and create interdependencies with other important species.

Gag, like many of the groupers, are protogynous hermaphrodites, i.e., they begin their adult life as females and later transition to males. Since males constitute the older age classes in a population, male gag may be particularly susceptible to declines due to juvenescence in a heavily exploited population. In addition, gag are haremic spawners, and it has been suggested that in a spawning aggregation, males are more aggressive than females and hook and line fishing tends to select 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. This issue is reviewed in detail in the introductory discussion in Section 2.10 (Action 11 – Creation of time/area closures). Because the male gag tend to remain offshore year-round, selective protection of areas around the 40-fathom depth contour may provide protection for the males.

Alternative 1, no action, does not create any new closed areas. In a presentation at the October 2007 Gulf Council meeting, NMFS noted that the Steamboat Lumps restricted fishing area does not contain significant grouper/snapper habitat. The ridge and fish pits area total 1.8 km^2 (0.7 m^2). While the Madison-Swanson restricted fishing area contains about 50 times as much habitat, the total gag habitat within the two restricted fishing areas combined is only 5.1% of shelf-edge habitat sampled by SEAMAP survey. During 2001-2005, the Madison-Swanson restricted fishing area saw increases in key reef fish species (gag, red grouper, scamp, red snapper), but so did open-access areas observed at Twin Ridges and the eastern Gulf of Mexico. During 2006-2007, the Madison-Swanson restricted fishing area saw decreases in abundance of all for species while the open-access areas saw abundance level or declining. There did not appear to be any change in the average size of gag in the area during the 2001-2007 monitoring period.[10] Researchers have previously said that it may take a minimum of ten years to detect any changes due to restricted fishing areas, and have noted ongoing poaching in both the Madison-Swanson and Steamboat Lumps restricted fishing areas that may be reducing their effectiveness. Thus the answer to the question of whether restricted fishing areas have an impact on the gag stock or on the male proportion of gag is inconclusive at this time. While the Ecosystem SSC has stated that the Madison-Swanson experiment is a key test of effect of sex ratio changes and poaching in MPAs[11], both the Ecosystem SSC and the Council's former Reef Fish Stock Assessment Panel have, as far back as 1999, stated that the existing restricted fishing areas are too small to have any stock-wide impacts (GMFMC 1999b, 2007a,b).

Preferred Alternative 2 would create an area closure along the 40-fathom contour of either 127 square nm (**Option a**) or 390 square nm (**Preferred Option b**). These new areas fall within the area identified by Koenig et al. (1996) as the dominant gag spawning area. If there is an impact

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[10] Summarized from a PowerPoint presentation titled Northeast Gulf of Mexico Marine Reserve Program, by Christopher T. Gledhill and Andrew W. David, presented at the October 29 – November 1, 2007 Gulf Council meeting in Biloxi, Mississippi.

[11] PowerPoint presentation titled, Can existing ecosystem models provide useful advice to the Council about key ecosystem management questions? Presented by Carl Walters at the October 29 – November 1, 2007 Gulf Council meeting in Biloxi, Mississippi.

on the gag stock or male proportion, these areas are in the best area to affect an impact. However, **Option a** encompasses an area only slightly larger than the existing Madison-Swanson and Steamboat Lumps areas. The Ecosystem SSC, based on its ecosystem modeling results, has suggested that such small MPAs on at least the northern part of the Florida Shelf will not be an effective tool for regulation of fishing impacts (GMFMC 2007a,b). **Option b** creates a time/area closure about three times larger than **Option a**, and is more likely to have long-term impacts on the gag stock of the male population. **Options i, ii iii and iv** determine what kind and how much fishing activity is allowed within the time/area closure. **Option i** is the most conservative of the three. It applies the same rules that currently exist for the Madison-Swanson and Steamboat Lumps restricted fishing areas, i.e. all fishing is prohibited November through April, and surface trolling is allowed May through October. **Option ii** differs in that it allows all fishing during the six months, May through October, rather than just surface trolling, thus creating a six month seasonal area closure that encompasses the entire spawning period for gag while allowing unrestricted fishing outside of the spawning season. **Preferred Option iii** is similar to **Option ii** in that it creates a seasonal area closure but for only four months, January through April. **Preferred Option iii** does not close the area for the entire gag spawning season, but it does encompass the months of January through March, when peak spawning is most likely to occur. **Option iv** creates a seasonal area closure for only two months, March and April, and only closes the area for half of the peak February to March gag spawning season. By leaving known areas with gag aggregations open during part of the peak spawning season, this option may encourage effort shifting to concentrate fishing on the aggregations, and could be counterproductive to protecting spawners,

Options i, ii and iii could provide protections to spawning gag (in decreasing order of effectiveness) that could be either greater or less than the existing closed season depending upon how successfully they are enforced and complied with relative to the closed season. **Option iv** leaves the area open to reef fish fishing during half of the peak gag spawning season, and is therefore less likely to provide protection for many spawning aggregations. **Option i** will also provide protection for male gag in the area year round, and for spawning of other species such as scamp that may utilize the area during the May through October period. With all of the options, repeal of the closed season will reduce protection of the offshore male gag population by allowing year-round fishing on them.

Alternative 3 expands the Madison-Swanson restricted fishing area to an area north and west of the existing area known to have habitat for gag spawning. This is also an area heavily used by both commercial and recreational fishing vessels (Smith and Zurcher 2007), which would be diverted away from this area. Because this area is smaller than either of the options in **Alternative 2**, its impact, if any, on spawning aggregations and male gag would likely be less than that alternative. Because of its relatively close proximity to shore, poaching may be a greater problem with this alternative than with the other alternatives.

Alternative 4 is based on the recommendation from the Ecosystem SSC's modeling workshops that existing MPAs on at least the northern part of the Florida Shelf will not be an effective tool for regulation of fishing impacts; much larger, cross-shelf MPAs would be needed to protect a range of species from fishing suffered during life-cycle offshore movement (GMFMD 2007a,b). However, in their modeling exercises, the Ecosystem SSC was unable to demonstrate an impact from the specific cross-shelf MPAs proposed in this alternative. One possible reason could be a lack of detailed habitat data within the extensions (personal communication, C. Walters). This alternative does not provide additional protection for either spawning aggregations or the offshore male population. However, the Ecosystem SSC noted that protection of fish during spawning does not protect them from harvest during seasonal migrations at other times of the year (GMFMC 2007b). Female gag migrating to and from the spawning areas may be susceptible to fishing mortality, particularly if fishermen locate pre-spawning aggregations. The restricted fishing areas created in **Alternative 4** will protect a portion of the female gag during their spawning migrations. In addition, as cross-sectional restricted fishing areas encompassing a variety of habitats, they will function as ecological reserves to help maintain biodiversity, similar to the Tortugas ecological reserves.

5.11.3 Direct and Indirect Effects on Economic/Social Environment

5.11.3.1 Direct and Indirect Effects on the Economic Environment

The two MPAs, Madison-Swanson and Steamboat Lumps, have been in effect since 2000. Steamboat Lumps is located in statistical area 6, and its size of 104 square nm is about 1.3% of the statistical area's total size of 8,100 sq. nm. Madison-Swanson is located in statistical area 8 and comprises about 115 sq. nm, which is about 1.2% of the statistical area's total size of 9,570 sq. nm. Fishing within these two areas is prohibited November through April, with surface trolling allowed May through October. The no action alternative refers to these two areas and their attendant fishing rules. **Alternative 2** would create an additional MPA, either the Snyder Ridge (127 sq. nm; **Option a**) or the Edges 40 Fathom Contour (390 sq. nm; **Preferred Option b**). Under this alternative, fishing regulation options consist of fishing rules identical to those of the two existing MPAs where all fishing is prohibited in an area from November to April and surface trolling can occur from May through October (**Option i**), or all fishing is prohibited in an area from November to April and all fishing is allowed from May through October (**Option ii**), or all fishing is prohibited in an area from January to April and all fishing is allowed from May through December (**Preferred Option iii**), or all fishing is prohibited in an area from March to April and all fishing is allowed from May through January (**Option iv**). **Alternative 3** would expand the size of the Madison-Swanson restricted fishing area by about 70 sq. nm, with the same fishing rules. **Alternative 4** would expand the Madison-Swanson restricted fishing area by an additional 523 sq. nm and the Steamboat Lumps by an additional 1,037 sq. nm. Existing fishing rules apply to the expanded areas. Other than **Alternative 1** then, all alternatives in this section would have direct economic effects in terms of highly likely increases in short-run cost and potential future benefits. The potential costs and benefits of any of the measures that would expand existing MPAs may be contended to magnify, but not necessarily in a linear fashion, the corresponding effects of existing MPAs.

The major economic benefit from the two MPAs would arise from protection of the fish within the time/area closure. If successful, areas around the area would also benefit from having increased fish abundance. With these two effects, the overall allowable harvest for protected species may be increased as to also increase the economic benefits from the fishery. Research conducted from 2001 to 2007 have shown significantly larger and older red snapper, red grouper, and scamp within the two MPAs relative to outside areas. However, the evidence for gag in terms of enhanced stock level and higher male proportion is inconclusive. It appears then that the alternatives expanding the restricted fishing areas would potentially yield some biological benefits to red snapper, red grouper, and scamp. The effects on gag are uncertain. Even if catches do not increase outside of the MPAs, it is possible for economic benefits to be derived from the creation of an MPA if the resulting enhanced stock condition inside the MPA allows for less restrictive management of fishing activity outside of the MPA.

On the cost side, it is instructive to outline the general costs associated with the establishment of the two restricted fishing areas, with the understanding that these costs may be expected to increase if current areas are expanded or new ones are created.

The primary effect of the two restricted fishing areas on the commercial sector would be the displacement of fishermen that historically utilized the fishery resource in those areas. It is assumed that fishermen who historically harvested fish in the two areas must have considered the areas as more productive than other areas. Otherwise, they would have fished in these other areas. The restricted fishing areas, therefore, removed more productive areas from these fishermen's production horizon. As a result, two things are likely to happen to these participants. First, their harvest and revenues would decrease. The reduction in harvest would come from fishing in less productive areas. Second, if fishermen attempted to offset their harvest and revenue loss by fishing in other areas, they would incur higher cost per pound of fish caught or fewer fish per dollar of cost relative to their previous fishing activities in the restricted fishing areas. In addition to profit reductions of these vessels directly affected by the restricted fishing areas, other vessels fishing elsewhere would also be affected to the extent that they would now face additional competition from the vessels displaced from the areas. An additional consideration is the possible mitigation effect on prices that reduced harvest quantities may cause. However, since the two restricted fishing areas accounted for only a small portion of total grouper and reef fish caught in Florida and elsewhere in the Gulf, a reduction in harvest would not likely be accompanied by a significant, if any, increase in price.

Recreational vessels, particularly the for-hire vessels, that fished in the restricted fishing areas for reef fish would also be displaced by the establishment of the restricted fishing areas. They would either have to shift their fishing effort on the restricted fishing areas to highly migratory species, which are still allowed to be harvested within the restricted fishing areas, or shift their fishing effort to other areas. It is likely that such effect on fishing effort would increase the cost of recreational fishing. In addition, competition would increase in those areas receiving displaced effort. Thus, not only would the cost of recreational fishing increase, there is also the likelihood that the overall quality of the fishing experience would decline.

Closed areas could also increase enforcement costs. Studies on the two restricted fishing areas mentioned some enforcement problems regarding fishing within the atras, and this may signify that more enforcement activities and thereby more expenditures may be required in order for the restricted fishing areas to be effective. This is perhaps true especially if the same regulatory structure currently governing existing restricted fishing areas are imposed on time/area closures. Currently, fishing of certain species using certain gear types is allowed within the two existing restricted fishing areas. In addition, vessel transit through the areas is allowed. The VMS requirement on commercial vessels and for-hire vessels with commercial permits would definitely enhance the enforcement of fishing rules within the areas. Maybe via VMS enforcement officers can distinguish between fishing and transit activities in the restricted area, but they might not be able to accurately tell if a fishing activity occurring within the restricted fishing areas is one that is allowed by the rules. Moreover, violations by private recreational vessels, which are exempted from the VMS requirement, would still continue to pose problems.

There are two additional points worth mentioning about the benefits and costs of the two restricted fishing areas and thus also of any alternative expanding the areas. First, the benefits (if achieved) would accrue in the future while the costs would be incurred from the moment the restricted fishing areas were established. Second, the realization of benefits is less certain than the imposition of costs. The economic issue with respect to the expansion of the restricted fishing areas, therefore, has to take into account not only the trade-off between short-run costs and long-term benefits but also the probability of realizing the expected benefits and incurring the costs.

In Amendment 21, which extended the two restricted fishing areas, it was estimated that the two areas would reduce revenues of commercial vessels by about $352,000 annually. If the new time/area closure possessed the same characteristics as the two existing restricted fishing areas, it would appear that annual revenue reductions would be more under **Alternatives 2(b), 4(a), and (4b)** since each of these alternatives would add larger areas than those of the two restricted fishing areas combined. **Alternatives 2(a) and 3** would reduce revenues by lesser amounts but nonetheless there would be additional revenue reductions. The specific magnitudes of effects of **Alternatives 2(a) and 2(b)** would also depend on the extent of fishery closures in these areas under **Sub-options (i) through (iv)**. Of the four sub-options, the potentially most restrictive is **Sub-option (i)**, which would ban all fishing for six months and open for surface trolling the other six months. This particular sub-option would likely result in the largest revenue reductions. The next largest revenue reductions would come from **Sub-option (ii)**, which is structured similarly as the first sub-option but with the added proviso of allowing all fishing, not only surface trolling, in the open months. Next in line would be **Preferred Sub-option (iii)**, which would ban all fishing for four months and allow all fishing the other months. The least revenue reductions would come from **Sub-option (iv)**, which would ban all fishing for only two months and allow all fishing the other months. Revenue losses to the for-hire vessels as well as additional fishing costs to both commercial and recreational vessels could not estimated.

Although it would appear straightforward to estimate the magnitude of effects of the new alternatives using the same approach used in Amendment 21, there is not enough information to do the estimation. In addition, that approach may not be entirely appropriate. To appreciate the difficulty involved in quantifying the effects of the alternatives to expand existing restricted fishing areas , it is instructive to describe the approach previously used.

In the original regulatory amendment that established the two restricted fishing areas in 2000, it was estimated that closure of the two areas would reduce overall landings of gag by 2.28%, red grouper by 0.61%, black grouper by 1.5%, and other shallow-water grouper by 0.05%. Two major assumptions used in the estimation were: (1) the closed areas would cover all areas in Statistical Areas 6 and 8 with water depths between 30 and 50 fathoms and, (2) all commercial landings of shallow-water grouper in Statistical Areas 6 and 8 would follow the distribution of landings by water depth reported in the Florida Trip Ticket System (FTTS). Although arguably a practical necessity, the first assumption would result in an overestimate of impacts of the proposed action since it would encompass a larger geographic range than the proposed action. Further, the second assumption was questioned by industry participants on the basis that reported depths of catch in the FTTS did not reflect actual catches by water depths. Industry participants contended that most grouper catches were caught in water depths below 50 fathoms while the FTTS information used showed that most catches of grouper were from areas deeper than 50 fathoms. If industry comments were true, then the second assumption would lead to an underestimation of impacts of the closed areas on commercial landings.

One way of modifying the first assumption was to further assume that catches of shallow-water grouper between 30 and 50 fathoms were uniformly distributed within these water depths. In this way, grouper catches in the restricted fishing areas could be calculated as the product of grouper caught between 30 and 50 fathoms and the proportion of area within the restricted fishing areas to total area between 30 and 50 fathoms. The Steamboat Lumps site, which is located in Statistical Area 6, covers an area of 104 sq. nm and is 13.2% of the area between 30 and 50 fathoms. The Madison-Swanson site, which is located in Statistical Area 8, covers an area of 115 sq. nm and is 25.7% of the area between 30 and 50 fathoms. These percentages were assumed to represent the proportion of grouper caught between 30 and 50 fathoms that could be assigned to the two restricted fishing areas. It should be noted that this approach did not differentiate between the different species of shallow-water grouper.

Modifying the second assumption involved using different information regarding the distribution of grouper catches within Statistical Areas 6 and 8. One possible source of additional information was the distribution of red grouper catches by water depth reported in the Trip Interview Program (TIP). Although some concerns were raised regarding the representativeness of sampled trips for this program, it did provide information on catches by water depths that appeared to address the criticism leveled at the FTTS data regarding the distribution of grouper catches by water depths. Per TIP information for 1998-1999, about 55.4% of red grouper were caught between 30 and 50 fathoms. Information for other species was not available. It was, therefore, assumed that this distribution of catches by water depths for red grouper also applied to the other species in the shallow water grouper complex.

The described approach hinges critically on the assumptions that all areas within the 30 to 50 fathom contour lines of the statistical areas 6 and 8 are equally productive and that fishing effort is also equally apportioned over all subject areas. In addition, the approach also depends on the appropriateness of using extending TIP information on catches by water depths of a species or two to all shallow-water groupers and even other fish species previously caught in the restricted fishing areas . How valid are these assumptions (especially when applied to the new time/area closures considered in this amendment) cannot be ascertained. For the new time/area closures, it is important to use information on the distribution of catches and fishing effort within these areas.

Using a more theoretically sound approach, Smith, Zhang, and Coleman (2006) estimated the effects of the two restricted fishing areas in the Gulf, with particular focus on gag. Results of their model were inconclusive when evaluating the Madison-Swanson restricted fishing area.

When applied to the Steamboat Lumps, their model found that after four years, the area did not produce statistically significant losses in sustainable yield or statistically significant gains in biological production. One major implication of these results for the two restricted fishing areas is that while costs continue to be incurred by fishing participants, benefits derivable from the restricted fishing areas are still uncertain. Expanding the areas would likely add costs to the fishing participants. Whether actual benefits would accrue from new time/area closures cannot be given a definite answer.

A couple of points, however, are worth noting here. First, Smith, Zhang, and Coleman hinted that the results they obtained for gag may be conditioned by the short time frame (4.5 years) they used, and suggested maintaining the restricted fishing areas over a longer period. Under current regulations, the two restricted fishing areas would sunset in 2010 unless extended by another amendment. Second, as noted in the biological effects part of this section, the Ecosystem SSC and the Council's former Reef Fish Stock Assessment Panel indicated that the two restricted fishing areas are too small to have any stock-wide impacts. Whether any of the alternatives to expand current restricted fishing areas would be sufficient to address the noted concern about size can only be answered after it is implemented preferably over a longer time frame.

<u>Summary</u>

Other than **Alternative 1**, all alternatives in this section would have direct economic effects in terms of increasing short-run cost and potential future benefits. The potential costs and benefits of any of the measures that would expand existing MPAs may be contended to magnify, but not necessarily in a linear fashion, the corresponding effects of existing MPAs. On the basis of researches done on the two existing restricted fishing areas, economic benefits from the alternatives in this section could come from potentially higher yields for red snapper, red grouper, and scamp. The effects on gag productivity appear to be uncertain.

The primary effect of the various alternatives to expand restricted fishing areas or create new time/area closures on the fishing sectors would be the displacement of fishers that historically utilized the fishery resource in those areas. This would tend to reduce commercial and recreational harvests and thus also commercial and for-hire revenues and benefits to anglers. If vessels were to attempt to offset their losses by fishing in other areas, they could partly offset revenues and benefits but at the expense of higher costs. The net effects are relatively uncertain.

5.11.3.2 Direct and Indirect Effects on the Social Environment

Alternative 1. No action. This alternative would not have any impacts on the social environment in the short term because it would not create any additional time/area closures that prohibit fishing for grouper and other reef fish.

Alternative 2 would establish a new time/area closure within the gag spawning area: **option (a)** is Snyder Ridge which is approximately 127 square miles. Establishing a new time/area closure could have a negative impact on commercial and recreational fishermen who would no longer be able to fish in these areas. If this is an area where fishermen now fish, they will have to find other areas to fish in. Charter boat fishermen may have to find new areas to take their clients if this area is where they normally fish. Commercial and recreational fishermen may have to use more fuel to get to other locations that are further away from where they now fish if they were fishing in the area that will be part of a new time/area closure. Fishermen will be prohibited from fishing for other species that may be located in the area which could lower overall landings.

If creating a new time/area closure keeps commercial and recreational fishermen from fishing in an area they are accustomed to, there may be loss of profits while they find new areas to fish. It may also make it more difficult to find fish to harvest which could indirectly change their fishing patterns. Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a restricted fishing area or time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure.

Although this action in itself may not have a major impact on the commercial and recreational fisheries, cumulatively there are added impacts when considered with other closures and regulations that restrict fishing.

In the long term, if the creation of a new time/area closure helps to protect the spawning grounds for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

Alternative 2, option (b) would create a time/area closure at the Edges of the 40 fathom contour area which is approximately 390 square miles. Like **option (a)** establishing a new time/area closure could have a negative impact on commercial and recreational fishermen who would no longer be able to fish in the area. If this is an area where fishermen now fish, they will have to find other areas to fish in. Charter boat fishermen may have to find new areas to take their clients to if this area is where they normally fish causing uncertainty in their catches while they adjust. Commercial and recreational fishermen may have to use more fuel to get to other locations that are further away from where they now fish if they were fishing in the area that will be part of a new time/area closure.

If creating a new time/area closure keeps commercial and recreational fishermen from fishing in an area they are accustomed to, there may be loss of profits while they find new areas to fish. It may also make it more difficult to find fish to harvest which could indirectly change their fishing patterns. Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a restricted fishing area or time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure.

In the short term, **Alternative 2, option (b)** would have more of a negative impact on commercial and recreational fishermen because it would close off a larger area than **option (a)**. Although this action in itself may not have a major impact on the commercial and recreational fisheries, cumulatively there is an added impact when considered with other closures and regulations that restrict fishing.

In the long term, if the creation of a new time/area closure helps to protect the spawning grounds for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

For either Option (a) or Option (b) under Alternative 2, there are four sub-options specifying restrictions on fishing activities. These sub-options range from the most restrictive (**Sub-option (i)**) which would prohibit all fishing for six months and allow surface trolling in the other six months to the least restrictive (**Sub-option (iv)**) which would ban all fishing only for two months and allow all fishing in the other months. The short-term adverse impacts on commercial and recreational fishermen would in general positively correlate with the restrictiveness of the various sub-options. From the largest to the smallest adverse impacts, the various sub-options may be ordered as follows: **Sub-option (i)**, **Sub-option (ii)**, **Sub-option (iii)**, **and Sub-option (iv)**. On the other hand, the long-term protection afforded to the fish stock, particularly gag, would be higher under the more restrictive sub-options.

Alternative 3 would expand the Madison-Swanson Marine restricted fishing area to the north and west to adding approximately 70 more square miles to the area. This would extend the restricted fishing area area closer to shore and could require that fishermen who fish in this area travel further from shore to avoid the newly defined area.

Establishing new time/area closures or expanding existing restricted fishing areas could have a negative impact on commercial and recreational fishermen who would no longer be able to fish in these areas. If this is an area where fishermen now fish, they will have to find other areas to fish in. Charter boat fishermen may have to find new areas to take their clients to if this area is where they normally fish causing uncertainty in their catches while they adjust. Commercial and recreational fishermen may have to use more fuel to get to other locations that are further away from where they now fish if they were fishing in the area that will be part of a new time/area closure.

If creating a new time/area closure keeps commercial and recreational fishermen from fishing in an area they are accustomed to, there may be loss of profits while they find new areas to fish. It may also make it more difficult to find fish to harvest which could indirectly change their fishing patterns. Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure.

Although this action in itself may not have a major impact on the commercial and recreational fisheries, cumulatively there is an added impact when considered with other closures and regulations that restrict fishing.

In the long term, if the creation of a new time/area closure helps to protect the spawning grounds for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

Alternative 4 would expand the Madison-Swanson and Steamboat Lumps restricted fishing areas into a network of cross-shelf restricted fishing areas to protect gag grouper and other species during life-cycle offshore movement. **Option (a)** would close off an additional 523 square nautical miles and **option (b)** would close off an additional 1,037 square nautical miles.

Establishing new time/area closures or expanding existing restricted fishing areas could have a negative impact on commercial and recreational fishermen who would no longer be able to fish in these areas. If this is an area where fishermen now fish, they will have to find other areas to fish in. Charter boat fishermen may have to find new areas to take their clients to if this area is where they normally fish causing uncertainty in their catches while they adjust. Commercial and recreational fishermen may have to use more fuel to get to other locations that are further away from where they now fish if they were fishing in the area that will be part of a new time/area closure.

If creating a new /area closures or expanding existing restricted fishing areas keeps commercial and recreational fishermen from fishing in an area they are accustomed to, there may be loss of profits while they find new areas to fish. It may also make it more difficult to find fish to harvest which could indirectly change their fishing patterns. Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure.

Although this action in itself may not have a major impact on the commercial and recreational fisheries, cumulatively there is an added impact when considered with other closures and regulations that restrict fishing.

In the short term, **option (a)** may have less impact on commercial and recreational fishermen than **option (b)** because the area that would be expanded is smaller.

In the long term, if the creation of a new time/area closure or expanding existing restricted fishing areas helps to protect the spawning grounds for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

Summary

Alternative 1 would have the least negative impacts on the social environment in the short term because it would not create any additional time/area closures that restrict fishing within it. **Alternatives 2, 3,** and **4** would each create new time/area closures or expanding existing restricted fishing areas. Commercial and recreational fishermen may prefer one alternative over another, depending on which port they fish from and where the fish. The impact to any particular fishermen will depend on if they can find other places to fish, or if the creation of time/area closures causes a reduction in harvest and a loss of income for commercial fishermen.

Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure.

Although any of these actions may not have a major impact on the commercial and recreational fisheries, cumulatively there is an added impact when considered with other closures and regulations that restrict fishing.

In the long term, if the creation of a new time/area closures or expanding existing restricted fishing areas helps to protect the spawning grounds for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

5.11.4 Direct and Indirect Effects on Administrative Environment

Alternative 1 does not create any new area closures and therefore does not change any exiting administrative impacts. Fishermen will still need to be notified of the existing restricted fishing areas and fishing restrictions though regulation pamphlets, and enforcement of the offshore areas will still need to be conducted at sea by the U.S. Coast Guard and/or Florida FWC enforcement. There are no permit or gear requirements for fishermen other than a requirement that fishing gear (other than surface trolling gear during May through October) must be appropriately stowed while a vessel is in the restricted area, and a vessel must be in transit if it has a species onboard that is prohibited from harvest in the restricted fishing area.

Under any alternative except Alternative 1, the creation of any new restricted fishing areas or time/area closures would require notification to fishermen through revised regulation pamphlets and news releases.

A key concern with offshore restricted fishing areas is poaching, which can reduce the effectiveness of such areas. All of the alternatives except **Alternative 1** increase the amount of area restricted to fishing, and may require additional at-sea enforcement efforts by the U.S. Coast Guard and Florida FWC enforcement. In order of the amount of increased area, **Alternative 3** creates the smallest increase, followed by **Alternative 2a, Alternative 2b, and Alternative 4**. Under **Alternative 2**, the allowance for surface trolling during part of the year in **Option i** can complicate enforcement by requiring that vessels be identified not only as to whether the are fishing, but also what kind of fishing activities they are participating in. This same concern applies to **Alternatives 3 and 4**, which extend the existing restricted fishing areas and regulations.

The effectiveness of restricted fishing areas and time/area closures as a fishery management tool remains in question. The existing Madison-Swanson and Steamboat Lumps restricted fishing areas were established as an experiment to evaluate their effectiveness. Any new time/area closures or expansion of restricted fishing areas created in **Alternatives 2, 3 or 4** would also need to be monitored for effectiveness, requiring additional research funding.

5.12 Action 12. Duration of Time/Area Closures

The previous discussion of Action 11 (creation of time/area closures) reviewed the environmental impacts of creating new area closures on the west Florida shelf or of extending existing restricted fishing areas. The alternatives in this section determine how long those impacts will be in effect. **Preferred Alternative 1** and **Alternatives 2 and 3** address the duration of any new time/area closures created in Action 11, while **Preferred Alternative 4** addresses reauthorization of the existing Madison-Swanson and Steamboat Lumps restricted fishing areas, which are currently set to expire on June 16, 2010.

5.12.1 Direct and Indirect Effects on Physical Environment

Preferred Alternative 1 (no action) states that there will be no expiration date specified for any new area closures created under Action 11. This means that the impacts to the physical environment described in Section 5.11.1 will continue indefinitely, or until modified in a subsequent plan amendment. Since these impacts are beneficial in terms of protecting bottom habitat, this is most likely the longest and therefore the most conservative alternative

Alternative 2 would set the expiration date on any new area closures at June 16, 2010, to coincide with the existing expiration date for Madison-Swanson and Steamboat Lumps restricted fishing areas. Since this amendment will likely not be implemented before mid-2009 at the earliest, this would provide only about one year of protection to the bottom habitat, unless the area closures are continued in a subsequent amendment that would need to begin to be developed immediately. This time frame is likely too short to establish any significant impacts.

Alternative 3 would establish new area closures for a period of 10 years. This would provide protection for the bottom habitat over an extended period, although not as long as **Preferred Alternative 1**. Thus, this alternative, while less conservative than **Alternative 1**, is more conservative than **Alternative 2**, is. After ten years, the area closures and the protection they afford would expire unless extended in a subsequent amendment

Preferred Alternative 4 addresses reauthorization of the existing Madison-Swanson and Steamboat Lumps marine restricted fishing areas . Option a, the no action option for this alternative, allows the restricted fishing areas to expire on June 10, 2010, at which time year round unrestricted fishing will again be allowed in those areas. Actions such as longlining or fishing lines becoming entangled in the bottom are potential likely sources of damage to the bottom habitat. **Preferred Option b** would reauthorize the restricted fishing areas indefinitely. The Madison-Swanson and Steamboat Lumps restricted fishing areas would thus remain in place unless removed by a subsequent amendment. This provides the greatest long-term benefits to the bottom habitat of all the options. **Option c** would reauthorize the restricted fishing areas for an additional 10 years, while this would provide short-term benefits to the habitat, a subsequent plan amendment within ten years would be needed to continue the long-term benefits inherent in **Option b**.

5.12.2 Direct and Indirect Effects on the Biological / Ecological Environment

Preferred Alternative 1 would leave new time/area closures in place indefinitely. This would provide the greatest protection from fishing interactions for organisms and ecosystems within the time/area closures. Monitoring studies to date in the Madison-Swanson and Steamboat Lumps restricted fishing areas have been inconclusive as to whether there are biological or ecosystem benefits, particularly with respect to abundance of key reef fish species and proportion of male gag[12], but researchers have suggested that a minimum of ten years is needed to detect any changes. This alternative would provide adequate time to assess the effectiveness of the restricted fishing areas.

Alternative 2 would result in new time/area closures expiring on June 16, 2010, unless extended in a subsequent amendment. This is less than two years from an expected implementation date of mid- 2009. Based on the monitoring reports for the Madison-Swanson and Steamboat Lumps restricted fishing areas , this is too short a time to detect any impacts to biological/ecological environment.

Alternative 3 would result in new area closures expiring ten years after implementation. Since the average age for a female gag to transition to a male is about 11 years (SEDAR 10), this ten-year time period will not provide sufficient time to fully evaluate the effects on the male gag population. However, it will allow time for male gag numbers and the gag stocks to respond to the protection from the closed areas, and will allow long-term scientific studies on the effects of the time/area closures. Because this alternative's duration is between that of **Alternatives 1 and 2**, it has more conservation value than Alternative 2 but less conservation value than **Preferred Alternative 1**.

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[12] Presentations from Chris Gledhill, Andrew David and Chris Koenig given at the October 29 – November 1, 2007 Gulf Council meeting in Biloxi, Mississippi

Preferred Alternative 4 extends the duration of the existing Madison-Swanson and Steamboat Lumps restricted fishing areas. Option a allows the existing sunset date of June 16, 2010 to remain in place, thus removing any protections for the biological/ecological environment. While the evidence of effectiveness of these restricted fishing areas is inconclusive, this may be due to too short a time period or to illegal poaching. **Preferred Option b** continues the restricted fishing areas indefinitely, providing the maximum long-term protection for the biological/ecological environment within the restricted fishing areas. Benefits may over time also accrue to the habitat adjacent to the areas through spillover migration of adult fish and through egg dispersal from spawners within the restricted fishing areas not only from gag, but also from scamp and other species that utilize the restricted fishing areas as a spawning area. **Option c** extends the time/area closures for an additional 10 years, providing short term benefits similar to **Option b**, but requiring a subsequent amendment to continue those benefits further.

5.12.3 Direct and Indirect Effects on Economic/Social Environment

5.12.3.1 Direct and Indirect Effects on the Economic Environment

The Madison-Swanson and Steamboat Lumps restricted fishing areas are set to expire in 2010 unless extended by another amendment. Alternatives 1 through 3 would address the duration of area fishing closures created under Action 11. The no action alternative (**Preferred Alternative 1**) is a little different from the usual no action alternative. It would, in effect, provide for an indefinite duration of any time/area closures created under Action 11. The Council, however, can intervene any time and terminate the closures. **Alternative 2** would provide for the new time/area closure to sunset at the same time as the two existing restricted fishing areas in 2010. **Alternative 3** would provide for a 10-year duration for new time/area closures. **Preferred Alternative 4** would address the duration of the two existing restricted fishing areas, with three sub-options under it. **Sub-option (a)** is a no action alternative and thus would allow the two restricted fishing areas to sunset in 2010. **Preferred Sub-option (b)** would extend indefinitely the duration of the two existing restricted fishing areas. **Sub-option (c)** would extend for ten years the duration of the two existing restricted fishing areas.

In general, the duration of the new time/area closures would be longest under **Preferred Alternative 1** and shortest under **Alternative 2**. For the two existing restricted fishing areas, the duration would be longest under **Preferred Sub-option (b)** and shortest under **Sub-option (a)**.

One major economic consideration here is that costs to fishery participants would directly vary with the duration of the areas. For time/rea closures created under Action 11, Preferred Alternative 1 may be considered to result in the largest costs while the lowest costs would accrue to **Alternative 2.** For the two existing restricted fishing areas, the largest cost would accrue to **Preferred Sub-option (b)**, and the lowest to **Sub-option (a)**.

For determination of benefits, however, there appears the need to allow restricted fishing areas or time/area closures to exist for an extended period of time. For newly created time/area closures under Action 11, **Alternative 2** would provide for the shortest time, so evaluation of new time/area closures is, at best, bound to come up with inconclusive results. Thus, for proper evaluation of new time/area closures, **Alternative 2** may be ranked lowest. An indefinite duration (**Preferred Alternative 1**) would offer the best scenario for properly evaluating time/area closures. But an indefinite duration would not appear to be a good balance between costs and proper evaluation of the benefits from time/area closures. It appears that such balance would likely be achieved by a 10-year horizon (**Alternative 3**). A similar comment may be made about the duration of the two existing restricted fishing areas. **Sub-option (a)** would not allow enough time to evaluate the effects of the two restricted fishing areas. On the other end, **Preferred Sub-option (b)** would impose a relatively large cost. Again, it appears the balancing and costs and effectiveness of restricted fishing areas evaluation would be offered by **Sub-option (c)**.

Summary

One major economic consideration here is that a proper evaluation of restricted fishing areas or time/area closures is a function of its duration, but costs to fishery participants directly vary with the duration of the area restrictions. Balancing costs and evaluative period of restricted fishing areas or time/area closures appears likely to be achieved by a 10-year horizon, both for the newly created time/area closures (**Alternative 3**) and the two existing restricted fishing areas (**Sub-option (c)**).

5.12.3.2 Direct and Indirect Effects on the Social Environment

Preferred Alternative 1 would be no action and restricted fishing areas created under Action 11 will be monitored for effectiveness and will remain in effect unless terminated in a subsequent amendment. From a social stand point, commercial and recreational fishermen may be less in favor of the creation of time/area closures if they are restricted from fishing in these areas indefinitely. They may be more willing to favor the creation of time/area closures if they think that the closure will result in increased stock which will benefit them in the long term as the stock rebuilds and the area can be once again open for fishing. If fishermen were expecting these areas to reopen in 2010, then keeping them closed until 2018 may cause fishermen to doubt council actions that originally allowed for the reopening of these closed areas in 2010.

Alternative 2 would allow for the monitoring of new time/area closures created in Action 11 and the areas would expire after June 16, 2010 unless reauthorized in a subsequent amendment. This alternative would allow for the newly created time/area closures to be reopened in 2010 unless a new amendment is put in place before then. Reopening areas that were declared a time/area closure will benefit recreational and commercial fishermen in the short term because they would only have fishing restrictions in these areas for two years. Fishermen may be more willing to comply with a time/area closure if it is for a short period of time and would aid in the rebuilding of stocks. In the long term, monitoring may show that the stocks are not rebuilt enough to open the time/area closures created in Action 11 to fishing again and new regulations will need to be written to keep these areas closed past 2010.

Alternative 3 would allow for the monitoring of new time/area closures created in Action 11 and the areas would expire 10 years after implementation unless reauthorized in a subsequent amendment. This alternative could have negative impacts on commercial and recreational fishermen who now fish in these areas because it will keep these areas closed for a minimum of ten years.

Preferred Alternative 4 addresses the continued duration of the existing Madison-Swanson and Steamboat Lumps restricted fishing areas. **Option (a)** would result in the Madison-Swanson and Steamboat Lumps restricted fishing areas remaining only until the expiration date of June 16, 2010. A sunset of June 16, 2010 would benefit fishermen who would once again be able to fish these areas after that date. **Preferred Option (b)** would keep the Madison-Swanson and Steamboat Lumps restricted fishing areas under the current regulations unless terminated in a subsequent amendment. From a social stand point, commercial and recreational fishermen may be less in favor of the creation of restricted fishing areas if they are restricted from fishing in these areas indefinitely. **Option (c)** would change the sunset date for Madison-Swanson and Steamboat Lumps restricted fishing areas so they expire in ten years rather than in 2010. If fishermen were expecting these areas to reopen in 2010, then keeping them closed until 2018 may cause fishermen to doubt council actions that originally allowed for the reopening of these closed areas in 2010.

Establishing new time/area closures or expanding existing restricted fishing areas could have a negative impact on commercial and recreational fishermen who would no longer be able to fish in these areas. If this is an area where fishermen now fish, they will have to find other areas to fish in. Commercial and recreational fishermen may feel that ten years is too long to be restricted from an area. Closing off these areas will require that fishermen find new locations to fish in. Charter boat fishermen may have to find new areas to take their clients to if this area is where they normally fish causing uncertainty in their catches while they adjust. Commercial and recreational fishermen may have to use more fuel to get to other locations that are further away from where they now fish if they were fishing in the area that will be part of a new time/area closure or restricted fishing area. Fishermen will be prohibited from fishing for other species that may be located in the area that would be designated as a restricted fishing area.

If creating a new time/area closure or expanding an existing restricted fishing area keeps commercial and recreational fishermen from fishing in an area they are accustomed to, there may be loss of profits while they find new areas to fish. It may also make it more difficult to find fish to harvest which could indirectly change their fishing patterns. Recreational fishermen may decide to fish from other ports where they can more easily access areas that are not part of a time/area closure. This could indirectly impact businesses such as hotels, bait and tackle shops, marinas, etc., that now cater to fishermen who fish in these areas. If closing off this area to fishermen results in a reduction in catch for the commercial fishermen, then there may also be a loss of profits and possible loss of jobs that are dependent on the fishing industry in businesses located nearest the newly created time/area closure.

Although this action in itself may not have a major impact on the commercial and recreational fisheries, cumulatively there is an added impact when considered with other closures and regulations that restrict fishing.

In the long term, if the creation of a new time/area closure helps to protect the spawning grounds for gag grouper, then this will aid in the rebuilding of the stocks which will benefit commercial and recreational fishermen, fishing dependent businesses, and fishing communities involved in the fishery in the future because presumably there would be more fish to harvest.

5.12.4 Direct and Indirect Effects on Administrative Environment

All of the alternatives would require that restricted fishing areas and time/area closures be monitored for effectiveness, adding to the administrative requirements from the SEFSC.

Preferred Alternative 1 would provide the least impact on the administrative environment. Since new area closures would be in existence indefinitely, there would be no need to periodically create an amendment to extend their duration. However, if monitoring and evaluation of the area closures determines that they are not effective, an amendment would be required to modify or terminate them.

Alternative 2 would require that a new plan amendment be prepared and implemented by June 16, 2010 if the new area closures are to be continued beyond that date. This would add to the administrative load for the Council and the SERO by requiring that preparation of that amendment begin even before implementation of this amendment.

Alternative 3 would require a new amendment to consider extending the new time/area closures prior to 2018, depending upon when this amendment is implemented. This would also create the administrative impact on the Council and SERO described for **Alternative 2**, but deferred for ten years.

Preferred Alternative 4 affects the administrative environment related to the existing Madison-Swanson and Steamboat Lumps restricted fishing areas. **Option a** would allow the restricted fishing areas to expire on their present sunset date of June 16, 2010. This would relieve the SEFSC of the requirement to monitor the restricted fishing areas effectiveness, but would also eliminate areas valuable to research scientists studying human impacts on the marine environment. **Preferred Option b** would continue the existing restricted fishing areas indefinitely, requiring ongoing monitoring but eliminating the need for a subsequent reauthorization amendment. **Option c** would continue the existing restricted fishing areas for an additional ten years. This would require ongoing monitoring over a finite time period, with a potential extension by a subsequent plan amendment. Requiring a subsequent amendment would impact the administrative environment for the Gulf Council and SERO ten years after implementation of this amendment.

5.13 Action 13. Federal Regulatory Compliance

5.13.1 Direct and Indirect Effects on Physical Environment

Fishery management actions that affect the physical environment mostly relate to the interactions of fishing with bottom habitat, either through gear impacts to bottom habitat or through the incidental harvest of bottom habitat. 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). Because habitat-gear interactions are closely linked to fishing effort, management measures that reduce fishing effort benefit habitat by reducing these interactions.

The degree and magnitude of impacts to the physical environment are often gear-specific. For instance, retrieval of commercial longline gear can abrade, snag and dislodge smaller rocks, corals, and sessile invertebrates (Bohnsack in Hamilton, 2000; Barnette 2001). The damage that this gear inflicts to the bottom depends on currents and the amount of line sweep caused by hooked fish (Barnette 2001). Vertical line gear has the potential to snag and entangle bottom structures and cause tear-offs or abrasions (Barnette 2001). If this gear is lost or improperly disposed of it can entangle marine life or become fouled with algae and eventually kill essential fish habitat, such as corals (Hamilton 2000; Barnette, 2001). Anchors may cause direct damage to habitat, especially at well known, frequently visited fishing sites. The cumulative effects of repeated anchoring could damage the hard bottom areas where fishing for reef fish occurs.

The effects on the physical environment resulting from **Alternative 1** are expected to be similar to current fishing conditions. **Alternative 1** would not require commercial or for-hire reef fish permit holders to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters. As a result, no change in fishing effort is expected to occur because no new fishing regulations would be implemented; therefore, habitat-gear interactions are estimated to remain unchanged.

Preferred Alternative 2 would provide slight benefits to important reef fish habitat in state waters if fishermen have to abide by more restrictive reef fish regulations than allowed by the state. More restrictive regulations are expected to reduce effort and the amount of time spent fishing, which would indirectly benefit the physical environment by reducing habitat-gear interactions. However, any benefits from **Preferred Alternative 2** to the physical environment are expected to be small given that most reef fish are harvested in federal waters and only a small number of reef fish species currently have inconsistent state and federal regulations (e.g., recreational red snapper, gag, red grouper and black grouper).

5.13.2 Direct and Indirect Effects on the Biological / Ecological Environment

The Magnuson-Stevens Act mandates that Council's prevent overfishing and rebuild overfished stocks. Additionally, the recent reauthorization of the Magnuson-Stevens Act requires Councils to establish annual catch limits and accountability measures for managed stocks by 2010 (species currently subject to overfishing) or 2011 (all other species). Currently in the Gulf of Mexico, four species are undergoing overfishing (red snapper, greater amberjack, gag, and gray triggerfish) and three species are overfished (red snapper, greater amberjack, and gray triggerfish). In February 2008, NOAA Fisheries Service implemented new regulations for red snapper. New regulations are also proposed for gray triggerfish and greater amberjack; these regulations will likely become effective in fall 2008. This amendment also proposes regulations to end overfishing of gag. In order to end overfishing, rebuild overfished stocks, and maintain stocks at sustainable levels, recreational and commercial fishermen must closely adhere to quotas and annual catch levels. This is especially true given that proposed federal regulations assume states will adopt consistent regulations. If states do not adopt consistent regulations, then more liberal regulations in state waters may allow harvest to exceed allowable catch levels. If this occurs, the likelihood of overfishing is increased and for overfished stocks, stock recovery is slowed. With regard to future annual catch limits, this could also lead to accountability measures being triggered more often to ensure landings are maintained within allowable limits.

Alternative 1 would not require commercial and for-hire reef fish permit holders to comply with the more restrictive of state or federal reef fish regulations. Currently, state and federal regulations for reef fish are largely consistent. Notable exceptions include recreational regulations for red snapper (recreational bag limit and seasonal closure) and grouper (seasonal closure). **Alternative 1** would negatively affect the biological environment for those species that lack consistent state and federal regulations. The likelihood of reef fish experiencing landings overages would be increased. Additionally, the likelihood of overfishing occurring would be increased and stock recovery for overfished reef fish species would be slowed. Lack of state consistency may also result in more restrictive accountability measures to ensure quotas/catch levels are not exceeded, such as the recently shortened 2008 red snapper recreational fishing season. As mentioned above, red snapper and grouper are the two primary reef fish species that do not have consistent state-federal regulations. In 2007, a significant overage was estimated to occur in the recreational red snapper fishery. The recreational red snapper allocation in 2007 was 3.185 million pounds, but MRFSS landings alone were estimated at 3.77 million pounds. When Texas and Headboat landings are included, it is estimated the 2007 quota was exceeded by approximately 1 mp or more. During this same year, a seasonal closure for recreational grouper was also implemented in federal waters, but consistent regulations were not implemented by the states of Florida and Alabama, which is where a majority of grouper landings occur. If proposed harvest reductions for these species are not achieved, then overfishing may continue. This will negatively affect stock abundance and the size and age-structure of these reef fish populations.

Preferred Alternative 2 would require commercial and for-hire reef fish permit holders to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters. This alternative is expected to positively benefit the biological environment by increasing the likelihood that overfishing is ended or does not occur. **Preferred Alternative 2** will also increase the likelihood that overfished stocks will recover in the timeframe necessary to rebuild. However, because this alternative would not affect non-permitted private anglers it would not eliminate the possibility of landings overages or overfishing from occurring. NOAA Fisheries Service does not currently require a recreational fishing permit and therefore does not have jurisdiction to establish permit conditions at this time for private anglers. NOAA Fisheries Service does have the authority to establish permit requirements and conditions for federal for-hire and commercial permit holders who choose to have a federal fishing permit and engage in the privilege of fishing (see Table 2.13.1).

During the June 2008 Council meeting, the Council requested NOAA Fisheries Service prepare an interim rule for 2009 based on the preferred gag management measures specified in Amendment 30B. Section 305(c) of the MSFCMA provides NOAA Fisheries Service authority to implement interim regulations to address overfishing. Gag was declared undergoing overfishing in October 2006. Other stocks within the reef fish complex undergoing overfishing include: red snapper, greater amberjack, and gray triggerfish. All of these species are also overfished and under rebuilding plans. The interim rule would pertain to all four species undergoing overfishing. Federally permitted reef fish commercial and for-hire vessels would have to abide by the more restrictive of state or federal reef fish regulations when fishing in state waters. Benefits to the biological environment would be similar to those described above. The likelihood of overfishing ending for these species would be increased and the likelihood that annual catch limits would be exceeded would be reduced. Recreational anglers would not be directly affected by this interim regulation because there is currently no requirement for a federal permit when fishing in the Gulf EEZ.

5.13.3 Direct and Indirect Effects on Economic/Social Environment

5.13.3.1 Direct and Indirect Effects on the Economic Environment

The no action alternative (**Alternative 1**) would not be expected to have any direct economic impacts on fishery participants because it would not place any additional restrictions. All customary fishing and business practices could continue. However, if incompatibilities between state and federal regulations exist, federal fishing rules may not be capable of achieving the management goals, leading to indirect impacts. Incompatibilities can go in either direction; state regulations can be either more restrictive or less restrictive that the federal regulations. If state regulations are more restrictive and the associated harvest reductions not factored into the determination of the federal regulations, the management measures applicable Gulf-wide will be more severe than necessary, resulting in potential forgone economic benefits. For a rebuilding fishery, the additional harvest savings from more restrictive state regulations would be expected to support faster rebuilding. However, the benefits of quicker recovery may or may not be sufficient to offset the costs (forgone benefits) of unnecessarily restrictive federal measures. For a stable fishery (i.e., a fishery not undergoing rebuilding), the overly restrictive federal regulations would simply represent lost benefits with no future offset. If state regulations are less restrictive than the federal regulations and the federal regulations do not account for such, then the goals of the federal regulations will not be met, necessitating corrective future action to impose more restrictive measures with likely adverse economic consequences. Regardless of the point at which federal management accounts for the incompatible regulations, the incompatibility creates a situation of inequity that may induce additional adverse economic outcomes, such as sector conflict, reduced cooperation by other states or constituents, etc. Between the two potential situations, i.e., state regulations could be more or less restrictive than federal regulations, the latter is perceived to be the more common and troublesome situation (see Section 2.13). Further, vessels would be subject to more restrictive state regulations and all circumstances, so focus on the situation where state regulations are less restrictive is more relevant.

Under **Alternative 2**, where state and federal reef fish regulations are not the same, all federally permitted reef fish vessels would be required to comply with the more restrictive reef fish regulations when fishing in state waters. While the actual state regulations would not be affected, this alternative would be expected to reduce the amount of harvest overage associated with incompatible regulations, thereby reducing either the amount of subsequent corrective Gulf-wide action required to account for non-compliance induced overages to meet management objectives, or the severity of restrictions placed on the entire fishery as a result of systematic incorporation of assumed non-compliance. While forced compliance would be expected to result in economic losses to affected entities, similar to projections for vessels elsewhere in the Gulf, these losses would be expected to be offset by the economic benefits to the other participants in the fishery that are able to avoid the more restrictive measures that would be required to limit the fishery to its harvest targets. Such compliance would effectively simply put all participants on an equal footing with respect to the federal regulations. Failure to comply with federal regulations would subject the vessel to fines and potential permit sanction. While the restrictive management may on occasion be so severe as to result in business failure for some fishery participants, such is usually the exception rather than the rule such that the costs of failure to comply with the federal regulations, particularly under a permit sanction, would exceed the economic costs of compliance.

While requiring compliance with the more restrictive regulations would be expected to reduce the severity of federal requirements and generate increased economic benefits relative to the status quo, since not all fishery participants are permitted, all potential overages will not be eliminated. Specifically, recreational anglers and for-hire vessels that only fish in state waters would not have to follow the more restrictive federal regulations. The significance of the remaining regulatory imbalance would depend on which group traditionally harvests more fish, which would likely vary by species and state. A potential outcome of this, however, is that the less restrictive measures for these entities may result in demand shifts, altering each sector's costs and benefits and the general ability to compete with other vessels or sectors. Within the for-hire sector, federally permitted vessels could lose business to vessels that operate exclusively in state waters. Further, the for-hire sector in general could lose business in favor of anglers choosing to fish more as a private or rental angler.

<u>Summary</u>

Alternative 1, being the no action alternative, would not impose any additional measures affecting fishing operations and so would have no direct impacts on fishery participants. In the event, however, of incompatibilities between state and federal regulations where federal regulations are more restrictive, the objectives of federal fishery management may not be met. And this could trigger future more restrictive actions affecting all federal fishing participants. **Alternative 2** would be expected to reduce the amount of harvest overage associated with incompatible regulations, thereby reducing the amount or severity of subsequent corrective Gulf-wide action. But this would totally eliminate any potential overages because some vessels operating in state waters do not have federal permits.

5.13.3.2 Direct and Indirect Effects on the Social Environment

Alternative 1 would be no action and in the short term would not have any direct impacts of the commercial or charter boat fishermen, businesses, or communities that depend on the reef fish fishery. **Alternative 2** would require that all vessels with federal commercial or charter reef fish permits must comply with the more restrictive state or federal reef fish regulations when fishing in state waters. This alternative would have direct impacts on commercial and charter boat fishermen who have reef permits because it would force fishermen to be under whichever rules were the most restrictive. Some fishermen who have reef permits fish in state waters when federal waters are closed.

This amendment would make it easier for the federal government to enforce rules for people with reef permits fishing in state waters and would bring both state and federal areas under the same restrictions such as closures, bag limits, etc. Under the regulations now, fishermen can continue to fish in state waters when the federal waters are closed, if the state waters are still open. This is a benefit to commercial and charter reef fish fishermen, but makes it more difficult to monitor fishing if the states and federal regulations are different. By requiring that fishermen comply with which ever regulations are the more restrictive, fishermen will be more limited by regulations than they are now.

5.13.4 Direct and Indirect Effects on Administrative Environment

Alternative 1 (no action) would require commercial and for-hire reef fish permit holders to abide by existing permit conditions. If state regulations are more liberal than federal regulations, then permit holders could potentially increase the amount of fish they harvest. As discussed in Section 5.13.2, this could result in harvest overages and increase the likelihood of overfishing. This could also trigger accountability measures associated with annual catch limits more often, thereby increasing the burden on the administrative environment to implement adjustments associated with accountability measures. Implementing accountability measures could take up considerable staff time to monitor and quantitatively determine the magnitude of an overage(s) and the subsequent accountability measures that are required to prevent the overage from occurring. If the level of excess harvest resulting from inconsistent state-federal regulations significantly affects management objectives, such as preventing overfishing and rebuilding overfished stocks, then subsequent amendments to fishery management plans may be necessary to adjust management measures to prevent or end overfishing and establish or revise rebuilding plans. Development of new amendments would negatively affect the administrative environment by increasing costs and the burden on staff to draft such documents.

Preferred Alternative 2 is a proactive accountability mechanism that reduces the probability of a landings overage occurring. **Preferred Alternative 2** would require commercial and for-hire reef fish permit holders to comply with the more restrictive of state or federal reef fish regulations when fishing in state waters. This alternative would positively affect the administrative environment by reducing the likelihood of landings overages, by reducing the likelihood of overfishing occurring, and by increasing the likelihood that accountability measures are not triggered in the future. Benefits to the administrative environment would also include reduced costs and less time to develop future amendments and regulatory actions. The alternative would not directly affect private anglers, because NOAA Fisheries Service does not currently require a recreational fishing permit and therefore does not have jurisdiction to establish permit conditions. As a result, management's ability to constrain landings to necessary catch levels would be diminished and the risk of overfishing or landings overages occurring would still remain, although to a lesser extent than **Alternative 1**.

5.14 Cumulative Effects Analyses (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. The 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 5.1-5.3);
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 immediate areas affected by this action and analyzed in this CEA are the federal waters of the Gulf of Mexico. These are the waters extending from the seaward side of the state waters of Texas, Louisiana, Mississippi, Alabama, and the west coast of Florida state waters to 200 miles. Eight species are in the SWG fishery, but gag and red grouper comprise the bulk of the grouper fishery. A brief description of their distribution and habitat requirements is provided below.

Red grouper are found from Massachusetts to Brazil including the Gulf of Mexico (Briggs, 1958). They are most abundant on the Florida and Yucatan Shelves and are found in coastal waters and estuaries out to 300 feet (Bullock and Smith, 1991). Juveniles use estuarine seagrass beds and inshore reefs (patch and transitional reefs) as nursery areas (Sluka et al., 1994; Ross and Moser, 1995). Adults are generally found over low relief hard bottom. Smith et al. (1975) frequently observed red grouper in diver surveys of the Florida Middle Ground. Sullivan and Sluka (1996) and Sluka and Sullivan (1996) reported that in the Florida Keys, red grouper inhabited reef-ridge, high relief spur and groove, and channel patch reefs. In the South Atlantic Bight, Huntsman and Dixon (1976) found that most red grouper in headboat catches were caught at depths between 120 to 210 feet. Richardson and Gold (1997) examined genetic diversity in Gulf of Mexico red grouper populations. They determined that stocks from the west Florida shelf and Campeche Banks could not be distinguished from each other and that red grouper in the Gulf should be considered a unit stock.

Gag are found from New York to Rio de Janeiro excluding the West Indies and they are abundant in the eastern Gulf of Mexico (Briggs, 1958). They are usually found in the Gulf of Mexico from coastal waters to 250 feet deep (Bullock and Smith, 1991). Adults are generally found over reef and shelf-break habitats with males occurring further offshore (Koenig et al., 1996). Smith et al. (1975) found gag to be common in diver transects of the Florida Middle Ground. Juveniles recruit to estuarine seagrass beds in the spring at an age of about 40 to 43 days (Keener et al., 1988; Ross and Moser, 1995; Coleman et al. 1998) and remain in the beds through the fall when they migrate to nearshore reefs. Bortone et al. (1994) reported juvenile and subadult gag on artificial reefs in nearshore waters of the Florida panhandle.

Reef fish vessels and dealers are primarily found in Gulf States. Based on either mailing addresses or home ports, 98 percent of historical charter captain reef fish, 96 percent of for-hire reef fish, and 98 percent of commercial reef fish permitted vessels are found in Gulf States. For permitted reef fish dealers, 95 percent are found in Gulf States. Therefore, the primary affects of the actions in this amendment and on the reef fish fishery in general would likely affect participants in the Gulf of Mexico region.

3. Establish the timeframe for the analysis

Grouper stocks in the Gulf of Mexico have been periodically assessed since 1991. Most assessments have focused on gag and red grouper, but yellowedge grouper (Cass-Calay and Bahnick, 2002), and goliath grouper (Porch et al., 2003; SEDAR 6, 2004b) have also been assessed. The 2006 SEDAR 10 gag stock assessment included data for analysis of stock status from 1963-2004 for commercial landings, and 1981-2004 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.

- Next assessments for gag and red grouper through SEDAR are scheduled to occur in mid-2011. SEDAR assessments for yellowedge grouper and tilefish are scheduled for 2010.
- Amendment 28 to the Reef Fish FMP is scheduled to begin development in 2008. This

amendment would examine fair and equitable ways to allocate all FMP resources between recreational and commercial fisheries.

- Amendment 29 to the Reef Fish FMP is scheduled to be completed in 2008. This amendment would establish a grouper IFQ program for the commercial reef fish fishery.
- Reef Fish Amendment 30A was been submitted to the Secretary for approval in early 2008, and subsequent regulations will likely be in effect in by August 2008. This amendment revises the greater amberjack rebuilding plan, establishes a gray triggerfish rebuilding plan, provides measures to constrain commercial and recreational harvest for both species to prevent overfishing, and sets accountability measures for the fisheries on both species.
- Reef Fish Amendment 30B is scheduled to be completed in mid 2008. This amendment addresses gag thresholds and benchmarks; establishing gag and red grouper TAC, interim allocations and AMs; ending overfishing of gag; managing gag and red grouper commercial and recreational harvests consistent with TAC; reducing grouper discard mortality; establishing time/area closures or expanding existing restricted fishing areas; and requiring compliance with Federal fishery management regulations by federally permitted reef fish vessels when fishing in state waters.
- An interim rule to implement gag regulations by January 1, 2009, has been requested by the Council. These regulations, if implemented, would end gag overfishing while the Council continues work on Amendment 30B.
- The Council will be developing either a Reef Fish amendment or a generic amendment to address ACLs and corresponding AMs. The reauthorized Magnuson-Stevens Act was enacted on January 12, 2007, and requires ACLs to be developed in 2010 for stocks subject to overfishing and 2011 for all other stocks.
- The Council is scheduled to complete an Aquaculture FMP in 2009. This FMP would provide a programmatic approach to evaluating the impacts of aquaculture proposals in the Gulf of Mexico and a comprehensive framework for regulating such activities.

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.

- Commercial grouper regulatory amendment established a 6,000 pound gutted weight aggregate deep-water and shallow-water grouper trip limit for the commercial grouper fishery.
- Recreational grouper regulatory amendment established a recreational red grouper bag limit of 1 fish per person per day as part of the 5 grouper per person aggregate bag limit, prohibited for-hire vessel captains and crews from retaining bag limits of any grouper while under charter and established a recreational closed season for red grouper, gag, and black grouper from February 15 to March 15 each year.
- Reef Fish Amendment 18A examined enforcement and monitoring issues including a VMS requirement, changes to the framework for setting TAC for reef fish, and gear requirements for permitted reef fish vessels to carry turtle release gear.
- Reef Fish Amendment 24 replaced the commercial reef fish permit moratorium with a

permanent limited access system.

- Joint Reef Fish/Coastal Migratory Pelagics (CMP) Amendment 25/17 replaced the for-hire reef fish and CMP permit moratorium with a permanent limited access system.
- Reef Fish Amendment 26 established an IFQ program for the red snapper fishery in the Gulf of Mexico.
- The final rule for the Council's Amendment 27/14 published in January 2008. This rule revises the red snapper rebuilding plan, provides measures to constrain the recreational harvest to its quota, and provides measures to minimize bycatch in the reef fish and shrimp fisheries. Bycatch reduction measures include permitted reef fish vessels having specific bycatch reduction gear onboard.

b. The following are recent reef fish actions not summarized in Section 1.4 but are important to the reef fish fishery in general.

An Individual Fishing Quota program (Amendment 26) for the commercial red snapper fishery was implemented in January, 2007. Each fisherman received a percentage share of the available commercial quota (See Amendment 27/14 above) based on previous historical landings. Fisherman can now fish for red snapper as necessary to keep markets supplied year-around and expend some of their previous fishing effort toward other reef fish such as vermilion snapper or grouper. Alternate targeted species or bycatch may include gag, red grouper, or other grouper species.

The Council approved a regulatory amendment to rescind all management of the vermilion snapper management measures implemented by GMFMC (2004c). A new stock assessment indicated that those measures were not necessary and, in fact, the stock was being fished at a yield equivalent to that at F_{OY}. A rule to address actions in this amendment published on January 3, 2008.

The Council is currently working on a draft public hearing document for Amendment 29 whose goal is to rationalize effort and reduce overcapacity in the commercial grouper and tilefish fisheries in order to achieve and maintain OY. This amendment evaluates several management programs that could be capable either independently or in combination of accomplishing the above goal. Programs evaluated include allowing permit stacking, eliminating latent permits, creating grouper and tilefish endorsements, and developing a grouper IFQ program.

The Council took final action to approve Amendment 30A at their January 2008 meeting. This amendment addresses overfishing greater amberjack and gray triggerfish. Besides revising the greater amberjack rebuilding plan and establishing a rebuilding plan for gray triggerfish, this amendment would set measures to constrain recreational and commercial harvests of these species consistent with the rebuilding plan and would establish accountability measures should harvest exceed that stated in the respective rebuilding plans. The amendment is currently under review by the Secretary of Commerce. A final rule implementing regulations from this amendment will likely publish during the summer 2008.

At their November 2007 meeting, the Council recognized the difficulties involved in decisions allocating reef fish TACs between recreational and commercial fisheries. They established an

Allocation Ad Hoc Committee to examine fair and equitable ways to allocate all FMP resources between recreational and commercial fisheries. Once completed, the principles for setting allocations should be more transparent and understandable to the various sectors in the fishery. Amendment 28 will likely be the amendment addressing allocation.

The Magnuson-Stevens Reauthorization Act (MSRA) 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 (ACLs) and corresponding AMs to ensure that overfishing does not occur. It also requires conservation and management measures be prepared and implemented within 2 years of notification that a stock is "overfished" or "subject to overfishing" in order to end overfishing immediately and begin rebuilding stocks. NMFS understands an ACL to mean a specified amount of a fish stock (e.g., measure of weight or numbers of fish) for a fishing year that is a target amount of annual total catch that takes into account projected estimates for landings and discard mortality from all user groups and sectors. The MSRA restricts ACLs to not exceed the recommendations of Council SSCs and plan amendments specify mechanisms for establishing ACLs. Measures are required by the MSRA to ensure accountability and ACLs will need to be developed in 2010 for stocks subject to overfishing and 2011 for all other stocks. Either a reef fish amendment or a generic amendment would be necessary to establish ACLs and AMs for reef fish stocks. Amendment 30B (this amendment) addresses catch limits and AMs for gag which is undergoing and for red grouper (Action 6). However, these measures may be revised in a future amendment as ACLs and AMs are developed for other reef fish stocks.

c. The following are non-FMP actions which can influence the reef fish fishery.

The demand for liquefied natural gas (LNG) is increasing. To meet this demand, 15 new LNG terminals are proposed for the Gulf of Mexico and one LNG currently exists in Lake Charles, Louisiana. Nine of the proposed facilities are closed loop systems that will not impact fishery resources, but six proposed facilities would each circulate approximately 100 - 200 million gallons of water per day to heat the liquefied natural gas back to its gaseous phase. Each facility would impact billions of fish eggs, larvae, and plankton each year. All fish eggs and larvae are assumed to be killed after passing through these systems. NMFS and the Council are concerned about the potential impact of these facilities on fish populations in the Gulf of Mexico. One facility at Sabine Pass, Texas would filter 30 percent of the water in Sabine Lake each year. Because most reef fish have pelagic larvae (see Section 3.2.2), some species may be affected by these facilities. The EPA has required the power generating industry to use closed loop systems to mitigate impacts on aquatic biota.

The hurricane season is from June 1 to November 30, a time period accounting for 97 percent of all tropical activity affecting the Atlantic Basin (NOAA, 2007). These storms, although unpredictable in their annual occurrence, can devastate areas of the Gulf of Mexico when they occur. For example, the 2005 hurricane season was the busiest and costliest on record. There were 28 named storms, including 15 hurricanes, four of which reached category 5 strength. Along the Gulf coast from the Florida Panhandle to Texas, five named storms (Tropical Storm Arlene and Hurricanes Cindy, Dennis, Katrina, and Rita) made landfall. Hurricanes Katrina (landfall August 29, 2005) and Rita (landfall September 24, 2005) were the most devastating of these storms, impacting an area stretching from eastern Texas to western Alabama and resulting in significant physical and economic damage to coastal communities. These storms came on the heal of hurricanes in 2004, especially Hurricane Ivan which caused extensive damage in the Orange Beach, Alabama – Pensacola, Florida area. Direct losses to the fishing industry and businesses supporting fishing activities included: loss of vessels, loss of revenue due to cancelled fishing trips, and destruction of marinas and other 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.

Due to the continuing rise in the cost of fishing, including increases in the cost of fuel and insurance, along with other increases in operating costs, it is becoming more difficult for many fishermen to make a living fishing. For example, fuel prices have increased nearly 2.5 times since 2002 (GMFMC 2007c). This could have negative impacts on communities that are dependent on jobs that support reef fish fisheries. Reductions in TAC could result in shorter seasons for various fisheries. This may also impact the businesses that are dependent on the commercial and recreational reef fish fisheries in that there will be fewer days to sell charter services, ice, fuel, tackle, hotel rooms, and other services to people participating in the fishery.

Eighty percent of seafood consumed in the United States is imported and the amount being imported has been steadily increasing (NMFS 2007). For reef fish, imports between 1993 and 2006 have increased from a low of 22 mp in 1994 to a high of 49.7 mp in 2005 (See Section 3.3.1 – Imports). This compares to average domestic Gulf grouper annual landings of 18.4 mp over this same time period. Domestic annual Gulf grouper landings have been declining since reaching a peak of 20.5 mp in 2002. The value of imports has increased from a low of \$42.3 million in 1994 to \$101.7 million in 2006 and is greater than domestic imports which peaked in value in 2001 at \$50.1 million. It should be noted numbers presented above are not directly comparable because of differences in product such as fresh versus frozen, but the difference in magnitudes between the domestic fish and imports shows the large market share of imports in the reef fish market. The effects of imports on domestic fisheries can cause fishermen to loose markets through fishery 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.

It is unclear how global climate changes will affect Gulf of Mexico fisheries. Suggested impacts include temperature changes in coastal and marine ecosystems could influence organism metabolism and alter ecological processes such as productivity and species interactions; change precipitation patterns and cause a rise in sea level which could change the water balance of coastal ecosystems; alter patterns of wind and water circulation in the ocean environment; and influence the productivity of critical coastal ecosystems such as wetlands, estuaries, and coral reefs (Kennedy et al. 2002). Modeling of climate change in relation to the northern Gulf of Mexico hypoxic zone may exacerbate attempts to reduce the area affected by these events (Justic et al. 2003).

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 Fisheries

Data used to monitor commercial reef fish effort includes the number of vessels with landings, the number of trips taken, and trip duration. Declines in effort may be a signal of stress within the fishery. These trends are described in Sections 3.1, 3.4, 6.0, 7.0, and briefly summarized here. While landings in the reef fish fishery have shown patterns of increases and decreases, the number of boats actively participating in the reef fish fishery (except for gag) show a pattern of decline over time. For shallow-water grouper, the average number of 2005-06 boats with landings for the years 1993-98 fell from 1,059 to 791 and red grouper, from 797 to 666. This same trend is reflected by the reef fish fishery 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 in the fishery, but could be used in the event noticeable improvements in the fishery arise. This reduction in the numbers of vessels participating in the fishery also reflects a decline in the number trips taken and days away from port by the fishery as a whole.

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 the grouper fishery), 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 fishery 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 fishery. These trends are described in Section 3.4.2. 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 since 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 fishery, increases in fishing costs, increases in harvesting efficiency, more restrictive regulations (particularly for the grouper fishery), 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. Trends in landings and the status grouper stocks are summarized in Section 3.3 and are based on NMFS stock assessments and SEDARs 6 (goliath grouper), 10 (gag), and 12 (red grouper). The following summarizes these stocks.

Goliath grouper in the Gulf of Mexico was assessed in 2004 populations in Florida was conducted in 2004 as part of SEDAR 06. The assessment agreed with anecdotal information indicating a rapid stock decline in the 1980s. In 1990, a moratorium on Goliath grouper harvest was implemented for both the commercial and recreational fisheries (See Section 1.3 History of Management). Since this harvest moratorium, the Goliath grouper stock has shown indications of recovery; however the extent of the recovery is uncertain. Porch et al. (2006) extended the SEDAR assessment by estimating the level of F under the moratorium based on recommendations from the SEDAR 6 review panel (SEDAR 6, 2004a). The base model suggested that the post-moratorium level of F was similar to the estimate for the MFMT level specified in the Generic SFA Amendment at about $F_{50\%SPR}$. Based on Porch et al. (2006), the model suggests that there is less than a 40 percent chance the stock will recover to the levels stipulated by the generic SFA within the next 10 years. Therefore, any additional harvest would make a recovery even less likely. However, there is controversy on what the overfishing and overfished thresholds should be for this species. The FWC is currently developing a research program to obtain further information on the stock to better determine its condition.

Briefly, estimated catches of gag (landings and dead discards) from 1998 to 2004 have exceeded catches in earlier years. The 2004 catch was about 85 percent higher than the highest estimated catches from before 1998 and about 75 percent higher than the more recent catches (1999) used in the last assessment. Commercial landings since the late 1990's have increased about 60 percent compared to the 1980's and estimated recreational landings have almost doubled from the 1980's. As would be expected, estimated annual Fs have also generally from about 0.2 in the mid-1970s to about 0.5 in 2004.

The estimated gag spawning stock biomass declined during the late 1960's and the 1970's, remained at about 20 mp during the 1980's and early 1990's. The spawning stock biomass then increased from 1997 to 2001, perhaps as a result of the higher recruitment. In recent years, estimated total biomass peaked at about 56 mp in 2002 and then declined to an estimated 51 mp in 2004.

With regard to the status of the stock, gag are considered to be undergoing overfishing. The most recent 4-year average F (0.40) from the most recent stock assessment was above the MFMT value of 0.27. Amendment 30B would define the overfished threshold (MSST) for gag. Whichever definition is chosen, the stock would not be considered in an overfished condition. Regardless of stock status, fishing mortality does need to be reduced to end overfishing and ensure the stock status does not worsen in the future.

For red grouper, total landings are variable with an overall declining trend from 1986 to 1998 (9 to 4.6 mp). Total landings then increased to nearly 8 mp in 1999 where they have stabilized through 2005 averaging 7.5 mp. Within sectors, commercial longline landings gradually increase during between 1986 and 2005. Commercial handline landings declined considerably over the same time period from 3.74 mp in 1990 to less than 1 mp in 1998, but have increased to 1.5 mp in recent years. Recreational landings have been less than total commercial landings. With the exception of the 1995-1997 period when landings were much lower than average, recreational landings have fluctuated between 1 and 3 mp. From 1986, F increased steadily, peaking in 1993. After 1993, F declined through 1998. Fishing mortality increased slightly in 1999, but has been on another downward trend through 2005.

Red grouper stock abundance has averaged approximately 27.6 million fish and varies with little trend between 1986 and 1999. However, abundance jumped sharply in 2000 to 40.5 million fish when a strong 1999 year class entered the fishery. Spawning stock is measured as total female gonad weight. The estimated spawning stock has gradually improved since 1986 from just below 500 metric tons (mt) of eggs in late 1980's to over 700 mt in the last few years including the observed high of 752 mt of eggs in 2005.

A stock assessment conducted in 1999 indicated red grouper stock status was one of overfished and overfishing in the 1997, the last year of data used in the assessment. A subsequent 2007 assessment using data through 2004, indicated the stock was no longer overfished or undergoing overfishing. This was in part due to a strong recruitment year in 2000.

The status of the yellowedge grouper stock remains essentially undetermined. An age-structured stock assessment model for yellowedge grouper in the U.S. Gulf of Mexico was conducted in 2002 (RFSAP 2002). The model was very sensitive to input parameters, and small changes in highly uncertain parameters resulted large changes in the estimated status of the stock. Therefore, the RFSAP concluded that the analysis of the stock was insufficient to determine the status of the stock relative to the definitions of overfished and overfishing (RFSAP, 2002). However, because of the longevity of yellowedge grouper, they may be particularly susceptible to even relatively low fishing mortality rates. The RFSAP recommended that the commercial yield should not greatly exceed the historical average of 0.84 million lbs.

<u>Ecosystem</u>
With respect to stresses to the ecosystem from actions in this amendment, changes in the gag and red grouper fisheries 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.

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 Fisheries

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 the grouper fishery), 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 fishery, the number of vessels landing either shallow-water grouper or red grouper has been decreasing (see Section 3.1). However, the number of permitted vessels has remained the same at about 1,000 vessels over the past few years. This indicates some fishermen are not participating in the fishery. Whether they are holding their permits as speculation for selling their permit, or waiting until reef fish prices improve to a point where returning to the fishery becomes more profitable is unknown.

For the for-hire fishery, 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. Most 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 fishery, 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 fishery as a whole is not undergoing widespread harm.

Grouper

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 OY, MSST and MFMT for three reef fish species and generic definitions for all other reef fish. The definition of MFMT for other reef fish which includes grouper species, $F_{30\%SPR}$, was approved and implemented. Definitions for OY and MSST were disapproved because they were not biomass-based.

A recent assessment was conducted for gag in 2006 under the SEDAR stock assessment process. SEDAR 10 methods and results are summarized in Sections 1.2.1 and 3.3. Based on the parameter estimates for 2004, the stock was found to be undergoing overfishing. A brief description of the stock and its status can be found in step 5 of this CEA. Measures proposed in this amendment are designed to immediately relieve stress on the gag stock and over the next six years relieve stress on the ecosystem. Landings will initially be reduced by approximately 29 to 45 percent depending on the value selected for MFMT.

For red grouper, Sustainable Fisheries Act compliant thresholds and targets were defined in Secretarial Amendment 1. MFMT is defined as the fishing mortality rate at MSY. MSST is defined as (1-M)*B_{MSY} with natural mortality (M) equal to 0.14. MSY is the yield associated with F_{MSY} when the stock is at equilibrium and OY is the yield associated with fishing at 75 percent of F_{MSY} when the stock is at equilibrium.

A new stock assessment for red grouper was completed in 2007 using an age-structured production model (SEDAR 12 2007). The assessment and its results are summarized in Section 1.2.2 and 3.2. Based on landings data from 1986 to 2005, 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. Therefore, harvest constraints currently placed on the stock as it recovered could be relaxed so the stock can be harvested at OY. Measures addressing the revised status of this stock are being proposed in this amendment.

Stock assessments have been conducted for yellowedge grouper (Cass-Calay and Bahnick, 2002) and goliath grouper (Porch et al., 2003; SEDAR 6, 2004b). However, the stock status of these species is uncertain. The assessment for yellowedge grouper concluded the stock condition was unknown and the assessment for Goliath grouper indicated the stock was still overfished. 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).

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, and 2006. An overview of the assessments is provided in Section 1.2. The most recent assessment was completed in 2006 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 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, 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. An overview of the assessments is provided in Section 1.2. The most recent assessment was completed in 2007 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, red grouper the 1999 assessment, a 2000 re-evaluation of the 1999 assessment, and the 2002 assessment have indicated this stock has been undergoing overfishing and was overfished, but has now 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 5.14.1 and 5.14.2.

Table 5.14.1. 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 fishery closed; significant declines in recreational landings; overfishing occurring

Table 5.14.2. 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	Slight increase in both commercial and

	aggregate grouper bag limit; 9.2 mp shallow-water grouper quota	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 fishery closed; significant declines in recreational landings; overfishing ended

9. Determine the magnitude and significance of cumulative effects.

The objectives of this amendment and associated EIS are fourfold. The first objective is to define MSST and OY, and to possibly redefine MFMT, and to set a TAC and management measures that will end overfishing of gag. Because the red grouper stock has recovered from an overfished state, the second objective is to increase red grouper TAC consistent with a level that would achieve OY. Two other objectives of this amendment are to co-manage gag and red grouper by implementing concurrent management measures, and to consider the expansion of the existing restricted fishing areas or to create new time/area closures to better protect gag stocks. Actions 1, 3, 5, and 10-13 address the first objective and Actions 3, 5, and 13 address the second objective. Actions 7 and 8 address the co-management of gag, red grouper, and other shallow-water species. Actions 10 and 11 address the expansion of current restricted fishing areas or the creation of new time/area closures. The short- and long-term direct and indirect effects of each these actions are provided in Sections 5.1 through 5.13.

To examine the magnitude and significance of the cumulative effects, important valued environmental components (VECs) were identified for the overall action to be taken with this amendment. VECs are "any part of the environment that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern" (EIP 1998). For purposes of this analysis, 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 5.14.3.

VECs not included for further analysis included sharks, consumers, and protected resources. Sharks were not considered as an important VEC because, as shark stocks have declined, the shark fishery has become more and more regulated, limiting the effects of this fishery and the stock on reef fish stocks. There may be some effort shifting from the shark fishery to the reef fish fishery due to increased restrictions, however, this effect will likely be minor because only a minority of vessels have dual permits. Consumers were eliminated from further analysis because of the high level of imported reef fish. Possible effects from reductions in domestic production would likely be offset by increased imports. Protected resources were also eliminated from further analyses in this section. Biological opinions have concluded the primary reef fish gear (longline and hook-and-line) were not likely to jeopardize sea turtles or small tooth sawfish.

Because actions considered in this amendment are not expected to change how reef fish fishing gear is used in the prosecution of the reef fish fishery, any take associated with reef fish fishing should not exceed that considered in biological opinions. All other Endangered Species Act (ESA)-listed species heave been found not likely to be adversely affected or not affected by the reef fish fishery. For marine mammals, gear used in the reef fish fishery were classified in the 2008 List of Fisheries (72 FR 66048, November 2007, 2007) as Category III fisheries. This means this fishery has minimal impacts on marine mammals (see Section 5.19 for more information).

Table 5.14.3. 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	

The following discussion refers to the effects of past, present, and RFFAs on the various VECs. These effects are summarized in Table 5.14.4.

<u>Habitat</u>

EFH, as defined in the GMFMC (2004a), for the Reef Fish FMP consists of all Gulf of Mexico estuaries; Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the Gulf of Mexico and the South Atlantic fishery management councils from estuarine waters out to depths of 100 fathoms. In general, reef fish are widely distributed in the Gulf of Mexico, occupying both pelagic and benthic habitats during their life cycle. A planktonic larval stage lives in the water column and feeds on zooplankton and phytoplankton (GMFMC 2004a). Juvenile and adult reef fish are typically demersal and usually associated with bottom topographies on the continental shelf (<100m) which have high relief, i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. However, several species are found over sand and soft-bottom substrates. For example, juvenile red snapper are common on mud bottoms in the northern Gulf, particularly off Texas through Alabama. Also, some juvenile snapper (e.g. mutton, gray, red, dog, lane, and yellowtail snappers) and grouper (e.g. Goliath grouper, red, gag, and yellowfin groupers) have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems.

Section 3.2.2 and GMFMC (2004a) describe the physical environment inhabited by groupers, particularly for red grouper and gag. Groupers are carnivorous bottom dwellers, generally associated (as adults) with hard-bottom substrates, and rocky reefs. Eggs and larvae for all species 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 2004a). 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 2004a). Adult gag are associated with hard bottom substrates, including offshore reefs and wrecks, coral and live bottoms, 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).

From fishing, the most sensitive gear/habitat combinations include EFH for reef fish species. These include fish otter trawls, shrimp otter trawls, roller frame trawls, and pair trawls over coral reefs; crab scrapes over coral reefs; oyster dredges over submerged aquatic vegetation (SAV), oyster reefs, or coral reefs; rakes over coral reefs; and patent tongs over SAV, oyster reefs, or coral reefs (GMFMC 2004a). Some of these gear/habitat interactions are unlikely to occur in actual practice (e.g., shrimp trawls towed through hard bottom areas can destroy shrimp nets and so are avoided). In general, gears that are actively fished by towing have the highest potential to alter habitats. However, some habitats, such as coral reefs and hard bottoms are sensitive to interactions with passive gears (e.g. traps) as well. Most directed reef fish fishing activities, as described in Section 5.1.1, use longlines, vertical lines, fish traps, and spearfishing gear. These have low levels of impacts compared to other gears.

In the past, some fishing practices have had detrimental effects on the physical environment. Gears such as roller trawls and fish traps damaged habitats while harvesting fish species. As a result of these effects, the Council developed stressed areas to reduce these impacts. Further protections have been developed, primarily by either prohibiting fishing or limiting fishing activities that can occur within certain areas. These are summarized in Section 3.1 and displayed in Figure 3.2. More recently, generic EFH Amendment 3 was implemented in 2006. The rule associated with this amendment prohibited bottom anchoring and the use of trawling gear, bottom longlines, buoy gear, and all traps/pots to protect coral reefs in several HAPCs, and required a weak link in the tickler chain of bottom trawls on all habitats throughout the Gulf of Mexico EEZ to minimize damage done to habitats should the chain get hung up on natural bottom structures.

Current management measures of the reef fish fishery have likely been beneficial to hard bottom areas. Vertical gear and longlines used in the reef fish fishery can damage habitat through snagging or entanglement. Longlines can also damage hard bottom structures during retrieval as the line sweeps across the seafloor. Additionally, anchoring over hard-bottom areas can also affect benthic habitat by breaking or destroying hard bottom structures. However, these gears are not believed to have much negative impact on bottom structures and are considerably less destructive than other commercial gears, such as traps and trawls. Fish traps have been used to harvest reef fish and this gear can cause significant damage to corals and other epibenthic organisms. However, this gear was retired from use in the fishery in February 2007.

Damage caused from reef fish fishing, while minor is associated with the level of fishing effort (see Section 5.1.1). Therefore, actions reducing levels of effort would result in greater benefits to the physical environment because fishing related interactions with habitat would be reduced. Thus, actions described in steps 3 and 4 of this CEA such as Amendments 22, 27/14 (red snapper), 23 (vermilion snapper), Secretarial Amendment 1 (red grouper), and Secretarial Amendment 2 (greater amberjack), which have reduced fishing effort for some species, and possibly the fishery on the whole, have had a positive effect on hard bottom habitats. RFFAs, such as Amendment 30A and the development of ACLs and AMs should also benefit these habitats as they would also reduce or limit fishing effort.

Reef fish EFH, particularly coral reefs and SAVs, are particularly susceptible to non-fishing activities (GMFMC 2004a). The greatest threat comes from dredge-and-fill activities (ship channels, waterways, canals, and coastal development). Oil and gas activities as well as changes in freshwater inflows can also adversely affect these habitats. 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. Decisions made by other agencies that permit destruction of EFH in a manner that does not allow recovery, such as bulkheads on former mangrove or marine vegetated habitats, would constitute irreversible commitments. However, irreversible commitments should occur less frequently as a result of EFH and HAPC designations. Accidental or inadvertent activities such as ship groundings on coral reefs or propeller scars on seagrass could also cause irreversible loss.

Managed Resources

There are 42 species of reef fish managed in the Gulf of Mexico EEZ, and of the species where the stock status is known, four of seven are undergoing overfishing (red snapper, gag, gray triggerfish and greater amberjack) and two of four species are considered overfished (greater amberjack and red snapper; see Section 3.3). Recent assessments for gray triggerfish and gag (SEDAR 9, 2006b and SEDAR 10, 2006, respectively) suggest these two species are experiencing overfishing, and stock recovery for greater amberjack is occurring slower than anticipated.

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 3.3). For grouper, management measures including a minimum size limit, commercial quota, and aggregate bag limit were put in place in 1990 (Section 1.4). None of these measures halted increases in landings. An increase in the size limit and one month commercial closure put in place in 1999 also did not end the increase in grouper landings. During this time period, red grouper became overfished and gag came close to being overfished.

Present management measures put in place primarily for red grouper through Secretarial Amendment 1, 2005 emergency and interim rules, and 2005 regulatory amendments have allowed red grouper to rebuild to a point where the stock is no longer considered overfished, which they were designed to do. However, these measures did not limit the gag harvest enough to prevent overfishing from occurring. In fact, these measures, along with actions from Amendments 22, 27/14 (red snapper), 23 (vermilion snapper)[13], Secretarial Amendment 1 (red grouper) and Secretarial Amendment 2 (greater amberjack), may have redirected effort towards other reef fish species such as gag. Gag currently have no harvest limit other than being a part of the shallow-water grouper quota.

Fishery management RFFAs are expected to benefit managed species. The purposes of this amendment are to end overfishing of gag, manage red grouper consistent with this species' OY level, co-manage gag and red grouper, and consider the expansion of the existing restricted fishing areas or to create new time/area closures to better protect gag stocks. In addition, this amendment contains measure to better manage grouper stocks on the whole and assist in the management of other species should state and federal regulations differ. Other actions are expected to be taken by the Council that would likely be beneficial to the stock and are described in steps 3 and 4 of this CEA. As a result of the MSRA, ACLs and AMs are to be applied to managed stocks. These are intended to develop triggers for action to be taken immediately should a stock appear to be approaching an overfishing condition. These triggers for action are being considered for shallow-water grouper species in Action 6 of this amendment. Amendment 30A is designed to reduce F in the greater amberjack and gray triggerfish fisheries. Amendment 29 would develop a grouper IFQ program for the commercial fishery. IFQ programs have been shown to reduce bycatch and discard mortality in fisheries because fishermen have options in terms of when and where to fish. Additionally, commercial quotas are better regulated under these programs.

Non-fishing activities are likely to adversely affect reef fish stocks. LNG facilities are being proposed in the western and northern Gulf. As described in Step 4c, these facilities can have a negative effect on species with pelagic larvae, like most reef fish species. To mitigate the affects of these facilities, closed- rather than open-loop systems are being called for. At this time, the effect of LNG facilities is unknown and is likely to be less for reef fish species than other more coastal species such as red drum. Global warming is another factor which could have a detrimental effect on reef fish species. However, what these effects might be cannot be quantified at this time.

Vessel Owner, Captain, and Crew (Commercial and For Hire)

Adverse or beneficial effects of actions to vessel owners, captains, and crew are tied to the ability for a vessel to make money. In commercial fisheries, these benefits are usually derived in terms of shares awarded after fishing expenses are accounted for. The greater the difference between expenses and payment for caught fish, the more revenue is generated by the fishing vessel. In

[13] Note a 2007 regulatory amendment rescinded management measures in Amendment 23, reducing the effect of this amendment on other reef fish stocks.

the for-hire sector, revenues are generated by the number of trips sold for charter businesses, and by the number of paying passengers for headboat businesses.

Relative to this amendment, the commercial fishery has 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. For red grouper, the primary grouper species landed by the fishery, landings averaged at 6.2 mp from 1986-1989, 4.8 mp from 1990-1998, and 5.7 mp from 1999-2005. Gag, the second most commercially harvested species, landings have averaged at about 1.5 mp from 1963 to 1997, and have increased in recent years (1998-2004) to an annual average of 2.7 mp. To constrain harvest so as not to overexploit reef fish in general and grouper specifically, the Council had implemented size limits, quotas, seasonal closures, and a permit moratorium to constrain the commercial harvest prior to 2000. These measures have met with limited success.

Current management measures have had a negative, short-term impact on the commercial fishery. Landing restrictions were needed to keep the commercial red grouper harvest within its quota. This forced closures in the commercial shallow-water grouper fishery in 2004 and 2005 to prevent the fishery from exceeding the red grouper quota. This kept many commercial vessels from taking more fishing trips during these years. As a result, a trip limit was instituted in 2005 in an attempt to lengthen the commercial season. For 2006 and 2007, the fishery did not exceed its quota. Further compounding the negative effects on the fishery are imports. Imports on domestic fisheries can cause fishermen to lose markets through fishery 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. Other factors which have had an adverse effect on the commercial fishery include increases in fishing costs such as fuel and hurricanes which may have pushed marginal fishing operations out of business (see step 4c).

Many RFFAs are likely to have a short-term negative impact on the commercial fishery. Red snapper (Amendment 27/14), gray triggerfish, and greater amberjack (Amendment 30A) have been experiencing overfishing. Measures required to end this condition and rebuild stocks have constrained the harvest for these species and are likely to increase competition within the fishery to harvest other stocks. Some short-term beneficial actions include an increase in TAC and relaxation of management measures for red grouper (this amendment) and vermilion snapper (regulatory amendment) because these stocks have been rebuilt.

Because many management RFFAs are designed to manage stocks at OY (e.g., Amendment 27/14, 30A, 30B), these actions should have long-term benefits for the commercial fishery. Stocks would be harvested at a sustainable level, and at higher levels for those stocks being rebuilt. The Council is developing a grouper IFQ amendment. IFQs allow individual fishermen to fish their shares when and where they want. As a result, prices for landed fish are expected to increase as observed in other IFQ programs (GMFMC 2006). Some RFFAs may have negative consequences. An amendment to develop ACLs and AMs for reef fish stocks would likely require the Council adopt more conservative harvest levels than currently in place, reducing the amount of biomass available for the fishery to harvest. Other measures being developed, but whose effects are unclear at this time, include addressing allocation between the commercial and recreational reef fish fisheries, and an amendment allowing offshore aquaculture in the Gulf of

Mexico. Dependent on allocations selected, the share of some stocks to the commercial fishery may increase or decrease. Non-management related RFFAs which could affect the commercial fishery 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, are likely to decrease the profitability of fishing operations.

Relative to this amendment, the for-hire fishery has 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. This increase has been fueled by increased interest by the public to go fishing (i.e., more trips sold) as evidenced by an almost three-fold increase in recreational fishing effort since 1986 (SEDAR 12 2007). For gag, the most important recreationally harvested species, annual discards were less than 0.5 million fish from 1981 to 1990. However, from 1990 onward, the number of discarded fish has increased from about 0.5 million to over 3.5 million fish in 2004. This is likely due to size and bag limits first introduced in 1990. Red grouper are the second most common grouper species landed by the fishery. Landings averaged approximately 2.0 mp from 1986-1995, 1.0 mp from 1996-1998, and 1.7 mp from 1999-2005. To constrain harvest so as not to overexploit reef fish in general and grouper specifically, the Council had implemented size and bag limits prior to 2000. The Council additionally implemented a permit moratorium to constrain the recreational effort from the for-hire industry in 2003. These measures have met with limited success toward ending overfishing.

Current management measures may have had a negative, short-term impact on the for-hire fishery. Landing restrictions were needed to keep the recreational red grouper harvest within its allocation of TAC. These included a reduced bag limit and seasonal closure. If these measures reduced interest by the public to take for-hire fishing trips, then the number of trips would likely go down. Other factors which have had an adverse effect on the for-hire fishery include increases in fishing costs such as fuel and hurricanes which may have pushed marginal fishing operations out of business (see step 4c). However, these factors may be less important than may seem apparent. For the red snapper for-hire fishery, reductions in charter fishing from more restrictive regulations, increased costs, and effects from hurricanes were claimed by the fishery (GMFMC 2007c). Preliminary red snapper data for 2007 found only lingering effects of the 2005 hurricanes; annual average effort for 2004 through 2005 were only slightly greater than in 2007. While the available data cannot address claims of severe economic losses by individual entities, data did not support contentions of widespread industry harm. Consistent with the projections, widespread loss of effort from these factors was not apparent. However, for red snapper, effort may have shifted to other species or other charter businesses.

Many RFFAs are likely to have a short-term negative impact on the for-hire fishery. Red snapper (Amendment 27/14), gray triggerfish, greater amberjack (Amendment 30A), and gag (this amendment) have been experiencing overfishing. Measures required to end this condition and rebuild stocks have constrained the harvest for these species. If these measures result in less interest by the fishing public to take fishing trips on for-hire vessels, then this will have an adverse affect on this sector. However, as mentioned above, this effect was not apparent for red snapper because the for-hire fishery has the ability to shift to other species. Some short-term beneficial actions include an increase in TAC and relaxation of management measures for red grouper (this amendment) and vermilion snapper (regulatory amendment) because these stocks have been rebuilt.

Because many management RFFAs are designed to manage stocks at OY (e.g., Amendment 27/14, 30A, 30B), these actions should be beneficial to the for-hire fishery. As mentioned for the commercial fishery, stocks would be harvested at a sustainable level, and at higher levels for those stocks being rebuilt. Some RFFAs may have negative consequences. An amendment to develop ACLs and AMs for reef fish stocks is likely to require the Council adopt more conservative harvest levels than currently in place, reducing the amount of biomass available for the fishery to harvest. If these actions reduce the participation of the public in the recreational fishery, the for-hire sector will be adversely affected. Other measures being developed, but whose effects are unclear at this time, include addressing allocation between the commercial and recreational reef fish fisheries, and an amendment allowing offshore aquaculture in the Gulf of Mexico. Dependent on allocations selected, the share of some stocks to the recreational (including for-hire) fishery may increase or decrease. Non-management related RFFAs which could affect the commercial fishery include hurricanes and increases in fishing costs. Hurricanes are unpredictable and localized in their effects. Increases in fishing costs, unless accompanied by a similar increase in the price charged per trip, are likely to decrease the profitability of fishing operations.

Dealers

Reef fish vessels and dealers are primarily found in Gulf states (step 2). Approximately 182 dealers possess permits to buy and sell reef fish species (Sramek pers. comm.). More than half of all reef fish dealers are involved in buying and selling grouper. These dealers may hold multiple types of permits. Average employment information per reef fish dealer is not known. Although dealers and processors are not synonymous entities, Keithly and Martin (1997) reported total employment for reef fish processors in the Southeast at approximately 700 individuals, both part and full time. It is assumed that all processors must be dealers, yet a dealer need not be a processor. Further, processing is a much more labor-intensive exercise than dealing. The profit profile for dealers or processors is not known.

Relative to past actions, dealers have benefitted from actions that have allowed the commercial fishery to expand as described above. However, the affect of measures constraining commercial landings both in the past, present, and RFFA may not have negative affects on dealers. As described in step 4c, the amount of reef fish imports have doubled between 1994 and 2005. In terms of pounds, 2005 imports (49.7 mp) were more than twice domestic annual Gulf grouper landings (average 18.4 mp). This means dealers have the ability to substitute domestic product with imports. In addition, dealers also have the ability to substitute other domestic seafood products for grouper in order to satisfy public demand for seafood. Therefore, the negative effects from management actions for the fishery may not necessarily translate into negative effects for dealers. As domestic fish stocks are rebuilt and management programs such as IFQs 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

It is estimated that 2.7 million private anglers fish in the Gulf. These anglers target red drum about 35 percent of the time and spotted sea trout 33 percent of the time. Red snapper is the most common reef fish targeted by 4.5 percent of private anglers that were intercepted (GMFMC 2004a, c). As summarized in Holiman (2000), the typical angler in the Gulf is 44 years old, male (80%), white (90%), and employed full-time (92%). They have a mean income of $42,700, and have fished in the state for an average of 16 years. The average number of trips taken in the 12 months preceding the interview was about 38 and these were mostly (75%) one-day trips with average expenditure of less than $50. Seventy-five percent reported that they held salt-water licenses, and 59 percent of them owned boats used for recreational saltwater fishing.

The effects of various past, present, and RFFA management measures on anglers are measured through levels of participation in the fishery. Measures that reduce participation are negative and measures that increase participation are positive. However, 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 was available. This increase has been from just over 6 million trips in 1981 to over 14 million trips in 2004 (SEDAR 12 2007). Therefore, it is difficult to link changes in participation to specific management action. 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

Infrastructure refers to fishing-related businesses and includes marinas, rentals, snorkel and dive shops, boat dockage and repair facilities, tackle and bait shops, fish houses, and lodgings related to recreational fisheries industry. This infrastructure is tied to the commercial and recreational fisheries and can be affected by adverse and beneficial economic conditions in those fisheries. Therefore, the effects of past, present, and RFFAs should reflect responses by the fisheries to these actions. Past actions allowing the recreational and commercial fisheries to expand have had a beneficial effect providing business opportunities to service the need of these industries. Present actions which have constrained the commercial fisheries likely have had a negative effect since lower revenues generated from the fishery would be available to support the infrastructure. However, as conditions improve for the fishery as described above through RFFAs, similar benefits should be accrued by the businesses comprising the infrastructure. For the recreational fishery, as stated above, it is difficult to assess the impact of present and RFFAs since angler participation has been increasing. Actions enhancing this participation should also be beneficial to the infrastructure. However, it should be noted the Council has been receiving public testimony that participation may be declining as fuel prices increase.

Administration

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. In 2007, an IFQ program was implemented for the commercial red snapper fishery, requiring NMFS to monitor the sale of red snapper IFQ shares. Recordkeeping requirements for IFQ shares would also improve commercial quota monitoring and prevent or limit overages from occurring. This should improve red snapper quota monitoring. VMS has also been implemented for all commercial reef fish vessels in 2007 and is helping enforcement identify vessels violating various fishing closures. RFFAs 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.

VECs	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, and Future Actions
Habitat - hard bottom - EFH	**Negative** - combined effects of disturbance by fishing gear and non-fishing actions reduce habitat quality	**Somewhat less negative** - combined effects of disturbance by fishing gear reduced, but still occurring so habitat quality still reduced	**Positive, but minor** - some reduction in effort should lead to reduced disturbance from fishing actions.	**Positive** - Stabilizing effort should lead to reduced disturbance from fishing actions
Managed resources - gag - red grouper - other reef fish species	**Negative** - for some stocks, allowed to become overfished; bycatch mortality from directed fishing for other species	**Positive** - overfished stocks under rebuilding plans, F reduced on stocks undergoing overfishing (e.g., red grouper). **Negative** - overfishing is occurring on some stocks (e.g., gag). **Negative** - bycatch mortality from directed fishing for other species	**Positive, long term** - As grouper stocks improve, less effort shifting toward other managed reef fish species. **Negative, short term** - if effort reduction for grouper, possible shifting toward other reef fish species.	**Negative, short term** - Potential increased harvesting due to effort shifting, possible bycatch mortality. **Positive long term** - as stocks increase, effort redirected back towards those stocks, less bycatch.
Vessel owner, captain and crew - Commercial - For-hire	**Positive** - Fishery has supported profitable vessels; increase recreational participation	**Negative** - lower catch per unit effort/effort results in increased fishing cost and reduces profits; decrease recreational participation	**Negative, short term** - reducing harvests reduces profits; reduce recreational participation. **Positive, long term** - as harvests allowed to approach OY, profits increase; increased recreational participation.	**Negative, short term** - reducing harvests reduces profits; reduce recreational participation. **Positive, long term** - as harvests allowed to approach OY, profits increase; increased recreational participation.
Dealers	**Positive** - Fishery has supported profitable landings	**Uncertain or zero effect** – replace domestic harvest with imports or substitutes.	**Zero, short term** - replace domestic harvest with imports or substitutes. **Positive, long term** - as harvests managed at OY, stable market.	**Zero, short term** - replace domestic harvest with imports or substitutes. **Positive, long term** - as harvests managed at OY, stable market.
Anglers	**Positive** - fewer restrictions allowing greater catches, increase recreational participation	**Negative** - lower catch per unit effort/effort results in reduced recreational participation	**Negative, short term** - lower catch per unit effort/effort results in reduced recreational participation. **Positive, long term** - as harvests allowed to approach OY, increase recreational participation.	**Negative, short term** - lower catch per unit effort/effort results in reduced recreational participation. **Positive, long term** - as harvests allowed to approach OY, increase recreational participation.

VECs	Past Actions	Present Actions	Reasonably Foreseeable Future Actions	Combined Effects of Past, Present, and Future Actions
Infrastructure	**Positive** - Fishery has supported profitable fishing operations which have supported an increase in infrastructure. Recreational fishery participation expands.	**Negative** – Contraction of fishing operations resulting in fewer dollars available to support infrastructure. **Positive** - Recreational fishery participation increases.	**Negative, short term** - Contraction of fishing operations resulting in fewer dollars available to support infrastructure. Recreational fishery participation declines. **Positive, long term** - as harvests allowed to approach OY, fishery expands allowing more money to support infrastructure. Recreational fishery participation expands.	**Negative, short term** - Contraction of fishing operations resulting in fewer dollars available to support infrastructure. Recreational fishery participation declines. **Positive, long term** - as harvests allowed to approach OY, fishery expands allowing more money to support infrastructure. Recreational fishery participation expands.
Administration	**Positive** - Fewer regulations minimized administrative and enforcement requirements	**Negative** - overfishing of stocks requires increased regulations and enforcement costs	**No effect** - Measures used to ensure compliance with regulations already in effect	**Negative, short term** - overfishing of stocks requires increased regulations and enforcement costs. **Positive, long term** – New programs enhance monitoring and enforcement

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects of the rebuilding plan for gag and restricting red grouper harvests from expanding on the biophysical and socioeconomic environments are positive since 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 fishery by using combinations of bag limits, size limits and closed seasons and for the commercial fishery by using combinations of trip limits, size limits or season closures that will provide the least disruption while maintaining TAC.

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 2011.

5.15 Unavoidable Adverse Effects

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 TACs. Gag discard mortality rates were estimated in SEDAR 10 (2006) at 67 percent for the commercial fishery, and, dependent on the geographic region and depth zone fished, 11-42 percent (average 20 percent) for the recreational fishery. While the release mortality rate is higher in the commercial fishery than in the recreational fishery, the number of discards is significantly lower in the commercial fishery than the recreational fishery. A review of the discard mortality data conducted in SEDAR 12 (2007) indicated appropriate discard mortality levels for red grouper were 10 percent for the recreational, handline, and trap fisheries and 45 percent for the longline fishery. Information of gag and red grouper discard mortality rates are described in more detail in Section 4.

This amendment considers several management measures to reduce grouper discards and discard mortality. Alternatives that could either directly or indirectly reduce red grouper, gag, and shallow-water bycatch, include lower grouper minimum size limits (Actions 9 and 10), a higher recreational red grouper bag limit (Action 9), and pamphlets and prominently displayed placards describing proper handling and release methods (Action 10). Other alternatives considered in this amendment that may increase grouper bycatch include a lower gag bag limit, longer recreational closed seasons, and commercial quota closures. In addition, the rule implementing Amendment 27/14 requires venting tools, dehookers, and non-stainless steel circle hooks be onboard reef fish fishing vessels in an effort to reduce discard mortality.

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 since these measures should not alter actual fishing practices, just how or when 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 5.1-5.13. 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.

5.16 Relationship Between Short-term Uses and Long-term Productivity

The objectives of this amendment and associated EIS are fourfold. The first objective is to define MSST and OY, and to possibly redefine MFMT, and to set a TAC and management measures that will end overfishing of gag. Because the red grouper stock has recovered from an overfished state, the second objective is to increase red grouper TAC consistent with a level that would achieve OY. Two other objectives of this amendment are to co-manage gag and red grouper by implementing concurrent management measures, and to consider the expansion of the existing restricted fishing areas or to create new time/area closures to better protect gag stocks.

Objectives 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.

5.17 Mitigation, Monitoring and Enforcement Measures

The process of ending overfishing on gag stocks, co-managing red grouper and gag, and expanding existing restricted fishing areas or creating new time/area closures are expected to have a negative short-term effect on the social and economic environment, and will create a burden on the administrative environment. No alternatives are being considered that would avoid these 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. Therefore, 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 ensure the harvest of red grouper does not exceed OY, 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 OY objectives. These assessments would be requested as needed by the SEDAR Steering Committee. It should be noted that these periodic stock assessments are not meant to replace the scheduled review by the Secretary of Commerce of rebuilding plans/regulations of overfished fisheries required under §304(e)(7) of the MSFCMA that is to occur at least every two years to ensure adequate progress toward stock rebuilding and ending overfishing. Additionally, NOAA Fisheries annually reports on the status of stocks in its Report to Congress.

Reviews will be based on periodic stock assessments. The next assessment for gag and red grouper is scheduled to occur in 2011. These assessments should benefit from updated landings information through state and federal fishery monitoring programs. Additionally, NMFS and other government agencies support research on these species by federal, state, academic, and private research entities.

Based on annual updates on the harvest or on projected stock status from the periodic stock assessments, NMFS may file a notification a fishery needs to be closed should harvest exceed gag and red grouper TACs (See Action 6 on Accountability Measures). Depending on the outcome of the assessments, the Council may determine further management action should be taken. Actions that the Council could employ to further restrict harvest include, but would not be limited to changes in size limits, bag limits, seasonal closures, or area closures. The Council has four options for implementing these measures. The first is to amend the Reef Fish FMP to include new information and management actions. Recent plan amendments put forth by the Council have taken between two and three years from conception to implementation. The second method is a regulatory amendment based on the framework established in Amendments 1 and 4 of the Reef Fish FMP to set TAC. Appropriate regulatory changes that may be implemented through framework include: 1) setting the TAC's for each stock or stock complex to achieve a specific level of ABC; and 2) bag limits, size limits, vessel trip limits, closed seasons or areas, gear restrictions, and quotas designed to achieve the TAC level (GMFMC 1989; 1991). However, TAC and catch limits may be adjusted only after a new stock assessment has been completed. Recent regulatory amendments have taken between 9 months and two years from conception to implementation.

The NMFS may take other management actions through emergency or an interim measures. Emergency actions and interim measures only remain in effect for 180 days after the date of publication of the rule and may be extended by publication in the *Federal Register* for one additional period of not more than 186 days provided the public has had an opportunity to comment on the emergency actions and interim measures. The MSFCMA further states that when a Council requests that an emergency action and interim measure be taken, the Council should also be actively preparing plan amendments or regulations that address the emergency on a permanent basis.

What type of rule making vehicle the NMFS or the Council determine is needed is difficult to predict. Actions would be dictated by the severity of overages in harvest and by the time frame needed to implement a regulatory change. If the overage in harvest is small, but would still allow the stock to recover within the maximum time frame required by NMFS guidance, NMFS could apply the accountability measures. Should the overage be severe, the Council could ask for an emergency action or interim rule that would severely restrict or halt the harvest of gag or red grouper while the Council explores management measures that would bring the harvest to levels consistent with those defined by the rebuilding plan.

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 restricted fishing areas or create new time/area closures. To improve enforceability of these areas, the Council has established a VMS program for the commercial reef fish fishery to improve enforcement. VMS allows NMFS enforcement personnel to monitor compliance with these area-specific regulations, and track and prosecute violations.

5.18 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, fishing seasons, and area quotas 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 caused by quota closures.

5.19 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 5.1-5.13. 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 5.16. Item h is discussed in sections 3 and 5, with particular mention in Section 5.17.

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). However, it should be noted the goals of this amendment are to end overfishing on gag, maintain both gag and red grouper stocks at a biomass level sufficient to allow the fisheries to harvest at OY, and to consider the expansion of the existing restricted fishing areas or to create new time/area closures to better protect gag stocks. These are goals the federal government shares with regional and state management agencies (see Section 3.5 – Administrative environment). 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 respect to the ESA, fishing activities pursuant the reef fish fishery should not affect endangered and threatened species or critical habitat in any manner not considered in prior consultations on this fishery. The most recent Biological Opinion (BiOp) on the Gulf of Mexico reef fish fishery was completed on February 15, 2005. The BiOp concluded authorization of this fishery is not likely to jeopardize the continued existence of endangered green, leatherback, hawksbill, and Kemp's ridley sea turtles, threatened loggerhead sea turtles, and endangered smalltooth sawfish. All other ESA-listed species at that time were all found not likely to be adversely affected or not affected. On July 17, 2006, an informal section 7 consultation determined threatened elkhorn coral and staghorn coral, listed subsequent to the February 15, 2005, opinion, are also not likely to be adversely affected by this fishery. With respect to the Marine Mammal Protection Act, fishing activities conducted under the Reef Fish FMP should have no adverse impact on marine mammals. The reef fish fishery is prosecuted primarily with longline and hook-and-line gear, and is classified in the 2008 List of Fisheries (72 FR 14466, November27, 2007) as Category III fishery. This classification indicates the annual mortality and serious injury of a marine mammal stock resulting from any fishery is less than or equal to 1 percent of the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock, while allowing that stock to reach or maintain its optimum sustainable population. The proposed actions are not expected to alter existing fishing practices in such a way as to alter the interactions with marine mammals.

Because the proposed actions are directed towards the management of naturally occurring species in the Gulf of Mexico, the introduction or spread of nonindigenous species should not occur.

6. REGULATORY IMPACT REVIEW

6.1 Introduction

The National Marine Fisheries Service (NMFS) requires a Regulatory Impact Review (RIR) for all regulatory actions that are of public interest. The RIR does three things: (1) it provides a comprehensive review of the level and incidence of impacts associated with a proposed or final regulatory action; (2) it provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problem; and, (3) it ensures that the regulatory agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way. The RIR also serves as the basis for determining whether the 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 probable impacts that management alternatives in this amendment to the Reef Fish FMP would have on the commercial and recreational reef fish sectors.

6.2 Problems and Issues in the Fisheries

Problems addressed by the proposed amendment to the Reef Fish FMP are discussed in Section 1.2 of this document and are included herein by reference.

6.3 Objectives

Management measures under consideration in this amendment aim to address gag (SEDAR 10) and red grouper (SEDAR 12) assessment recommendations. This amendment proposes to reduce the harvest of gag grouper in order to end overfishing and implement concordant red grouper harvest levels. The amendment also proposes to set management thresholds and targets for gag grouper that comply with the SFA. Measures considered in this amendment also include the establishment of accountability measures and annual catch limits, the concordance between federal and state regulations, the establishment of requirement of federal regulatory compliance, the creation of additional time/area closures, and extension of existing restricted fishing areas.

6.4 Description of the Fisheries

Descriptions of the gag, red grouper, and other reef fish fisheries are provided in Sections 3.1 and 3.2 of this document and are incorporated here by reference.

6.5 Impacts of Management Alternatives

Section 6.5 contains summaries of the expected economic impacts associated with the management measures considered in this amendment. Detailed analyses and discussion for all management measures are contained in Section 5.0 and are incorporated herein by reference.

6.5.1 Action 1: Set Gag Thresholds and Benchmarks

A detailed analysis of the expected impacts of this action is contained in Section 5.1.3 and is incorporated herein by reference. Defining the OY, MFMT and MSST of a species does not alter the current harvest or use of the resource. Since there would be no direct effects on resource harvest or use, there would be no direct effects on fishery participants, associated industries or communities. Specifying OY, MFMT and MSST, however, establishes the platform for future management, specifically from the perspective of bounding allowable harvest levels. In this sense, specifying these parameters may be considered to have indirect economic effects. Restrictive management measures are required by all alternatives, but weighing both short-term losses and long-term benefits, Preferred Alternative 2 appears to provide more stable streams of net benefits over time than any of the other alternatives.

6.5.2 Action 2: Action Moved to the Considered but Rejected Section

6.5.3 Action 3: Set Gag TAC

A detailed analysis of the expected impacts of this action is contained in Section 5.3.3 and is incorporated herein by reference. Setting a TAC for gag necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified with available information. Within the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also led to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure led to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change. Using an economic model, estimates of the potential effects of each alternative were generated. Based on overall effects on the commercial sector, the alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4**, **Alternative 5**, **Alternative 2**, and **Alternative 3**. The effects of **Alternative 1** would be a gain of $1.1 million. Losses from the rest of the alternatives would be $22.9 million for **Alternative 2**, $25.8 million for **Alternative 3**, $8.8 million for **Alternative 4**, and $10.6 million for **Alternative 5**.

6.5.4 Action 4: Set Red Grouper TAC

A detailed analysis of the expected impacts of this action is contained in Section 5.4.3 and is incorporated herein by reference. In general, setting a TAC for red grouper necessitates an explicit or implicit allocation of allowable gag harvest between the commercial and recreational sector. The general tone of potential effects on the recreational fishery is that of reductions in short-run benefits and increases in long-term benefits. These effects, particularly the net effect, cannot be quantified. In the commercial sector, certain changes would occur especially if a commercial gag quota and quota closure were adopted. With a gag quota, changes in the red grouper quota or shallow-water grouper quota would no longer have direct effects on allowable gag harvest. But if quota closures for gag or shallow-water grouper also led to quota closure for gag, then actual harvest of gag would change due to changes in red grouper or shallow-water grouper quota. Conversely, if the gag quota closure led to closures in the red grouper or shallow-water grouper fishery, then actual harvests of these species would also change. Using an economic model, estimates of the potential effects of each alternative were generated. Based on overall effects on the commercial sector, the alternatives may be ranked in descending order as follows: **Alternative 2**, **Alternative 1**, and **Alternative 3**. At a 3 percent discount rate, the losses would amount to $23.0 million for **Alternative 1**, $22.9 million for **Alternative 2**, and $23.1 million for **Alternative 3**.

6.5.5 Action 5: Gag and Red Grouper Allocations

A detailed analysis of the expected impacts of this action is contained in Section 5.5.3 and is incorporated herein by reference. **Action 5** considers alternative reallocations of the gag and red grouper TACs between the recreational and the commercial sectors. **Alternative 1** reverts to the repartition of the gag and red grouper resources set in Amendment 1 to the Reef Fish FMP and grant 65 percent of the gag TAC to the recreational sector and 35 percent to the commercial sector. Under this alternative, the red grouper TAC will be allocated as follows: 23 percent to the recreational sector and 77 percent to the commercial sector. **Alternative 1** is associated with changes in economic benefits due to discrepancies observed between the specified allocation and recreational and commercial recorded landings. Under **Alternative 1**, aggregate decreases in net present value based on a 7 percent discount rate, are estimated at $ 6.6 million, approximately. **Alternative 2** would allocate gag and red grouper based on observed landings during 2001-2005. The allocation corresponding to current landings is used as a benchmark in this analysis and thus, is not associated with changes in economic value. **Preferred Alternative 3** would reallocate gag and red grouper based on the longest existing data series (1986-2005). For gag and red grouper, recreational/commercial splits would be 61:39 and 24:76, respectively. Anticipated changes in net present value based on a 7 percent discount rate are estimated at about -$2.84 million under **Preferred Alternative 3**.

6.5.6 Action 6: Shallow-water grouper Interim Annual Catch Limits and Accountability Measures

A detailed analysis of the expected impacts of this action is contained in Section 5.6.3 and is incorporated herein by reference. This action considers several scenarios for the establishment of interim annual catch limits and accountability measures in the recreational and commercial grouper fisheries. In the commercial sector, Alternatives 2 and 4 may be more stringent than the other alternatives. Alternative 2 is expected to be the most restrictive because it would not provide a buffer between the ACL and the respective quotas and require an annual evaluation of ACL. Alternatives 3 and 5, on the other hand, are anticipated to result in less adverse short-run economic impacts than Alternatives 2 and 4. However, the probability of generating more benefits in the future would greater under Alternatives 2 and 4 because they minimize the probability of overfishing. In the recreational sector, Alternatives 2 and 3 are anticipated to result in more adverse short-run economic impacts on fishery participants. The saving factor of Alternative 3, relative to Alternative 2, is the provision for higher ACLs than target catches. Higher ACLs are associated with a higher probability that more restrictive measures may be implemented in the future.

6.5.7 Action 7: Shallow Water, Gag and Red Grouper Commercial Quotas

A detailed analysis of the expected impacts of this action is contained in Section 5.7.3 and is incorporated herein by reference. Explicitly stated in the two alternatives to the current quota regime would be the dependence of the three sub-quotas on the chosen TAC and commercial/recreational allocation ratio. The actual economic effects would also depend on the specific regulatory measures adopted for the subject fisheries. Hence, evaluation of the economic effects of the quota alternatives was undertaken by assuming not only specific TAC and allocation ratio but also specific management measures contained in other sections of this amendment. Using this approach necessitated the consideration of the no action alternative (**Alternative 1**) as equivalent to the baseline scenario wherein all alternatives were assumed to be the no action alternative. Model results for **Alternatives 2 and 3** were identical because the two alternatives would differ only on the level set for the other shallow-water grouper quota, which would not be binding. Total losses from **Alternative 2 or 3** would amount to $22.9 million using a 3 percent discount factor.

6.5.8 Action 8: Application of Quota Closures

A detailed analysis of the expected impacts of this action is contained in Section 5.8.3 and is incorporated herein by reference. Although by itself a fishery closure would have direct effects on the commercial sector, evaluation of its economic effects would still have to consider other relevant actions in this amendment, such as TACs, allocations, quotas, and size limit. Based on simulation results of the various alternatives several generalizations can be made. First, the fishery would be economically better off if no closures were to occur, or if a closure were to occur, it should happen very late in the fishing year as in **Alternative 1**. Second, a partial fishery closure as in **Alternatives 3 and 4** would provide a better economic scenario than a total fishery closure as in **Alternative 2**. Third, if the limiting gag quota were included as one of the closure triggers, some form of trip limits (or other measures) to slow down the harvest of gag would result in lower economic losses. Fourth, introduction of measures to slow down the harvest of gag early in the fishing year would produce lower economic losses than when such measures were introduced later in the year. Fifth, there appears to be some gag trip limit levels, such as the 500 pounds, that would tend to minimize the sum of negative effects from the gag trip limit and fishery closure. Based on total economic effects, the various alternatives may be ranked in descending order as follows: **Alternative 1**, **Alternative 4c**, **Alternative 4d**, **Alternative 4aii**, **Alternative 4ai**, **Alternative 4b**, **Preferred Alternative 3b**, **Alternative 3a**, **Alternative 3c**, and **Alternative 2**. The use of either a 3 percent or 7 percent discount rate would not affect the ranking of alternatives.

6.5.9 Action 9: Recreational Harvest of Gag and Red Grouper

A detailed analysis of the expected impacts of this action is contained in Section 5.9.3 and is incorporated herein by reference. In addition to the status quo, gag and red grouper recreational management measures under this action consider several adjustments to gag and red minimum size limits, species-specific and aggregate bag limit changes, season length and format modifications. Anticipated decreases in gag landings vary from 46 to 23 percent. For red grouper, fluctuations in landings range from a 19 percent increase to a 21 percent reduction. In selecting **Alternative 7 – option e** as the preferred alternative for this action, the Council considered several factors such as required reductions in gag harvest levels and associated socio-economic effects on the recreational sector, possible increases in red grouper harvests, expected recreational season length, and, the length and timing of the recreational shallow water grouper closure. **Preferred Alternative 7 – option e** would reduce gag landings by 26 percent and increase red grouper landings by 17 percent, yielding a 306 day recreational season. Within the 4 fish per person per day aggregate grouper limit, **Preferred Alternative 7 – option e** would implement a gag bag limit of 2 fish per person per day and a red grouper bag limit of 2 fish per person per day. **Preferred Alternative 7-option e,** which is expected to result in a $1.80 million decrease in short term economic value, would also establish a February 1 through March 31 closed season for shallow-water grouper.

6.5.10 Action 10: Grouper Discard Mortality Reduction

A detailed analysis of the expected impacts of this action is contained in Section 5.10.3 and is incorporated herein by reference. The no action alternative (**Alternative 1**) would have no direct or indirect economic impacts, but it should be recognized that this alternative imbeds whatever measures to reduce discard mortality that were proposed in other amendments but not yet implemented. The direct economic effects of Alternative 2 would come in the form of increasing the cost of fishing operations due to the cost of having on board fishing vessels the necessary instruction materials for venting, handling, and release of fish. Additional costs can also arise from exposing fishing vessels to possible enforcement actions for not complying with this additional requirement. These two types of costs to the industry cannot be quantified, but the first type of cost would be mitigated if the agency rather than the industry were to shoulder the burden of developing and producing the required information materials. The economic consequences of various options and sub-options under Alternative 3 were estimated using the same economic model. From the standpoint of overall results, the alternatives may be ranked in descending order as follows: **Alternative 3di**, **Alternative 3ci**, **Alternative 3bi**, **Alternative 3dii**, **Alternative 3cii**, **Alternative 3bii**, **Alternative 3ai**, and **Alternative 3aii**. This ranking would be unaffected by the choice of a discount factor. At a 3 percent discount factor, the losses from each size limit option would be $17.5 million for **Alternative 3ai**, $12.5 million for **Alternative 3bi**, $11.4 million for **Alternative 3ci**, $11.2 million for **Alternative 3di**, $18.4 million for Alternative 3aii, $15.5 million for **Alternative 3bii**, $14.6 million for **Alternative 3cii**, and $14.5 million for **Alternative 3dii**.

6.5.11 Action 11: Creation of Time/Area Closures

A detailed analysis of the expected impacts of this action is contained in Section 5.11.3 and is incorporated herein by reference. Other than **Alternative 1**, all alternatives in this section would have direct economic effects in terms of increasing short-run cost and potential future benefits. The potential costs and benefits of any of the measures that would expand existing MPAs may be contended to magnify, but not necessarily in a linear fashion, the corresponding effects of existing MPAs. On the basis of researches done on the two existing restricted fishing areas, economic benefits from the alternatives in this section could come from potentially higher yields for red snapper, red grouper, and scamp. The effects on gag productivity appear to be uncertain. The primary effect of the various alternatives to expand restricted fishing areas or create new time/area closures on the fishing sectors would be the displacement of fishers that historically utilized the fishery resource in those areas. This would tend to reduce commercial and recreational harvests and thus also commercial and for-hire revenues and benefits to anglers. If vessels were to attempt to offset their losses by fishing in other areas, they could partly offset revenues and benefits but at the expense of higher costs. The net effects are relatively uncertain.

6.5.12 Action 12: Duration of Time/Area Closures

A detailed analysis of the expected impacts of this action is contained in Section 5.12.3 and is incorporated herein by reference. One major economic consideration here is that a proper evaluation of a restricted fishing area or time/area closure is a function of its duration, but costs to fishery participants directly vary with the duration of the restricted area. Balancing costs and evaluative period of time/area closures appears likely to be achieved by a 10-year horizon (**Alternative 3**). Within **Alternative 3, Option A** is a preferable choice as it would allow a larger set of time/area closures.

6.5.13 Action 13: Federal Regulatory Compliance

A detailed analysis of the expected impacts of this action is contained in Section 5.13.3 and is incorporated herein by reference. **Alternative 1**, being the no action alternative, would not impose any additional measures affecting fishing operations and so would have no direct impacts on fishery participants. In the event, however, of incompatibilities between state and federal regulations where federal regulations are more restrictive, the objectives of federal fishery management may not be met. And this could trigger future more restrictive actions affecting all federal fishing participants. **Alternative 2** would be expected to reduce the amount of harvest overage associated with incompatible regulations, thereby reducing the amount or severity of subsequent corrective Gulf-wide action. But this would totally eliminate any potential overages because some vessels operating in state waters do not have federal permits.

6.6 Private and Public Costs

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. Due to its administrative nature, direct costs are not associated with this action. Costs associated with this specific action will include:

Council costs of document preparation, meetings, and information dissemination	$105,000
NMFS administrative costs of document preparation, Meetings and review	$70,000

Law enforcement costs	$0
TOTAL	$175,000

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.

6.7 Determination of Significant Regulatory Action

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

7 REGULATORY FLEXIBILITY ACT ANALYSIS

7.1 Introduction

The purpose of the Regulatory Flexibility Analysis (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the 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 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 Description of reasons why action by the agency is being considered

The need and purpose of the actions are set forth in Section 1.3 of this document and are incorporated herein by reference.

7.3 Statement of the objectives of, and legal basis for, the proposed rule

The primary objectives of this action are set forth in Section 1 of this document and are incorporated herein by reference. In essence the objectives are: (1) to establish benchmarks and thresholds for gag; (2) to address the overfishing condition of gag and the Optimum Yield management of red grouper via changes in regulations affecting directly the gag and red grouper fisheries and concomitantly the shallow-water grouper fishery; (3) to create new time/area closures or expand existing restricted fishing areas in the Gulf; and, (4) to address potential inconsistencies with state and Federal rules. The Magnuson-Stevens Act, as amended, provides the legal basis for the rule.

7.4 Description and estimate of the number of small entities to which the proposed rule will apply

The Small Business Administration (SBA) defines a small business if it is independently owned and operated and not dominant in its field of operation, and if it has annual receipts not in excess of $4.0 million in the case of commercial harvesting entities or $6.5 million in the case of for-hire entities, or if it has fewer than 500 employees in the case of fish processors, or fewer than 100 employees in the case of fish dealers.

In 1992, when the moratorium on the issuance of new reef fish commercial permits first began, approximately 2,200 permits were issued to qualifying individuals and attached to vessels. These permits are subject to certain conditions for renewal, and some permits did expire without being renewed. As of July 1, 2005 there are 1,118 active commercial reef fish permits and 91 others that are currently expired but may be renewed within a year. Thus, a total of 1,209 vessels may be considered to comprise the universe of commercial harvest operations in the GOM reef fish fishery. It may be noted that as of February, 2008 there are 904 active commercial reef fish permits attached to the same number of vessels. Whereas there is a one to one correspondence between permits and vessels, the total number of vessels actually harvesting reef fish may be lower or higher than the number of permits. Some vessels may remain inactive in the reef fish fishery during the entire year, so there would fewer vessels than permits. Because a permit can be transferred from one vessel to another during the year, the number of vessels harvesting any of the species in this amendment during the year may exceed the number of permits. This distinction is important when using logbook information to count vessels.

For the period 2001-2006, an average of 631 vessels harvested varying amounts of gag. When distributed according to pounds landed, the number of vessels harvesting gag were: 116 vessels with 100 pounds or less, 217 vessels with between 100 and 1,000 pounds, 190 vessels with between 1,000 and 5,000 pounds, 57 vessels with between 5,000 and 10,000 pounds, 51 vessels with between 10,000 and 50,000 pounds, and very few vessels with greater than 50,000 pounds. For the same period, an average of 732 vessels harvested varying amounts of red grouper. The corresponding distribution by pounds landed was: 138 vessels with 100 pounds or less, 206 vessels with between 100 and 1,000 pounds, 167 vessels with between 1,000 and 5,000 pounds, 69 vessels with between 5,000 and 10,000 pounds, 129 vessels with between 10,000 and 50,000 pounds, and 23 vessels with greater than 50,000 pounds. For the same a period, an average of 888 vessels harvested any shallow-water grouper species. These vessels were distributed as follows: 114 vessels with less than 100 pounds, 232 vessels with between 100 and 1,000 pounds, 229 with between 1,000 and 5,000 pounds, 88 vessels with between 5,000 and 10,000 pounds, 183 vessels with between 10,000 and 50,000 pounds, and 42 vessels with greater than 50,000 pounds.

Vessels harvesting reef fish in general and shallow-water grouper in particular use a variety of gear. Some vessels use only one gear type while others use multiple gear types; thus, classification of vessels by gear type is not straightforward for some vessels. At any rate, logbook records contain information on the gear type used by vessels in harvesting reef fish which may be used for classifying vessels by gear type. For the period 2001-2006, an average of 677 vessels may be classified as vertical line vessels, 137 vessels as longline vessels, and 74 as other vessels (diving, trap, unclassified). These vessels landed some species of shallow-water grouper for the specified period.

Collection of vessel operating costs was only initiated in mid-2005 and is anticipated to provide trip cost and return information once these data are processed and analyzed. It should be noted that information from this survey was used in estimating overall economic effects on the commercial sector from the various measures in this amendment. However, vessel-level gross and net revenues could not be readily derived using the same information. For our current purpose, we use cost and return information derived from an earlier survey of commercial reef fish fishermen in the Gulf of Mexico (Waters, 1996). Annual gross receipts and net income per vessel in 2005 dollars are provided below.

High-volume vessels, vertical lines:	Gross Income	Net Income
Northern GOM:	$110,070	$28,466
Eastern GOM:	$ 67,979	$23,822
Low-volume vessels, vertical lines:		
Northern GOM:	$ 24,095	$ 6,801
Eastern GOM:	$ 24,588	$ 4,479
High-volume vessels, bottom longlines:		
Both areas:	$116,989	$25,452
Low-volume vessels, bottom longlines:		
Both areas:	$ 87,635	$14,978
High-volume vessels, fish traps:	$ 93,426	$19,409
Low-volume vessels, fish traps:	$ 86,039	$21,025

A definitive calculation of which commercial entities would be considered large entities and small entities cannot be made using average income information. However, based on those data and the permit data showing the number of permits each person/entity owns, it appears that all of the commercial reef fish fleet would be considered small entities. The maximum number of permits reported to be owned by the same person/entity was 6, additional permits (and revenues associated with those permits) may be linked through affiliation rules. Affiliation links cannot be made using permit data. If one entity held 6 permits and was a high-volume bottom longline gear vessel, they would be estimated to generate about $700,000 in annual revenue. That estimate is well below the $4 million threshold set by the SBA for defining a large entity.

In 2003, when the for-hire permit moratorium was first instituted, NMFS issued a total of 1,857 for-hire vessel permits in the coastal migratory and reef fisheries. At that time 510 to 899 for-hire vessels were excluded but some were subsequently granted permits through an emergency action. Given eligibility criteria under the initial moratorium and emergency actions, NMFS issued a total of 4,040 for-hire permit eligibilities, of which 2,303 were for the coastal migratory pelagic fishery and 1,737 were for the reef fish fishery. Potentially then, a total of 1,737 for-hire vessels could be permitted for the reef fish fishery, although not all eligibilities could result in permits. In addition, some permit owners would not renew their expired permits for one reason or another. As of August 2007, NMFS issued 1,692 reef fish for-hire permits. This number may be considered to comprise the universe of for-hire reef fish vessel operations in the GOM reef fish fishery. It is worth noting that as of February 2008, there were 1,301 active for-hire permits attached to the same number of vessels. It is not precisely known how many of these for-hire vessels are charterboats and how many are headboats, but in general charterboats outnumber headboats. Several entities/individuals were reported to own multiple charter/headboat vessel permits, with as many as 12 permits for one entity.

For-hire vessel costs and revenues are not routinely collected in the Gulf. In 2002/2003 Gulf of Mexico Charter Boat Economic Survey was conducted as an add-on to the MRFSS For-Hire Survey in the Gulf of Mexico. Information from this survey was used in estimating overall economic effects on the for-hire fishery from the various measures in this amendment. However, vessel-level gross and net revenues could not be readily derived using the same information. For the purpose of presenting vessel-level information, data from two previous studies (Holland et al., 1999; Sutton et al., 1999) were pooled to generate some information regarding the financial performance of for-hire vessels. These two studies classify the for-hire vessels into charterboats and headboats depending on how a base fee is charged. Charterboats charge their fees on a group basis while headboats do it on a per person (head) basis. On average, a charterboat generates $76,960 in annual revenues and $36,758 in annual operating profits. An average headboat, on the other hand, generates $404,172 in annual revenues and $338,209 in annual operating profits. Both types of for-hire operations are profitable, although it should be noted that the calculation of costs does not include fixed and other non-operating expenses. These items generally tend to be higher for headboats. On average, both charterboats and headboats operate at about 50 percent of their passenger capacity per trip.

The determination of the exact number of charter or headboat operations that would be classified as small and large entities cannot be made based on average revenue estimates. However, inferences can be made by combining average estimates with permit data showing the number of permits owned by each entity/individual. Average annual revenues for charter boats and headboats are $76,960 and $404,172, respectively. The maximum number of permits reported to be owned by one entity/individual was 12, additional permits (and revenues associated with those permits) may be linked through affiliation rules. Affiliation links cannot be made using permit data. At any rate, if one entity possessed 12 permits, its average annual revenues would range from $923,520 to $4,850,064. The upper limit of the estimated range falls below the $6.5 million threshold set by the SBA for defining a large for-hire entity. Thus, it appears that all of the for-hire reef fish operations affected by this action would be considered small entities. Some fleet activity may exist in both the commercial and for-hire snapper grouper sectors, but the extent of such is unknown and all vessels are treated as independent entities in this analysis.

Also affected by the measures in this amendment are fish dealers, particularly those that receive gag and red grouper from harvesting vessels. Currently, a federal permit is required for a fish dealer to receive reef fish from commercial vessels. As of February 2008, there were 178 active permits for dealers buying and selling reef fish species. As part of the commercial reef fish logbook program, reporting vessels identify the dealers who receive their landed fish. Commercial reef fish vessels with federal permits are required to sell their harvest only to permitted dealers. Based on vessel logbook records for 2004 to 2006, an average of 156 reef fish dealers were actively buying and selling gag. These dealers were distributed around the Gulf as follows: 138 in Florida, 7 in Alabama and Mississippi, and 10 in Louisiana. One dealer was identified to have a homeport outside the Gulf. Dealers in Florida purchased about $6.27 million worth of gag, followed by dealers in Louisiana with purchases of $50.6 thousand and dealers in other Gulf States with purchases of $14.3 thousand. For the period 2004-2006, an average of 172 reef fish dealers were actively buying and selling red grouper. They were distributed around the Gulf as follows: 160 in Florida and 11 all in all for Alabama, Mississippi and Louisiana. Dealers in Florida purchased about $13.7 million of red grouper while the rest of the Gulf States purchased $29.4 thousand of red grouper.

Average employment information per reef fish dealer is unknown. Although dealers and processors are not synonymous entities, Keithly and Martin (1997), however, reported total employment for reef fish processors in the Southeast at approximately 700 individuals, both part and full time. It is assumed all processors must be dealers, yet a dealer need not be a processor. Further, processing is a much more labor intensive exercise than dealing. Therefore, given the employment estimate for the processing sector, it is assumed that the average dealer's number of employees would not surpass the SBA employment benchmark.

Based on the gross revenue and employment profiles presented above, all permitted commercial reef fish vessels, reef fish permitted for-hire vessels and fish dealers affected by the proposed regulations may be classified as small entities.

7.5 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 amendment does not introduce any new or additional reporting, record-keeping and other compliance requirements. The same compliance requirements currently in place govern the activities of all affected small entities.

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

The discussion in Section 8, and incorporated here by reference, has identified no duplicative, overlapping, or conflicting federal rules.

7.7 Significance of economic impacts on small entities

<u>Substantial number criterion</u>

The measures in this amendment are expected to affect 1,209 commercial vessel operations and 1,692 for-hire vessel operations. These vessels are estimated to earn revenues and profits, as described in Subsection 7.4, which are well below the $4 million threshold for commercial fishing vessels and $6.5 million for for-hire vessels. Hence, all affected vessel operations fall within the definition of small entities, and thus it may be concluded that the substantial number criterion would be met.

<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 commercial vessel, for-hire vessel and dealer operations affected by measures in this amendment are considered small entities, so the issue of disproportionality does not arise in the present case. It may only be noted some vessel operations are larger than others, but they nevertheless fall within the definition of small entities.

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

To address the overfishing condition of gag, the harvest of gag would have to be reduced. The various measures in this amendment have been designed to achieve the required harvest reduction. On the other hand, some measures for red grouper would potentially increase the harvest of red grouper or decrease the cost of harvesting red grouper. In analyzing the economic impacts of the various measures on the commercial sector, the interplay of the contrasting and complementing measures for gag and red grouper was explicitly considered This was made possible by the availability of an economic simulation model developed by Waters (2008, pers. comm.). A similar model for the recreational sector was not available, so some simplifying assumptions, particularly regarding the translation of reductions in harvest to reductions in target trips, were introduced in order to estimate the resulting economic impacts on the recreational sector. Details of the analyses of economic impacts on the commercial and recreational sectors were presented in Section 5 of the amendment document and are included here by reference.

For the current purpose, only the overall economic impacts are presented since they would suffice to determine the extent of effects on the profitability of small entities. For the commercial sector, the overall effects may be considered as the difference in net operating revenues between the set of all preferred alternatives and the baseline case. The baseline case is assumed to be the pertinent no action alternatives for all Actions in this amendment. The Council's chosen set of preferred alternatives would serve as the basis for the discussing the economic effects on small entities. Since the relative standing of all alternatives would not be affected by the discount rate used, only a 3 percent discount rate is assumed in the following discussion.

Relative to the baseline case, the set of all preferred alternatives would reduce net operating revenues of commercial vessels by $5.3 million (in 2005 dollars) over the period 2008-2013. It would be equivalent to an annual loss of $0.88 million. If this loss were equally shared by all 888 vessels harvesting any species of shallow-water grouper, the loss per vessel would be $991 annually. This amount of loss would probably be accommodated by the 42 vessels landing greater than 50,000 pounds of shallow-water grouper but most likely would be quite burdensome for the 663 vessels landing less than 10,000 pounds. Since these numbers are averages, it is necessarily the case that losses would be lower for some vessels and higher for others. The resolution of currently available information is not fine enough to pursue this issue.

In terms of effects on commercial vessels by gear type, the set of preferred alternatives would result in net operating revenue reductions of $0.46 million to vertical line vessels, $5.5 million to longline vessels, and a gain of $0.83 million to other vessels over the 2008-2013 period. Average annual net operating revenue reductions would be $0.08 million to vertical line vessels and $0.92 million to longline vessels. Average annual gains to other vessels would be $0.14 million. If equally distributed across vessels within the same vessel category, each vertical line vessel would lose $118, each longline vessel would lose $6,715, and each of the other vessels would gain $1,892. Relative to the information on net income per vessel tabulated above, the estimated annual losses from the set of preferred alternatives would be substantial for some vessels, especially longline vessels. The gains to other vessels would also be relatively substantial. This would be particularly true for vessels in the eastern Gulf, since they would bear most of the effects of the regulatory changes affecting the shallow-water grouper fishery.

Being averages, the loss ratios just noted would tend to mask the extent of losses for some vessels, particularly among vertical line vessels. Although not discounting the per vessel loss to longline vessels, the per vessel loss to the vertical line vessels would appear to be substantially lower than that to longline vessels. It would not be unreasonable to contend that most of the vessels landing low levels of grouper were vertical line vessels, so their inclusion in the averaging process exerted a downward bias in the estimation of per vessel loss to vertical line vessels. Some of these low-volume vessels could be dependent on grouper to supplement their other fishing income, but others could be just incidentally landing grouper. The presence of the latter type of vessels would mainly dampen the severity of potential losses in the vertical line sector. Particular attention to the vertical line sector is important because the more severe measures in this amendment would be imposed on the gag fishery, which has been historically dominated by vertical line vessels. However, this should not be construed to imply that longline vessels would be less affected by measures on the gag fishery. If a gag quota were to become the more binding quota for closing the entire shallow-water grouper fishery, the red grouper fishery would also be affected. This latter fishery has been dominated by the longline sector.

Measures in this amendment would affect a maximum of 1,692 for-hire vessels, and the impacts on these vessels would be a function of their level of dependence on shallow-water grouper, particularly gag and red grouper. Holland and Milon (1999) reported that 81 percent of Florida charter captains they surveyed indicated targeting any grouper species at some time during the year, but targeting behavior varied somewhat during the year. About 59 percent of charter captains targeted grouper from April to June, 58 percent targeted the species from July to September, 62 percent targeted grouper from October to December, and 56 percent targeted grouper from January to March. The targeting behavior for grouper was higher for headboat captains. About 93 percent of headboat captains targeted grouper at some time during the year. Although targeting behavior varied during the year, it remained relatively high throughout the various seasons of the year. About 87 percent of headboat captains targeted grouper from April to June, 80 percent targeted the species from July to September, 87 percent targeted grouper from October to December, and 80 percent targeted grouper from January to March. Sutton et al. (1999) reported that 28 percent of charterboat captains in Alabama through Texas targeted grouper at least once during the year, with the following seasonal variations: 10 percent for March-April, 8 percent for May-June, 11 for July-August, 8 percent for September-October, 13 percent for November-December, and 13 percent for January-February. About 15 percent of headboat captains in Alabama through Texas targeted grouper at least once during the year, with the following seasonal variations: 10 percent for March-April, 5 percent for May-June, 5 percent for July-August, 5 percent for September-October, 10 percent for November-December, and 10 percent for January-February.

The allocation alternatives for both gag and red grouper would result in an increase in producer surplus to the for-hire sector ranging from $405 thousand to $794 thousand for the period 2008-2013, or roughly $67 thousand to $132 thousand annually. However, the various management measures affecting the recreational sector would result in producer surplus reductions ranging from $1.7 million to $2.3 million per year. Summing up both positive and negative effects on the for-hire vessels, the reductions in producer surplus would be at least $1.6 million and at most $2.2 million. If these reductions were equally distributed across all 1,692 for-hire vessels, the resulting per vessel loss would be relatively small. Naturally, the more dependent for-hire vessels are on shallow-water grouper, the greater will be their share of the total loss to the for-hire sector. Given the targeting behavior of for-hire vessel captains noted above, for-hire vessels in Florida would be more dependent on grouper than those in other Gulf States, and that headboats would be more dependent on grouper than charterboats. A good possibility then exists that some headboat and also charterboats in Florida would experience more losses than others, and those losses could be substantial relative to their net income.

From the information thus far presented, one can infer that the measures in this amendment could result in sizeable economic impacts on some commercial and for-hire vessels. The negative impacts would potentially be more severe for the commercial sector, with some vessels expected to experience significant reductions in net operating revenues. The case with the for-hire sector is not as straightforward. The losses on a per vessel basis would be relatively small, but there would likely be vessels which may bear a good portion of the entire losses to the for-hire sector. Whether these vessels comprise a substantial portion of all affected vessels is not known. Public input is therefore necessary to determine if a substantial number of for-hire vessels would incur significant net income losses.

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

In summary form, the Council's current set of preferred alternatives consists of the following:

Action 1	Set MFMT equal to F_{MAX}, set MSST equal to (1-M)*SSB_{MAX} and set OY equal to the yield at 75 percent of F_{MAX} (**Alternative 2**).
Action 2	(Moved To Considered But Rejected)
Action 3	Set TAC in 2009, 2010, and 2011 at 3.38 mp, 3.62 mp, and 3.82 mp, respectively; TACs for subsequent years would be 3.82 mp until changed by another amendment (**Alternative 2**).
Action 4	Set red grouper TAC at 7.57 mp (**Alternative 2**).
Action 5	Set the recreational:commercial allocation of TACs at 61:39 for gag and 24:76 for red grouper (**Alternative 3**).
Action 6	Set shallow-water grouper annual catch limits and accountability measures (**Alternative 5**).
Action 7	Set the annual commercial gag and red grouper quotas, in pounds, at the commercial allocation of each species annual TACs, and set the commercial allowance for the other shallow water grouper at 0.68 mp. The aggregate commercial shallow-water grouper quota for each year is the sum of the gag and red grouper quotas, plus the other shallow-water grouper allowance (**Alternative 3**).
Action 8	When 80 percent of the gag or red grouper quota is reached or projected to be reached, the directed fishery for the applicable species would be closed; however, an incidental harvest trip limit of 200 pounds would be allowed until either the gag, red grouper, or shallow-water grouper quota is reached or projected to be reached, upon which the shallow-water grouper fishery would close.
Action 9	Establish a gag bag limit and a red grouper bag limit of 2 fish per person for each species within the aggregate bag limit, establish an aggregate bag limit of 4 fish per person, and close the recreational shallow-water grouper fishery February 1-March 31 (**Alternative 7e**).
Action 10	Reduce the red grouper minimum size limit to 18 inches TL for the commercial fishery (**Alternative 3ei**).
Action 11	Prohibit all fishing January-April, but allow all fishing in other months, within the Edges 40 fathom contour time/area closure (**Alternative 2bii**).
Action 12	The Madison-Swanson and Steamboat Lumps restricted fishing areas will remain in effect indefinitely, unless terminated in a subsequent amendment (**Alternative 4a**).

Action 13 All vessels with federal commercial or charter reef fish permits must comply with the more restrictive of state or federal reef fish regulations when fishing in state waters (**Alternative 2**).

For purposes of the succeeding discussion, each preferred alternative is considered the proposed action.

Three alternatives, including no action, were considered under Action 1. The first alternative (no action) to the proposed action would not comply with the SFA requirement. The other alternative to the proposed action would provide less conservative proxy for MSY, and would likely result in catch levels in excess of the true MSY. Each of the alternatives under Action 1 would not have direct impacts on small entities, but would serve as a platform for the development of specific management measures.

Five alternatives, including no action, were considered under Action 3. The first alternative (no action) to the proposed action would not provide for a gag TAC, and thus would allow continued overfishing of the stock. The second alternative to the proposed action uses a stepped approach to managing TAC levels by setting TAC at three-year intervals. This alternative, however, is susceptible to providing management measures that could result in overages in years 2 and 3 of the interval. It could, thus, trigger accountability measures that would have potentially larger adverse impacts on small entities. The third alternative to the proposed action is almost similar to the proposed action, but it would set fishing mortality rate right at the threshold. It is more likely to generate overfishing situations that would only require more stringent regulations. The fourth alternative to the proposed action is similar to the second alternative and thus would be saddled with similar problem. In addition, it is also susceptible to providing management measures that would result in overages in years 2 and 3 of each interval, setting the stage for application of accountability measures.

Three alternatives, including no action, were considered under Action 4. The first alternative (no action) to the proposed action would retain the red grouper TAC at 6.56 mp. The proposed red grouper TAC of 7.57 mp would provide more benefits to small entities than the no action alternative. The second alternative to the proposed action would set a higher TAC of 7.72 mp corresponding to fishing at equilibrium F_{MSY} as opposed to equilibrium F_{OY} in the proposed action. Although this higher TAC would be more beneficial to small entities, it is right at the threshold when accountability measures would set in. This higher TAC, then, would place at higher probability the imposition of stringent management measures that would essentially undo the initial benefits received by small entities.

Three alternatives, including no action, were considered under Action 5. The first alternative (no action) to the proposed action would practically revert the recreational:commercial allocation to that of Amendment 1—65:35 for gag and 23:77 for red grouper. The second alternative to the proposed action would set the recreational:commercial allocation at 59:41 for gag and 24:76 for red grouper. The proposed recreational:commercial allocation would be 61:39 for gag and 24:76 for red grouper. The general nature of any allocation is that it would favor one group of small entities at the expense of another group of small entities. The Council's choice for the proposed action was based on the fact that it would consider the longest and most robust time series of data than the other alternatives.

Five alternatives, including no action, were considered under Action 6. The first alternative (no action) to the proposed action would not provide for annual catch limits (ACL) and accountability measures. By not specifying AMs, harvests could likely exceed target catch levels and would thereby reduce the likelihood overfishing would be ended or prevented. The second alternative to the proposed action would have identical target catches as the proposed action but would set the ACLs lower than those of the proposed action. It would then likely to result in potentially more adverse impacts on small entities. The third alternative to the proposed action would set the same commercial target catches as, but some higher ACLs than, the proposed action. It would set higher recreational target catches and ACLs for gag than the proposed action, but would set the same target catches and ACLs for red grouper. On average, this alternative would provide lesser adverse impacts on small entities than the proposed action. The fourth alternative to the proposed action would set the same target catches as, but lower ACLs than, the proposed action. It may then be expected to result in higher adverse impacts on small entities than the proposed action.

Four alternatives, including no action, were considered under Action 7. The first alternative (no action) to the proposed action would maintain the red grouper and shallow-water grouper quotas. While this alternative would potentially allow the largest shallow-water grouper quota, it would not provide specific protection to gag so that overfishing of this stock would continue. In addition, it would not provide flexibility to increases in red grouper quota due to stock improvements. The second alternative to the proposed action would be similar to the proposed action, except that the proposed action would provide for a higher allowance for other shallow-water grouper. Hence, small entities would be provided a better economic environment under the proposed action.

Three alternatives, including no action, were considered under Action 8. The first alternative (no action) to the proposed action would maintain the red grouper or shallow-water grouper quota, whichever comes first, as a trigger to close the shallow-water grouper fishery. Given all preferred alternatives for all other Actions, this alternative would provide the largest benefits to small entities. However, it would not provide sufficient protection to gag so that overfishing of the stock could continue. The second alternative to the proposed action would add the gag quota as a closure trigger. With the gag quota most likely to be met first, the entire shallow-water grouper would close early in the year. This alternative would yield the largest negative effects on small entities. The third alternative to the proposed action is similar to the second, except that it would impose gag trip limits at the start of the fishing year. This alternative would allow the shallow-water grouper fishery to remain open much longer than the second alternative so that it would result in less adverse impacts on small entities. The third alternative differs from the proposed action, which would impose the trip limit only when 80 percent of the gag or red grouper quota is reached. Due to the generally longer closure under the proposed action, the third alternative would turn out to result in less adverse economic impacts on small entities. The third alternative, however, would impose more adverse effects on the gag fishery so that in general it would adversely affect hook-and-line vessel trips than longline trips. The opposite would generally occur under the proposed action.

Seven alternatives, including no action, were considered under Action 9. The first alternative (no action) to the proposed action would maintain current recreational regulations so that it would likely allow overfishing of gag to continue. All other alternatives to the proposed action would eliminate the recreational red grouper bag limit, establish a gag grouper bag limit (except one alternative), establish recreational closure , and reduce the grouper aggregate bag limit to three fish. These other alternatives would reduce gag harvest by 45 percent or more and either increase red grouper harvest (3 alternatives) or reduce red grouper harvest (2 alternatives). The proposed action, on the other hand, would reduce gag harvest by a lesser percent and increase red grouper harvest by a larger percent than any of the other alternatives. Thus, among the alternatives, the proposed action would tend to provide potentially the least adverse impacts on small entities.

Three alternatives, including no action, were considered under Action 10. The first alternative (no action) to the proposed action would not require any new equipment or implement to reduce bycatch, and would retain the size limit for grouper species subject to size limits. This would not then address the bycatch problem in the grouper fishery. The second alternative would require pamphlets or placards providing instructions on venting, proper handling, and release methods. The presence on board of these pamphlets/placards would provide convenient resource materials for reducing bycatch mortality, but the extent of its effects cannot be determined. The proposed action, on the other hand, would reduce the size limit for red grouper and thus may be expected to result in positive effects on small entities.

Four alternatives, including no action, were considered under Action 11. The first alternative (no action) to the proposed action would not create additional restricted fishing areas or time/area closures, and thus would have no immediate negative effects on small entities. However, this alternative would allow continued adverse impacts of gears on bottom habitat which could eventually lead to habitat degradation particularly in areas suitable as marine reserves. The second alternative to the proposed action would expand the Madison-Swanson restricted fishing area. However, the area for expansion is relatively close to shore and likely would the most heavily fished area. Its short-run adverse impacts on small entities would be larger than those of the proposed action. The third alternative to the proposed action expand both the Madison-Swanson and Steamboat Lumps restricted fishing areas, and thus would result in more adverse impacts on small entities than the proposed action.

Four alternatives, including no action, were considered under Action 12. While the proposed action would address the reauthorization of the Madison-Swanson and Steamboat Lumps restricted fishing areas , the three alternatives to the proposed action would address the duration or seasonal closure of the newly created time/area closure in

Action 11. Not choosing these other alternatives would not affect the rules governing the two existing restricted fishing areas or the time/area closure chosen in Action 11.

Two alternatives, including no action, were considered under Action 13. The first alternative (no action) to the proposed action would retain any existing inconsistencies between state and Federal regulations in state waters. This would be particularly problematic for species, considered overfished or undergoing overfishing, that have relatively substantial presence in state waters. Although in this case, the no action alternative would provide better economic prospects for small entities in the short run, the long-run sustainability of the fishery and economic benefits derivable from the fishery would be jeopardized.

8 OTHER APPLICABLE LAW

The MSFCMA (16 U.S.C. 1801 et seq.) provides the authority for fishery management in federal waters of the EEZ. 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 (OMB) 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 OMB 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. 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.

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 OMB before requesting most types of fishery information from the public.

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 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 RFA. 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. NMFS has preliminarily determined that this action will not meet the economic significance threshold of any criteria.

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. Federal agency responsibilities under this Executive Order include conducting their programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons from participation in, denying persons the benefit of, or subjecting persons to discrimination under, such, programs policies, and activities, because of their race, color, or national origin. Furthermore, each federal agency responsibility set forth under this Executive Order shall apply equally to Native American programs.

Specifically, federal agencies shall, to the maximum extent practicable; conduct human health and environmental research and analysis; collect human health and environmental data; collect, maintain and analyze information on the consumption patterns of those who principally rely on fish and/or wildlife for subsistence; allow for public participation and access to information relating to the incorporation of environmental justice principals in Federal agency programs or policies; and share information and eliminate unnecessary duplication of efforts through the use of existing data systems and cooperative agreements among Federal agencies and with State, local, and tribal governments.

The Council conducted a series of scoping meetings for this amendment in which the public was invited to provide input on actions contained therein. A summary of the scoping meetings can be found in Section 12 of this document. Comments received from scoping and other forms of public input such as public hearings and solicitations for public comment on the DEIS were considered during the development of Amendment 30B. No environmental justice issues were raised during the these processes. No Native American programs would be affected by actions contained within this amendment; therefore no tribal consultation has been initiated.

Sections 3.4.4-3.4.6 describes several areas communities in the Gulf where reef fish fisheries have a local presence. These communities were identified as key communities involved in the Gulf of Mexico reef fish fishery based on fishing permit and landings data. The demographic information reported for these communities were derived from permit address and census data. However, as described in Section 3.4.3, this data does have some limitations. The proposed actions would be applied to all participants in the fishery, regardless of their race, color, national origin, or income level, and as a result are not expected to result in adverse or disproportionate environmental or public health impacts. Comments received during public comment, including scoping, did not indicate proposed actions are expected to affect any existing subsistence consumption patterns. Therefore, no environmental justice issues are anticipated and no modifications to any proposed actions have been made to address environmental justice issues.

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. [Sentence removed]

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 11 (Creation of Time/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).

Action 13 (Federal Regulatory Compliance) would affect some reef fish vessels while fishing in state waters, but only those that have federal reef fish permits, as a condition of the permit. Vessels that choose not to fish in federal waters do not need federal permits and would not be subject to the provisions of this action.

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 10 and 11 contain alternatives regarding the establishment of additional time/area closures and the duration of both new time/area closures and existing restricted fishing areas. 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 2004a) 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

Name	Expertise	Responsibility	Agency
Mr. Steven Atran	Population Dynamics Statistician	Summary/Introduction/Purpose and need/Status determination criteria, TAC, accountability measures, and marine reserve actions /Reviews	GMFMC
Ms. Sarah Devido	Biologist	Bycatch practicability analysis (BPA)	SERO
Dr. Assane Diagne	Economist	Economic analyses and write ups/RIR	GMFMC
Ms. Sue Gerhart	Biologist	Allocation and discard mortality actions	SERO
Dr. Stephen Holiman	Economist	Economic analyses/Review	SERO
Mr. Peter Hood	Biologist	Commercial quota actions/Affected environment/cumulative effects analysis	SERO
Dr. Palma Ingles	Anthropologist	Social analyses	SERO
Mr. Frank S. Kennedy	Biologist	Summary/Introduction/Purpose and need/TAC actions	GMFMC
Mr. David Keys	NEPA Specialist	NEPA Review	SERO
Dr. Antonio Lamberte	Economist	Economic analyses and write ups/Affected environment/IRFA	SERO
Ms. Jennifer Lee	Biologist	Protected resources review	SERO
Mr. Andrew Strelcheck	Biologist	Scientific analyses/AM, TAC, recreational, and federal compliance actions/BPA	SERO
Dr. Jim Waters	Economist	Economic analyses	SEFSC

10 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE AMENDMENT/EIS 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
- Fishermen's Advocacy Organization
- Fishing Rights Alliance
- Gulf Fishermen's Association
- Recreational Fishing Alliance
- Southeast Fisheries Association
- Southern Offshore Fishing Association
- Ocean Conservancy
- Gulf Restoration Network
- Environmental Defense

11 PUBLIC HEARING LOCATIONS AND DATES

Monday, March 10, 2008
Hilton Airport
901 Airline Drive
Kenner, LA 70062
504-469-5000

Tuesday, March 11, 2008
University of Southern Mississippi
- Gulf Coast Research Laboratory,
Caylor Auditorium
703 East Beach Drive
Ocean Springs, MS 39564
228-872-4200

Tuesday, March 11, 2008
Holiday Inn
5002 Seawall Blvd.
Galveston, TX 77551
409-740-3581

Wednesday, March 12, 2008
Erie Meyer Civic Center
10300 2nd St.
Gulf Shores, AL 36542
251-968-1173

Wednesday, March 12, 2008
Plantation Suites & Conference Center
1909 State Highway 361
Port Aransas, TX 78373
361-749-3866

Thursday, March 13, 2008
Edgewater Beach & Conf. Center
11212 Front Beach Blvd.
Panama City, FL 31407
800-814-8686

Wednesday, March 19, 2008
Radisson Hotel & Conference Center
12600 Roosevelt Blvd.
St. Petersburg, FL 33716
727-572-7800

Thursday, March 20, 2008
Comfort Inn & Executive Suites
3860 Tollgate Blvd.
Naples, FL 34114
239-353-9500

12 SCOPING HEARING SUMMARIES

Scoping meetings were held during the early stages of developing Amendment 30 during March 19, 2007 to March 22, 2007 in Orange Beach AL, Naples FL, Panama City FL, Madeira Beach FL, Biloxi MS, New Orleans LA, and Galveston TX. Summaries of those scoping meetings are included below. Following the scoping meetings, the Council voted to split Amendment 30 in two, with Amendment 30A covering greater amberjack and gray triggerfish issues, and Amendment 30B (this amendment) covering gag, red grouper, reef fish discard mortality, time/area closures, and federal regulatory compliance issues.

Reef Fish Amendment 30 Scoping Meeting Summary
Orange Beach, Alabama
March 19,2007

In attendance: Bobbi Walker
Steven Atran
Tina Trezza
4 members of the public

Due to luggage having been lost by the airline, staff was unable to give the PowerPoint presentation that had been prepared for the meeting. In addition, turnout was low because of another meeting dealing with a state fishery issue. Instead of running the meeting in the usual presentation/testimony format, the meeting was conducted in a discussion group format. Staff introduced the issues, and discussed the purpose of the scoping process. Staff verbally summarized each section of the scoping document, and the Council meeting chair and staff then discussed the section interactively with the audience. Comments and recommendations from the audience are summarized below, but due to the format of the meeting, are not attributed to specific individuals. The meeting concluded with staff presenting a tentative schedule for completion of Amendment 30, and providing a special e-mail address for submitting Amendment 30 scoping comments.

Gag/Red Grouper comments:

Steven Atran noted that the gag and red grouper assessments were undergoing a re-analyses and review including a re-estimation of dead discard estimates, and that the stock status and/or magnitude of any changes needed could change as a result. Specific alternatives in the grouper portion of the document would likely be rewritten once the results of the analyses and review were presented to the Council. Thus, the Council was looking for what types of actions should be included/excluded from the amendment and what a suitable range of alternatives is for each action rather than support or opposition for specific alternatives. Comments from the meeting participants included:

- There was support for requiring the use of circle hooks for grouper. One person supported requiring circle hooks for all reef fish fishing, but two others opposed it for all reef fish. One reason given for opposition was that clients on charter boats tend to habitually jerk on the line when hooking a fish, in which case J-hooks work better, especially for vermilion snapper and triggerfish.
- All present who spoke supported venting tool requirements, but it was felt that training and instructional placards on vessels on proper use of the tools was also needed along with the requirement.
- One person who normally fishes in more than 150 feet felt that, even with venting, a lot of his released fish do not survive. He felt that the 1 red grouper bag limit was counterproductive because of this and that it should be raised. He also suggested

reducing the size limit in order to reduce the number of dead discards. However, eliminating the size limit entirely was opposed by several members of the audience who felt that would lead to abuses by commercial fishermen.

- One person felt that if it is necessary to reduce gag harvest, a lower bag limit for gag would be preferable to a closed season.
- Another bag limit suggestion was to consider a 4 or 5 fish aggregate grouper bag limit with no red grouper or gag species specific limit within the aggregate.

Greater Amberjack comments:

- Participants agreed that greater amberjack are a hardy fish and that release mortality is not a problem.
- Instead of vessel limits, participants suggested considering fractional bag limits. For example, set the limit at ½ amberjack per person or at one amberjack for every two people. It was felt that this would be a fairer method than setting a single vessel limit for all vessels regardless of how many people are aboard.
- One participant suggested banning commercial harvest of greater "amberjack.
- Another suggestion was to allow commercial harvest of greater amberjack, but under the same limits as recreational harvest, similar to the regulations for cobia.

Gray Triggerfish comments:

- All of the participants questioned the 1.5% release mortality rate used in the scoping document. While it was agreed that triggerfish are a hardy fish, release mortality is caused by the surface interval.
- One participant felt that the best approach to reduce harvest would be to consider size limits first followed by closed seasons. However, he noted that this was his personal preference and felt that other charterboat operators might not support this position.

General comments:

- One participant expressed concern with how any new regulations would be enforced. It was noted that NOAA Enforcement has a limited number of field agents, and that the Coast Guard and state marine enforcement agencies share responsibility for on the water enforcement, but that much of the enforcement depends on voluntary compliance and educating fishermen as to the regulations.
- Education should be at the forefront in order to keep people informed about new regulations. The Gulf Council's regulation pamphlets are rarely seen at bait and tackle shops. It was suggested that a copy of the regulations be given with every fishing license.
- Fines should be increased in order to encourage compliance.

SCOPING MEETING MINUTES

REEF FISH AMENDMENT 30
NAPLES, FLORIDA
MARCH 21, 2007

Council
Julie Morris

Staff
Rick Leard
Lela Gray

22 Members of the Public were in attendance.

The scoping meeting was convened at 7:00 p.m. on Wednesday, March 21, 2007 at the Best Western - Naples Plaza Hotel in Naples, Florida.

Dr. Leard gave a presentation on the scoping document.

Ms. Morris noted that the Gulf of Mexico Fishery Management Council (Council) would discuss splitting Reef Fish Amendment 30 to separate red and gag grouper from amberjack and grey triggerfish next week during the March Council Meeting in Destin, Florida. The public was then invited to speak.

Public Comment:

Barry Nicholls, a recreational fisherman, stated he saw a flyer the week prior which indicated that recreational fishermen kill four short gag groupers for every full-sized grouper they keep. He stated that those figures were highly inaccurate and that the recreational fishermen he fished with used circle hooks, generally fished in more shallow waters, were very careful when they released fish, and rarely did not see the released fish swim back down or swim away alive. He noted that longliners kill every fish they catch, regardless of size. He spoke against regulations effecting recreational fishermen if commercial longline fishermen remain unaffected. He also indicated that he was concerned with the science involved in this process, particularly the sampling. He felt that sampling based on interviews, phone or dockside, lead to bad data due to memory loss. He concluded that he is a proponent of fishing regulations when they are needed, but not when they are based on bad information or when they unfairly target recreational fishermen and ignore the numbers of fish killed by longliners.

John Biggs, local business owner, fisherman, and member of the FRA stated he would preserve his comments on gag grouper until after the re-review of the stock assessment. He advised that he was opposed to additional spawning area closures. He urged the Council to split Reef Fish Amendment 30. He pointed out that since red grouper have been declared recovered, the recent red grouper restrictions were unnecessary. He requested that the Council return the red grouper bag limits to five per person per day and the emergency closure be rescinded as well. He felt that the commercial regulations on red grouper should also be returned to prior levels.

Dan Biggs, local business owner, fisherman, and member of the FRA, agreed with Mr. John Biggs. He expressed frustration over the scoping document because he felt it was too scientific and too technical. He also contended that the math and science showing fish as depleted had to be erroneous because he saw an abundance ofred grouper each time he went diving.

Frank Panhuise, a recreational fisherman and spear fisherman, stated he was not confident in the science either, particularly in surveys. He reported that he was approached by shrimpers while he was out in the Gulf of Mexico and they offered to exchange their bycatch for a few alcoholic beverages. He commented that he was astounded by the amount of bycatch he saw aboard shrimp vessels. He insisted that the scientific numbers were skewed in favor of the commercial sector, particularly shrimpers and longliners, and inflated against the recreational sector.

Adam Wilson, a recreational fisherman and spear fisherman, stated that the science does not concur with what the fishermen are seeing while they are out in the water. He reported that in 2004 the average size of an amberjack he shot was about 25 pounds, but now they are regularly shooting 60 pound amberjack. He reiterated that the fishermen are seeing a tremendous increase in the numbers of fish since 2003.

Carl Gill, a recreational fisherman and spear fisherman, questioned what the Council was doing about the pollution like red tide. He stated that the fishermen see a lot of pollution in the water, and he questioned whether the scientific data took pollution into account.

Ms. Morris asked whether Mr. Gill noticed pollution in a particular area. **Mr. Gill** responded that a lot of it was in the Venice area and much of the pollution came down the Peace River.

Jasmine Workman, questioned what the Council was doing about water purification. She also reported that she had been seeing a lot of dead fish, thousands, hanging on shrimp nets. She also suggested that the Council consider aquaculture of fish species that are depleted.

Ms. Morris explained that the Council does not set the regulations on water pollution, but they do send comment letters to the agencies that do regulate water pollution. As to shrimp bycatch, she explained that the Council requires bycatch reduction devices on shrimp nets, that the Council is starting to require logbooks on shrimp boats, and that the Council is considering capping effort in areas of the Gulf where red snapper bycatch is particularly high. She further explained that the Council has to carefully manage the fisheries to ensure conservation while also refraining from taking away the livelihoods of fishermen.

The scoping hearing was adjourned at 8:08 p.m.

Reef Fish Amendment 30 Scoping Meeting Summary
Panama City, Florida
March 20, 2007

In attendance: Bill Teehan
Steven Atran
Tina Trezza
22 members of the public

Jim Clements, Carrabelle, FL - Charterboat and commercial grouper fisherman:
Gag/Red Grouper comments:

- Wants to see red grouper TAC increase adjustments set right away, not wait for a lengthy plan amendment process. He feels that implementing a 15% red grouper TAC increase right away would help to restore fishermen's' confidence in the process.
- The gag stock assessment does not have enough data to support implementing a TAC, noted assessment advisory report statement that there is a high degree of uncertainty in the biomass estimates.
- The main problem with gag is high levels of recreational dead discards. This issue needs to be addressed before imposing a TAC. However, he is not sure that the statement that 99% of the dead discards is from the recreational sector is correct.
- Commercial gag fishermen should not be penalized because of high recreational dead discards.
- Because of the ambiguous results of the gag assessment, either Amendment 30 should be tabled or gag should be addressed in a separate amendment.
- Supports requiring circle hooks and venting tools. He feels that the use of circle hooks by the commercial sector is a reason for the low number of commercial dead discards.
- Supports having inshore closed areas in grass beds to protect juvenile gag.
- Would like to see the grouper fishing year start on March 15 so that any quota closure will occur in January and February, during the peak of gag spawning season. A closure at this time would also promote safety at sea.
- FWC requires that commercial fishermen fill out a Joint Enforcement Report of their catches. Recreational fishermen should also be required to fill out similar reports. This would allow real-time monitoring and a recreational quota.
- Instead of regulation recreational catch by numbers of fish caught, regulate by pound caught. Allow recreational fishermen to keep all fish until their poundage limit is caught.

General comments:

- MRFSS data is hearsay and should be thrown out.
- Minimum size and bag limits are not working and should be thrown out.

Walter Akins, Panama City - retired charterboat fisherman, former wildlife statistician:
Gag/Red Grouper comments:

- Season should be open year round and fishermen allowed to keep the first three or four fish (not sure if he was talking about red snapper or grouper).

- Consider adding artificial reefs as part of the management plan.

Pat Green, Panama City - recreational spearfisherman, also some experience as a commercial greater amberjack fisherman:

Gag/Red Grouper comments:

- Felt that the gag recreational release mortality estimates were improperly based on a study using electric reels.
- Demands that recreational fishermen be immediately given back their 5 red grouper bag limit.
- Opposed to closed areas - they have not been proven to work.
- Closed seasons are a bad idea for both commercial and recreational. They force fishermen to fish in adverse weather, and create more fishing pressure before and after the closure.
- Traditional bag and minimum size limit regulations have always been shown to work.
- Amendment 30 should be split, especially if it would allow a red grouper TAC increase to be fast tracked.

Greater Amberjack comments:

- Recreational fishermen are already down to a I amberjack bag limit, and it would be unduly harsh to put more regulations on them.
- A commercial trip limit should be used to achieve any necessary greater amberjack reductions in harvest.

General comments:

- Reallocate all fisheries based on economic impact.

Bart Niquet, Lynn Haven - fisherman for over 65 years

Gag/Red Grouper comments:

- Eliminate size limits for both commercial and recreational fishing. They just result in wasted fish.
- Recreational should be 4 fish/person, no size limit.
- The commercial 6,000 pound trip limit and quota are sufficient to mange the commercial fishery, no size limit is needed.

Steve Runkel, Dothan Alabama - former commercial fisherman, currently recreational.

Gag/Red Grouper comments:

- Concerned about the gag estimates of dead discards. If dead discard information is corrected, we may be at or above OY right now.
- Opposed to closed areas, sees no need for them.

Scott Robson, Miramer Beach - recreational fisherman:

Gag/Red Grouper comments:

- Would not comment on the grouper section because of the flawed data that is currently being reviewed and corrected.

Greater Amberjack comments:

- Questioned the accuracy of statements on page 38 that the highest greater amberjack catches per trip were 50 for headboats, 10 for charterboats, and 7-8 for TPWD and MRFSS private recreational vessels. Given the 1-fish bag limit, these numbers seem too high.
- If anything needs to be done, the February-March closed season and 30-inch minimum size limit would be the way to go.

Gray Triggerfish comments:
- Felt that fish caught on artificial reefs are not being counted.
- 12-inch size limit was just implemented last year. There has not been time to evaluate its impact.

Mike Eller, Destin - charterboat captain:
Gag/Red Grouper comments:
- Need to consider the purely recreational grouper sector with respect to bycatch mortality, and to improve the bycatch data.
- Consider recreational sector logbooks.
- Educate mates on ways to reduce bycatch mortality.
- It would be OK to have a TAC that includes bycatch if the bycatch numbers were OK.
- Charterboat operators in Destin feel that a 5-grouper bag limit is too many. A 3grouper limit would be OK.
- If there is a greater amberjack closed season, make it the same as the February 15-March 15 grouper closed season in order to minimize economic impacts. Many charterboats are shut down during the grouper closed season anyway.

Greater Amberjack comments:
- Could not survive a 2 greater amberjack per vessel limit.

Gray Triggerfish comments:
- Since the 12-inch size limit was implemented, he has thrown a lot of triggerfish
- back. However, he is not opposed to a 13-inch size limit.

General comments:
- Does not know what to believe in information provided. Does not trust government.
- The data collection system is flawed, and the data comes in a year later than needed.
- The loss of seagrass habitat is not being addressed.

Tim Edwards, Carabelle - commercial fisherman
Gag/Red Grouper comments:
- Every grouper caught should be kept and landed under trip limits.
- Grouper caught below 85 feet are dead.
- Circle hooks will do little to reduce release mortality. The main cause of release mortality is depth of capture.
- Observer and VMS requirements do not work well. In order to carry an observer, the vessel operator must have taken a "drill course", and it is difficult to find a place to take the course.

General comments:

- He and many commercial fishermen do not have computers and are not getting
- the documents or timely notice of meetings such as this, or are not being notified at all.

Ricky Millender, Carabelle - commercial fisherman
General comments:
- He does not have a computer at home to get meeting notification.
- He and many commercial fishermen do not have computers and are not getting timely notice of meetings such as this, or are not being notified at all.
- If commercial fishermen are required to have VMS, then so should recreational fishermen.
- If commercial fishermen are required to fill out trip reports, so should recreational fishermen.
- Grass beds that are juvenile habitat for gag need to be protected. Condo development is tearing the grass flats up. Grass beds need to be protected from all boating activity.

James Chapman, Panama City - owns 3 charterboats and 1 commercial vessel:
Gag/Red Grouper comments:
- The grouper assessments are inadequate and need to be separated out from the amendment.
- The February IS-March 15 closed season covers only a fraction of the gag spawning season. December-February should also be closed to cover more of the gag spawning season.
- Closed areas are not a way to manage the fishery, since finfish can and will swim out of the area.

Henry Hunt, Panama City - charterboat operator.
Gag/Red Grouper comments:
- Red grouper and gag should have separate amendments:
- Reallocate red grouper to a more fair allocation
- Raise the red grouper bag limit to at least 2 fish.
- For gag, a 2 or 3 fish bag limit is plenty adequate.

Greater Amberjack comments:
- Questioned that the stock is in any in of trouble, given that the bag limit is down to one fish.
- Commercial sector needs a trip limit. Without one, a vessel may stumble across a large concentration of fish and target them extensively.

Gray Triggerfish comments:
- Recommended no changes. Triggerfish changes are good one yea, not good another. This suggests that triggerfish move about.

General comments:
- The charterboat industry is dependent on red snapper season.
- The charterboat industry has seen a 25% percent reduction in its economy due to the closed seasons.

Reef Fish Amendment 30 Scoping Meeting Summary
Madeira Beach, Florida
March 22, 2007

In attendance: Bob Gill
Steven Atran
Tina Trezza
43 members of the public

Dennis Ohern, FRA: (Note: 8 subsequent speakers supported the FRA position)
Gag/Red Grouper comments:
- With the gag assessment under review, there is no reason to take scoping comments on gag at this time.
- The red grouper interim rule was unnecessary. He demands emergency action to restore the 5 red grouper bag limit, captain and crew bag limit, and eliminate the closed season.
- The ½ mp of TAC taken from the commercial sector should be given back.
- An apology is wanted for the red grouper actions.
- There is no quantifiable evidence to have spawning area closures.

General comments:
- Called for another round of scoping meetings. Having scoping meetings right before the Council meeting does not give the Council adequate time to review the comments and adds to the perception that public input is not given consideration.
- The amendment should be split into a grouper amendment and an amberjack/triggerfish amendment.
- The Council should adopt realistic levels of OY rather than precautionary levels.

Marianne Cufone, Gulf Restoration Network (submitted written comments):
General comments:
- Council should consider using ecosystem based management. Amendment 30 is a good place to begin.
- A stable, transparent regulatory process is needed for public understanding.
- IPT meetings should be public meetings and should be publicly noticed. The IPT should not change a document between the public comment period and Council review, which has happened in the past.
- Council should comply with NEPA and with the Magnuson Act.

Bob Spaeth, SOFA:
Gag/Red Grouper comments:
- Questioned how overfished and overfishing status are determined, and where management targets come from. Has said time and again that the data are bad.
- Vessel bycatch logbooks are difficult to keep real time, so the fisherman will often just put down some number.
- If the areas defined on the 40 fathom break are made closed areas, you might as well closed down the commercial fishery. There is only so much habitat.

- Supports restoring red grouper bag limit to 5 fish and increasing red grouper commercial quota 15%.

Greater Amberjack comments:
- Greater amberjack do not seem to be in any trouble in the southern Gulf of Mexico, but fishermen cannot sell as much as they can catch due to a loss of market. Conditions might be different in the north and west.
- Consider splitting the Gulf amberjack stock into southern and northwestern stocks, similar to kingfish.

Gray Triggerfish:
- The commercial hook and line fishermen don't get too many triggerfishes.
- However, fish trappers had caught lots of triggerfish. Has that (fish trap phase out) been taken into consideration?

Mark Hubbard, West Coast Partyboat Association:
Gag/Red Grouper comments:
- Supports FRA position.
- Recreational sector should get its 5-fish bag limit back. At least increase it to 3 fish.
- Commercial sector should get its TAC back.
- Does not support closures.
- Supports requiring circle hooks. His vessels use kahle hooks on party boats fishing in deep water.
- Supports requiring venting tools. His crew is trained in their use.

Greater Amberjack comments:
- Has not seen any decline in greater amberjack.
- Vessel possession limits won't work for party boats where 30% - 50% of the catch is sometimes greater amberjack. Stay with 1 fish/person.
- If anything needs to be done, raise the size limit. Greater amberjack have a low release mortality.
- Opposed to closed seasons.

Gray Triggerfish:
- Will catch a handful of triggerfish but not a lot, fishing between the Suwanee River and Fort Myers,
- Has seen neither a decline nor increase in triggerfish.
- Triggerfish are very resilient when released.
- Would not mind that much if triggerfish were closed down, but prefers no action in eastern Gulf of Mexico.

General comments:
- Consider allocating a budget to "seeding" the Gulf of Mexico through egg releases. This approach has been used with snook, redfish and trout in the Tampa Bay area.

Libby Featherstone, Ocean Conservancy (will submit a written letter):
Gag/Red Grouper comments:

- Council should put together a broad range of alternatives to address ending overfishing, reducing bycatch, and protecting spawning aggregations.
- There is concern about the reduction in percent of gag males in recent years.
- There should be alternatives to restore the males to their historical percentage.

Greater Arnberjack comments:
- A hard TAC is needed to end overfishing immediately.
- Alternatives should restore the stock within the original 7 year time frame.
- Bycatch needs to be accounted for.

Gray Triggerfish:
- Alternatives should immediately end overfishing.

General comments:
- Alternatives should consider a range of ABC that is consistent with ending overfishing and rebuilding stocks.
- TACs should transition from a landed yield TAC to a total mortality TAC
- Implement capacity reduction programs
- Protect areas where spawning occurs
- Set appropriate size limits, taking into account bycatch mortality.
- There should be mandatory data collection systems such as electronic logbooks, observers, and enhanced MRFSS.
- Consider options that allow in-season management, and that account for overages.
- Consider holistic approaches to managing the resources.

Tom Bartone, Cedar Key - commercial, charter and spearfisherman:
Gag/Red Grouper comments:
- Gag and red grouper catches and sizes haven't changed much.
- Regulations get changed too quickly.
- Has few dead discards, maybe 1 in 100 is dead on contact.
- Closed areas and closed season don't help anybody. Closed seasons are just atime when fishermen can't make a living.
- An alternative to closed seasons might be reduced bag limit seasons.

General comments:
- Goliath grouper have come back in last 15 years. There are at least 1 to 12 on
- every site.

Bob Bryant, Recreational Anglers Cooperative Research
Gag/Red Grouper comments:
- Supports FRA position.
- Recreational fishermen should be given back their red grouper bag limit.
- Gag and red grouper should not be lumped together. He can target red grouper or gag.
- Scoping workshops are being conducted before we have the tools (special review results). Another round of workshops is needed.

Greater Amberjack comments:
- Should be separated out and given its own amendment.

Gray Triggerfish comments:
Should be separated out and given its own amendment.

General comments:
- He is setting up a data collection system designed after MRFSS but without the biases. The Council should work with him as he registers anglers to participate.

Bret Walley, Plant City - recreational fisherman and spearfisherman:
Gag/Red Grouper comments:
- Supports the FRA position.
- Is not opposed to requiring circle hooks as long as spearfishing is allowed.
- He is not seeing high gag release mortality.

Robert Powell, Tarpon Springs - commercial fisherman for 35 years
Gag/Red Grouper comments:
- Commercial red snapper size limits were recently reduced based on 85% release mortality. The same problem exists with grouper. Thousands or millions of fish are being wasted each year.
- Current size limits are arbitrary.
- Longline vessels catch a lot of undersize red grouper, and then cut them up for bait. Why not let them bring those fish back to the dock?
- Estimates that over 1 million pounds of grouper are thrown back to catch 7 mp.
- Recreational fishermen would be happy with an 18 inch size limit. That would result in less inadvertent kills.
- Venting is of no help if fish are caught deeper than 150 feet.
- A Mote Marine Lab tag-release study is getting a consistent 10% return. He felt that those results indicate that a lot of fish are not surviving.

Michael Hansen, recreational fisherman and scuba diver:
Gag/Red Grouper comments:
- Would not have a problem with giving up some of his catch to help the fish if it
- was necessary.
- Season closures will put small scale fishermen who cannot survive during the closure out of business
- Feels that longline fishermen are calling the shots.

Stephen Sanders, recreational fisherman and scuba diver:
Gag/Red Grouper comments:
- Supports FRA position.
- Disappointed in the gag dead discard estimates.

Raymond Oder (submitted written comments):
Gag/Red Grouper comments:
- Supports a 20 inch standard size limit for all groupers. Cited a recent trip in which only 1 of70 grouper caught was legal (22"). Most ofthe fish were 20"21".
- Feels that trimming the goliath grouper population will work better at increasing grouper survival than reducing grouper bag limits.

Gray Triggerfish comments:
- Feels that the triggerfish assessment is ridiculous.

General comments:
- Questioned accuracy of landings data, felt that only 3% of landings get counted.
- Wants no new regulations until it can be proven how many fish are in the Gulf.
- Suggested that managers go diving in the Gulf to see how many goliath grouper are out there.

Chris Hudgens:
Gag/Red Grouper comments:
- Supports FRA position.
- Give red grouper bag limit back.
- Would be ok with setting gag size limit at 24 inches across the board.

Greater Amberjack/Gray Triggerfish comments:
- These stocks should not be considered together with the grouper. They should be separated out and given their own study.
- Northern Gulf seems different from southern Gulf

John Schmidt, President - Florida Skin Divers Association:
Gag/Red Grouper comments:
- Supports FRA position.
- Strongly opposed to area closures.
- Does not like season closures.
- Supports commercial trip limits.
- Gag dead discard figures do not make sense.

Greater Amberjack comments:
- In 20 years, he does not recall having an undersized greater amberjack that he releases die.

Gray Triggerfish comments:
- Triggerfish are his last choice for fish to target.
- Cannot see why any triggerfish rules would be changed.

General comments:
- He would be willing to take a government official on his boat. His bycatch is less than 5%.
- Supports eliminating wasted fish by any means necessary.

Jose Pais, Jr. - recreational fisherman and diver:
Greater Amberjack comments:
- Amberjacks that he sees are usually pretty big. The stock seems to be healthy.

Gray Triggerfish comments:

- To demonstrate hardiness of triggerfish, he told a story about his son spearing a triggerfish and putting it on his stringer, but the fish still attacked and bit his son on the leg.
- Doesn't usually target triggerfish. It takes a large fish to get some meat.

General comments:
- Agrees with the others regarding goliath grouper. They are all over the place.
- In a spearfishing tournament once, he had to shoot 4 greater amberjack before he was able to keep one. Goliath grouper ate the first three.
- Suggested opening goliath grouper, maybe using a kill tag.

Sahrab Jaber - recreational fisherman no partnered with commercial fishermen.
Gag/Red Grouper comments:
- Reduce gag or red grouper size limit to 18 inches. Allow 1 grouper from 18" to 30", 1 grouper over 30", and three that are 18" to 30". This will help protect the breeders.
- Supports bycatch monitoring.
- Reducing the grouper bag limit would be devastating.
- Totally opposed to closed areas. There is not enough scientific evidence to support them.

General comments:
- We need hatcheries and fish farms. Two acres of shrimp farms can provide more shrimp than all the trawlers.
- The main reason for depletions is the commercial fishery. Let them harvest fish from hatcheries.
- Ban all commercial fishing from the Gulf of Mexico.
- Ban longline fishing immediately. They are the main reason for depletions.
- Ban shrimp trawls immediately. They kill baby fish.
- Implement a fishing license or tag fee on recreational fishermen, and use the proceeds to fund commercial buy-outs.

Travis Paladino, Live wire Fishing Charters:
Gag/Red Grouper comments:
- Supports FRA position and Bob Bryant's comments
- Mandatory venting tools is the best idea he's heard tonight.

Paul Kerr, recreational fisherman and spearfisherman:
Gag/Red Grouper comments:
- Supports FRA position

Greater Amberjack comments:
- Greater amberjack stocks appear healthy.

Gray Triggerfish comments:
- Has not seen much change in triggerfish in last 20 years.

Written comment submitted by Ray Odor

GROUPER QUESTIONS

1. If the sole method of Grouper stock assessments are determined by counting landings at the dock or boat ramp, how do you assess the Goliath Grouper? No one can bring them in. Hog Fish? Trigger fish? Amberjack? Etc.

How can you count 3 percent of fish landings on shore and, logically, with clear conscience, assess anywhere near a factual stock assessment of the number of existing fish of six different species in our waters. How dare you use such a farfetched day dream to continue fostering limits on our fishery. Every year you tighten the noose. It's almost as if you are admitting each successive year that what you have previously implemented has been a failure. Guess work has gone far enough. Prove your method works

2. If the larger grouper are considered the sexually mature male, why do we force fishermen to target them by unrealistic size limits? Why not a twenty inch standard for all grouper?

3. Last but not least. If just 2 or 3 of you could muster up the courage to don a SCUBA tank and, see for yourself, the Humongous, big bellied, Goliath Grouper hovering over rock and wreck structure, you would have a better idea of where our fish are going.

Ray Odor

TRIM THAT HERD! TRIM THAT HERD! TRIM THAT HERD!

Written comment submitted by Marianne Cufone, Gulf Restoration Network

Amd 30 Scoping.Recommendations:

1. USE ECOSYSTEM BASED MANAGEMENT: **Consider predator/prey interactions, fish found and caught together, fish caught in opposing seasons, bycatch, and habitat impacts.**

NMFS/NOAA and Council keep talking about ecosystem based management and now the reauthorization of Magnuson expressly encourages it...but where is it? We still are mostly using a species-by-species approach. Management decisions about one fish often affect others. We need to be better about understanding how wildlife interacts with each another and create rules that consider those interactions. Amd 30 is a good place to take the time to look at the whole picture.

2. USETHE PRECAUTIONARY APPROACH: **Things to consider when making decisions using the precautionary approach include uncertainties and environmental and ocioeconomic. conditions.**

The precautionary approach requires use of the best available science for management decision-making and prevents using the absence of adequate scientific information as a reason for postponing or failing to take conservation-oriented management measures. The precautionary approach is designed to buffer against uncertainty, conserve-resources for the present and the future, and provide insurance for the continued healthy existence of our natural resources

3. DEVELOP A STABLEAND TRANSPARENT REGULATORY PROCESS: **NMFS and the**
Gulf Council should design a consistent process for use on the development of all future
FMPs and Amds to avoid duplication, and promote timeliness, public understanding and effective resources usage (like staff and money).

Also, Interdisciplinary Planning Team (IPTs) meetings should be noticed open public meetings.

U.S. fish resources belong to everyone in the U.S. and are meant to be managed by NMFS with help from Councils and others for the benefit of the nation. The management process is required to be open and accessible to anyone interested. Only a few types of meetings of Council, SSC, advisory panels and other committees can be closed to the public: matters or information that bears a national security classification; matters or information that pertain to national security, employment matters, or briefings on litigation in which the Council is interested[14]

[14] 16 USC §1852(3)(A).

4. COMPLY WITH NEPA: **Use NEPA as a tool rather than viewing it as a complicated burden. Provide summary documents that are more user friendly than only large EAs/EISes. Try to streamline the process by making it compatible with Magnuson process (in preparation for new NEPA process under re-authorization).**

The primary purpose of NEPA is to ensure the provision of unbiased information to government entities and the general public regarding a proposed action, potential alternatives to that action, and the possible impacts from those measures so that managers and the general public understand potential consequences and benefits from any future actions and knowledgeable management choices can be made. "NEPA's purpose is not to generate paperwork, but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on the understanding of environmental consequences, and take actions that protect, restore and enhance the environment.[15]

The outcome of a NEPA document is not to be presupposed. Documents created under NEPA "shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made".[16]

5.COMPLYWITH MAGNUSON: **End overfishing, minimize bycatch, reduce mortality of bycatch, and develop a standardized bycatch reporting methodology for the species included in Amd 30.**

The re-authorization of Magnuson in December 2006 added, some new provisions and thus some other goals that should be included in Amd 30: **develop annual catch limits for all managed fisheries in the Council's jurisdiction that do not exceed the fishing level recommendations of the SSC, specify these limits, means to implement them and assure accountability in plans, establish incentives for bycatch reduction by: incorporating bycatch into quotas, including establishing individual or collective bycatch quotas, establish measures to promote use of gear that have less bycatch, and establish measures, based. On the best scientific information available, that will reduce bycatch.**

6. CHOOSE MANAGEMENT MEASURES WITH AT LEAST A 50% CHANCE OF SUCCESS: **A number of meaningful alternatives should be included in Amd 30that do
have at least a 50% chance of success.**

Under National Resources Defense Council v. Daley[17], any regulations implemented by NMFS must have a 50% chance of success.

Marianne Cufone. .

[15] 40 CFR §1500.1
[16] 40 CFR §1502.2(g)
[17] 209 F.3d 747 (D.C. Cir 2000) at 754.

Florida Program.Manager

SCOPING MEETINGS
REEF FISH AMENDMENT 30
SUMMARY

Biloxi. Mississippi - March 19. 2007

Council: Tom Mcllwain
Corky Perret
Staff: Assane Diagne
Charlotte Schiaffo
Attendance: 2

The scoping meeting was convened at 7:00 pm on Monday, March 19, 2007 at the Imperial Palace Hotel in Biloxi, Mississippi. Dr. Diagne gave a presentation on the scoping document. The public was then invited to speak. Public comments emphasized the critical role that educational material and training programs could play in improving anglers' knowledge concerning proper venting techniques. The scoping hearing was adjourned at 7:30.

New Orleans. Louisiana - March 20. 2007

Council: Harlon Pearce
Staff: Assane Diagne
Charlotte Schiaffo
Attendance: 40+

The scoping meeting was convened at 7:00 pm on Tuesday, March 20, 2007 at the Sheraton Four Points Hotel in New Orleans, Louisiana. Dr. Diagne gave a presentation on the scoping document. The public was then invited to speak.

Due to the impending reviews, a majority of audience members indicated that it was premature to make any comment concerning red or gag grouper. However, it was noted that red grouper TAC should be reinstated at its previous level. It was further indicated that separating the amendment into two documents; one with red and gag related issues and another with greater amberjack and gray triggerfish management measures would benefit the process. Meeting participants indicated that, to address the overfishing of the greater amberjack, size limit adjustments would be preferable to season closures. An increase in the minimum size limit to 30 or 32 inches was suggested. Participants noted that many for-hire operators rely on amberjack during difficult periods and thus, seasonal closures would really hurt their bottom line. This observation was reinforced by participants who commented that every time a species becomes inaccessible due to restrictive management measures, effort is shifted towards other available species.

Concerning the management of gray triggerfish, an increase in the size limit to 12" was the preferred course of action for participants. It was also noted that gray triggerfish was not favored by most recreational anglers and that, if there were a problem, it may be linked to commercial operations. In response to a question from Mr. Pierce, for-hire operators present repeatedly indicated that they would be ready to participate in additional data collection efforts through a for-hire trip ticket program.

Several speakers indicated that management measures could account for the fact that spearfishermen generate a negligible, if any, amount of bycatch. In effect, several participants spoke in favor of special programs for divers. Participants also suggested the possibility of keeping the first 4 or 5 fish in lieu of size limit restrictions and season closures.

Several participants strongly emphasized that management needed to fully account for fish around oil rigs and other artificial structures. In addition, expansions of existing artificial reef were suggested. The scoping hearing was adjourned at 9:30 pm

Galveston, Texas - March 21, 2007

Council:	Degraaf Adams
Staff:	Assane Diagne
	Charlotte Schiaffo
Attendance:	8

The scoping meeting was convened at 7:00 pm on Wednesday, March 21, 2007 at the Hilton Hotel in Galveston, Texas. Dr. Diagne gave a presentation on the scoping document. The public was then invited to speak.

Speakers indicated that comments on red and gag grouper would be premature given the upcoming reviews. However, concerns over the dead discard figures provided in the scoping document were expressed. It was indicated that, in Texas, greater amberjack is abundant. Similarly, it was strongly noted that there are so many gray triggerfish in Texas waters that it was almost becoming a nuisance. Based on these observations, participants suggested that there may be a need for more regionalization in management measures. The importance of fish populations around artificial reefs in Texas was also noted. Speakers noted that the availability of educational material and training programs on proper fish venting techniques was critical to successful bycatch mortality reduction.

The scoping hearing was adjourned at 8:15 pm

Written comment submitted by Louis Rossignol, Hell Divers Spearfishing Club.

HELL DIVERS
SPEARFISHING CLUB

3513 43rd st.
Metairie La. 70001
Phone 504-481-7529
dclouis@cox.net

Addressing Amendment 30, it is the belief of the Hell Divers that the data the Gulf Council is using is fatally flawed. It appears that the Gulf Council is using data that pertains to the Florida ecosystem and the Council is trying to apply it here in Louisiana. Louisiana and Florida have 2 completely different eco-systems. (As far as the red grouper ruling, catching a red grouper in Louisiana would be a very rare occurrence. As for red snappers, Louisiana has more red snappers than any of the other Gulf States, whether your data shows it or not.)

It is also the opinion of the Hell Divers that the Gulf Councils decision not to allow fish on artificial structure to be counted is a mistake. The recreational fishermen and commercial fishermen all fish the oil platforms off the coast of Louisiana, as that is where the fish such as Red Snapper, Grouper, Amberjack and Gray Trigger fish all live in abundance.

It is also the belief of the Hell Divers that the Gulf Council is making decisions without even considering the economic impact of their decisions, just to please the commercial fishermen. The Gulf Council is forcing laws on the recreational fishermen but in the commercial sector the laws are not enforced whatsoever.

Louis Rossignol
Hell Divers

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13 ALTERNATIVES CONSIDERED BUT REJECTED

Action 2. Red Grouper Minimum Stock Size Threshold

Alternative 1. No action. The MSST for red grouper shall be (1-M)*SSB_{MSY}, where M = 0.15.

Alternative 2. Red grouper MSST shall be 0.75* SSB_{MSY}

Alternative 3. Red grouper MSST shall be 0.50* SSB_{MSY}

Discussion:

The minimum stock size threshold (MSST) is the smallest stock size allowed before a stock is declared overfished. NOAA Fisheries Service technical guidance (Restrepo et al. 1998) allows MSST to be set at any level greater than ½ of the spawning stock biomass capable of producing maximum sustainable yield (SSB_{MSY}) or the minimum level for rebuilding a stock within 10 years. Restrepo et al. (1998) recommended setting MSST equal to (1-M)*SSB_{MSY} or 50 percent of SSB_{MSY}, whichever is greater. It was reasoned that a stock fished at F_{MSY} would fluctuate around SSB_{MSY} on a scale related to M.

Secretarial Amendment 1 to the Reef Fish FMP established an MSST definition for red grouper. However, given the Council is considering establishing an MSST for gag in this amendment, coupled with the fact that gag and red grouper have similar life histories and are prosecuted by the same fishermen, it seems prudent that biological reference points and status determination criteria be consistent between these two species. Action 1 considers three definitions for gag MSST. These same definitions are also considered for red grouper in this action. If the Council selects (1-M)*SSB_{MSY} as the preferred definition for gag MSST then there is no need to revisit the definition for red grouper MSST and this action could be moved to the considered, but rejected section. If, however, the Council selects an alternative definition for gag MSST, then the Council may want to consider an alternative MSST definition for red grouper to maintain consistency between these two species.

The following discussion provides a brief summary of each of the alternatives in this action. For a more detailed discussion of the impacts of each of these alternatives on the physical, biological, social/economic, and administrative environments see Section 5.2.

Alternative 1 (no action) would maintain the current definition for red grouper MSST, which is (1-M)*SSB_{MSY}, where M is the natural mortality rate for red grouper (M = 0.15). **Alternative 1** is the most conservative of the three alternatives considered in this action. Setting MSST close to SSB_{MSY} increases the likelihood the stock may be declared overfished due to factors unrelated to management (e.g., assessment uncertainty, changes in stock productivity due to environmental factors). Analyses conducted by the SEFSC indicate there is a 20-28 percent probability that SSB would fall below (1-M)*SSB_{MSY} given natural fluctuations in recruitment and assessment uncertainty if fishing mortality is maintained to achieve MSY. If fishing mortality is maintained to achieve OY then there would be less than a 0.2 percent probability of SSB falling below (1-M)* SSB_{MSY} (Cass-Calay and Ortiz 2007).

Alternatives 2 and **3** would revise the definition of MSST to equal either 75 percent or 50 percent of SSB_{MSY}, respectively. NOAA Fisheries Service technical guidance (Restrepo et al. 1998) recommends setting MSST no lower than 50 percent of SSB_{MSY}. By setting MSST equal to a specified percentage of $SSB_{MSY,}$ MSST is no longer tied to the red grouper natural mortality rate, which may change based on updates to stock assessments or new biological information. The lower MSST is set, the lower the likelihood the stock will be declared overfished due to data uncertainty or changes in productivity associated with prevailing environmental conditions. . However, if a stock is declared overfished, it would potentially take longer for the stock to recover to SSB_{MSY} and management measures would likely be more restrictive than if the status quo MSST definition (**Alternative 1**) is maintained. Given natural fluctuations in recruitment and taking into account assessment uncertainty, there is a 0-2 percent probability that SSB would fall below 0.75*SSB_{MSY} if fishing mortality is maintained at MSY and a zero percent probability if fishing mortality is maintained at OY (Cass-Calay and Ortiz 2007). There is a zero percent probability that SSB would fall below 0.5*SSB_{MSY} if fishing mortality is maintained at either MSY or OY (Cass-Calay and Ortiz 2007).

Revising or maintaining the definition for MSST should not directly affect the physical environment because this action simply provides fishery managers with a defined harvest target to determine if a stock is or is not overfished. The alternatives in Action 2 should have no direct effect on the physical environment. However, specifying these criteria may indirectly affect the physical environment by defining the future level of fishing effort that will sustain the stock over the long term. **Alternative 2** would provide for the highest amount of fishing mortality/effort before a stock is declared overfished, followed in order by **Alternative 2** and **Alternative 1**.

Action 2 would have no direct effects on the administrative environment in the short-term because stock biomass is estimated to be well above any of the proposed MSSTs. In the long-term, Action 2 could result in indirect effects on the administrative environment by establishing different probabilities for triggering an overfished determination. **Alternative 1** would result in the stock being declared overfished more often than **Alternatives 2** or **3**, especially if fishing mortality is not successfully constrained to F_{MSY} or F_{OY} levels. However, because **Alternatives 2** and **3** are less conservative than the current MSST definition, greater reductions in harvest may be required in the future to rebuild the stock if it is declared overfished.

Action 8. Application of Quota Closures

Alternative 3a. When an individual species quota is reached (gag or red grouper), commercial harvest of that species closes, but harvest of the remaining shallow-water species can continue until either both gag and red grouper quotas are reached, or the shallow-water grouper quota is reached, whichever comes first.

Alternative 3b. When 80% of an individual species quota is reached or projected to be reached (gag or red grouper), directed commercial harvest of that species closes. However, harvest of the remaining shallow-water species can continue with a bycatch allowance on the closed species of 10% of the grouper catch by weight until either both gag and red grouper quotas are reached or projected to be reached, or the shallow-water grouper quota is reached or projected to be reached, whichever comes first. These proportions apply when the vessel returns to port.

Alternative 4. Whichever of the following occurs first will be implemented, but not both:
When 70 percent (or some other percentage) of the gag quota is reached, commercial harvest of shallow-water grouper in statistical areas 5 through 21 would be prohibited. Or: when 70 percent (or some other percentage) of the red grouper quota is reached, commercial harvest of shallow-water grouper in statistical areas 1 through 4 would be prohibited. However, if both quotas are estimated to be reached within 30 days of one another, then all statistical areas would remain open until either the gag, red grouper, or shallow-water grouper quotas were met. Harvest of shallow-water grouper in the remaining open areas could continue until either the gag quota, red grouper quota, or shallow-water grouper is reached, whichever comes first.

Alternative 3a addresses the underharvest situation in the previous alternative by closing the commercial fishery only for the species whose quota is reached first. Fishing on the remaining shallow-water grouper species is allowed to continue until either the second species quota or aggregate quota is reached, whichever occurs first. If the aggregate quota is reached before the second species quota, this will result in an underharvest of the second species, but by a smaller margin than under Alternative 2. However, this will prevent an uncontrolled increase in harvest of the remaining shallow-water grouper species. These remaining species have not had stock assessments and their status is unknown. Bycatch and bycatch mortality of the grouper species that is first closed could be an issue in areas where both gag and red grouper are abundant. Commercial fishermen have testified that they can selectively target for a particular species, but some bycatch of the non-targeted species is still likely to occur, resulting in a potential overfishing of that species.

Alternative 3b had some limitations as currently structured. It is likely some commercial fishermen who target gag will switch to other species besides grouper once the bycatch allowance (incidental harvest) trigger is met. On these trips, should they catch gag, they would discard these fish unless they had sufficient catches of other grouper species to apply their bycatch allowance. These regulatory discards would have a mortality level associated with them. This discard level could be reduced if the bycatch allowance was simply a trip limit rather than the proposed percent of grouper landed. This would allow gag to be landed regardless of what reef fish species are targeted. Besides being a simpler rule to follow for fishermen, the specific trip limit bycatch allowance would also be easier to enforce.

As currently worded, **Alternative 3b** could allow either the gag or red grouper commercial annual catch limit (ACL) to be exceeded. The text states "the remaining shallow-water species can continue with a bycatch allowance on the closed species of 10 percent of the grouper catch by weight until either both gag and red grouper quotas are reached or projected to be reached, or the shallow-water grouper quota is reached or projected to be reached, whichever comes first." This could allow the species operating under the bycatch allowance to exceed its quota under some circumstances. For example, should the gag harvest operating under a bycatch allowance alternative fill its quota on August 1, **Alternative 3b,** as currently worded, would allow the gag harvest to continue after this date until either the red grouper or SWG quota is filled.

Another problem with this alternative is there are no provisions about what should happen if the bycatch allowance trigger is met toward the end of the fishing season. Under these conditions, it is possible the application of the bycatch allowance provisions would result in the inability of the fishery to catch its quota. For example, should the 80 percent quota trigger be met on December 1 of the fishing year, it is unlikely the fishery would be able to harvest the remaining 20 percent of the quota by the end of the fishing year without the bycatch allowance.

Alternative 4 addresses the bycatch issue in **Alternatives 3a** and **3b** by proposing regional closures. These closures are based on the distribution of gag and red grouper landings along the west Florida shelf. The geographic closure is triggered when a percentage of the species quota is reached rather than the entire quota in order to leave an allowance for that species to continue to be able to be caught and kept in the remaining open areas, thus reducing the problem of regulatory bycatch. Ninety-seven percent of gag and 99.5 percent of red grouper landings are from the west Florida shelf. Gag are predominately harvested in statistical zones 5 through 7 (Tampa to Apalachicola); 72 percent of gag landings were from these statistical areas during 2001-2004 (Figures 2.8.1 and 2.8.2). Red grouper landings are predominately from statistical areas 4-6 (Crystal River to Fort Myers); 73 percent of red grouper landings were from these statistical areas during 2001-2004 (Figures 2.8.1 and 2.8.2). Although these fisheries overlap significantly, a large percentage of red grouper landings occur in areas where gag are less abundant, and vice versa. Figure 2.8.3 shows the average percentage landings within each statistical area of gag and red grouper. The proportion of gag caught in each statistical area increases from south to north, while the proportion of red grouper decreases. In statistical areas 1 through 5, the ratio of red grouper to gag landings is 1.0:0.32. In contrast, the ratio of red grouper to gag landings in statistical areas 6 through 21 is 1.0:0.86.

To determine how this alternative might affect season closures, gag and red grouper quotas were applied to 2004-2006 landings data. This analysis assumed a gag commercial quota of 1.22 mp and a red grouper commercial quota of 5.75 mp. These quotas represent the lower potential quotas from Actions 3, 4, and 5. The gag quota was calculated by applying a 39 percent commercial allocation (Action 5) to the 2008 3.13 mp TAC (Action 3), which equaled 1.22 mp. For red grouper, a 76 percent commercial allocation (Action 5) was applied to a 7.57 mp TAC (Action 4) and resulted in a 5.75 mp quota. Landings were broken down between areas (statistical zones 1-4 and 5-21) and into half month intervals. Triggers were examined from 70 percent to 90 percent with no grouper fishing allowed in closed zones once the trigger was met. For all years, gag reached the trigger before red grouper, so only closures of statistical zones 5-21 were examined (Table 1).

Based on these analyses, statistical zones 5-21 would have been closed to commercial shallow-water grouper fishing in early April in 2004 and 2005, and in late June in 2006 if a 70 percent trigger was applied (Table 1). Increasing the trigger percentage shifted the closure to later dates. Adding gag landings from statistical zones 1-4 and assuming no effort shifting between regions, the gag fishery would have been allowed to stay open through the remainder of the year with the 70 percent trigger. With higher trigger percentages, the shallow-water grouper fishery would have had close prior to January 1 during 2004 and 2005. In addition, by restricting the red grouper fishery to statistical zones 1-4 and given the assumptions of this analysis, less than 50 percent of the red grouper quota would have been landed in 2004, approximately 50 percent would have been landed in 2005, and between 50 and 74 percent would have been landed in 2006.

One potential negative effect associated with establishing a regional management regime is localized overfishing. For instance, there is some indication that red grouper may exhibit different demographic and life history characteristics north and south of 28º N latitude (Fitzhugh et al. 2006). If there is not sufficient movement and recruitment between these areas, then regional closures may negatively affect this stock by causing localized overfishing.

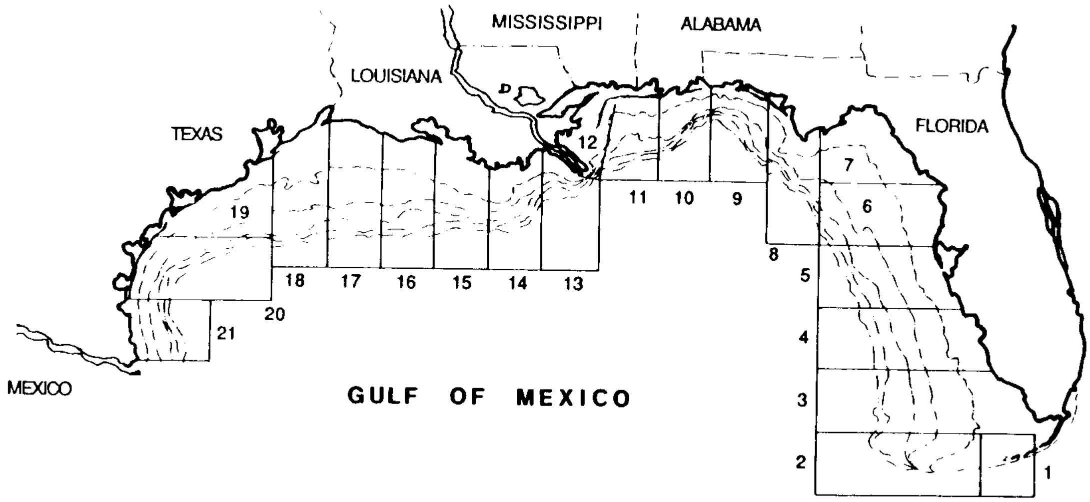

Figure 2.8.1. Statistical zones in the Gulf of Mexico. Bathymetric lines represent 60-ft. depth intervals.

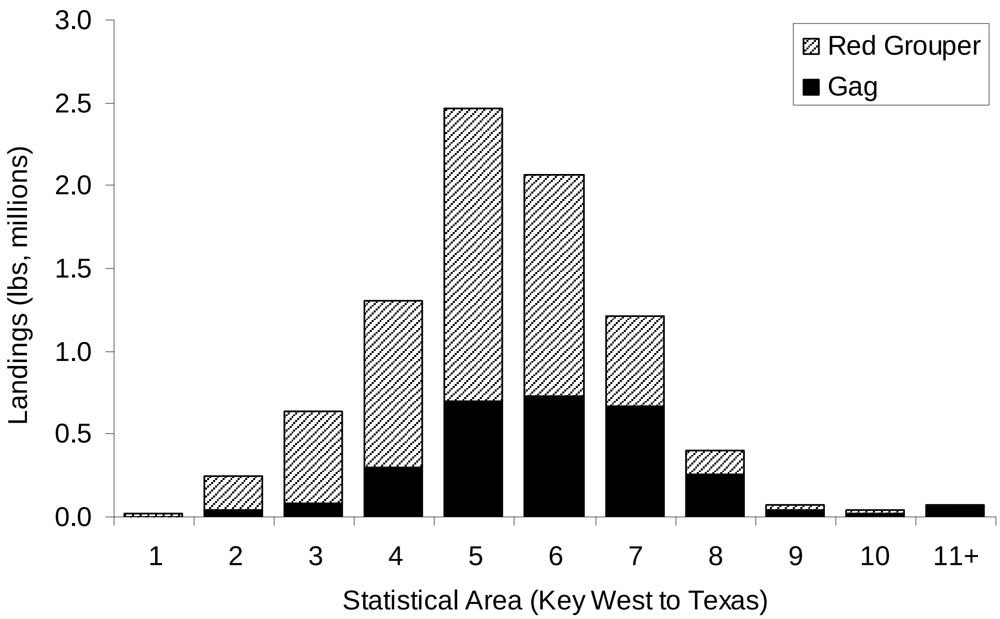

Figure 2.8.2. Average 2001-2004 commercial gag and red grouper landings (lbs, millions) by statistical area.

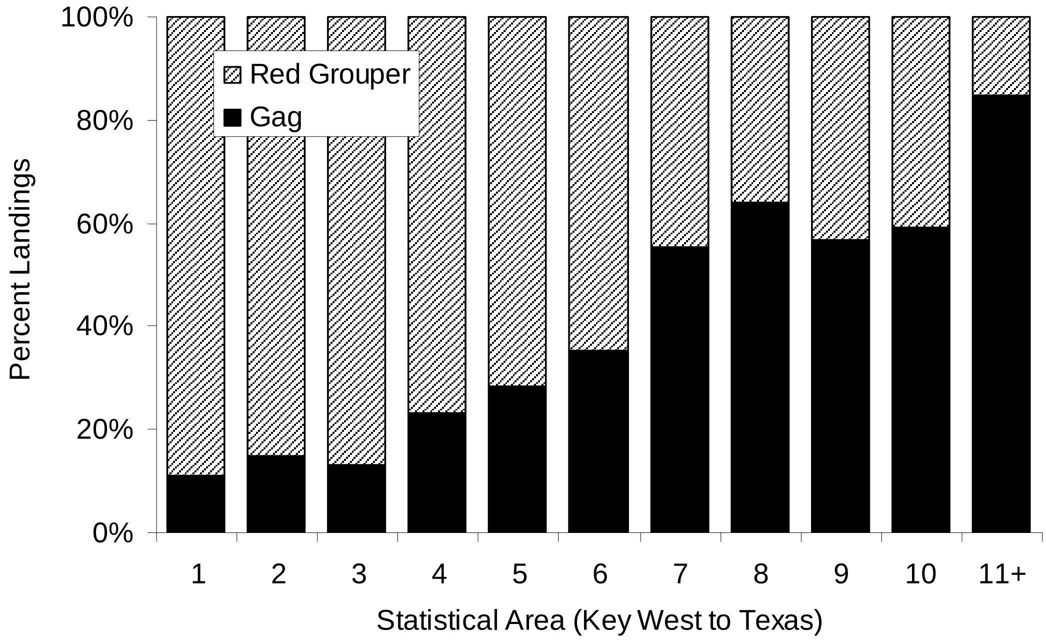

Figure 2.8.3. Average percent landings (2001-04) within each statistical area of gag and red grouper.

Table 2.8.1. Date of closure of statistical areas 5-21 for shallow-water grouper based on gag landings. Also the closure date for the shallow-water grouper fishery and percent of red grouper harvest caught at the time of the closure. Closure dates are estimated using quotas of 1.22 and 5.75 mp for gag and red grouper, respectively, and applying those quotas to 2004-2006 landings data.

Year	Stat Area 5+ Closure Trigger	Date Stat Areas 5+ Closed	Date Grouper Fishery Would Close	Red Grouper Landings (mp)	Red Grouper % Quota
2004	none	N/A	early-May	1.8	31%
	70%	early-Apr	no closure*	2.7	48%
	75%	late-Apr	late-Oct	2.7	46%
	80%	late-Apr	early-Oct	2.6	45%
	85%	late-Apr	late-Aug	2.4	42%
	90%	early-May	early-Jul	2.1	37%
2005	none	N/A	late-May	2.6	45%
	70%	early-Apr	no closure*	2.8	49%
	75%	late-Apr	no closure*	2.9	51%
	80%	late-Apr	early-Nov	3.0	52%
	85%	early-May	late-Aug	2.9	51%
	90%	early-May	late-Jul	2.8	48%
2006	none	N/A	late-Nov	4.6	80%
	70%	late-Jun	no closure	3.2	56%
	75%	early-Jul	no closure	3.4	59%
	80%	late-Jul	no closure	3.6	62%
	85%	late-Aug	no closure	3.9	69%
	90%	late-Sept	no closure	4.2	73%

Action 9. Recreational harvest of gag and red grouper

(All alternatives that included an increase in the gag minimum size limit were moved to Considered but Rejected)

Alternative 5. Establish

- **a gag bag limit of 1 fish per person per day within the aggregate bag limit**
- **a 24-inch TL gag recreational minimum size limit**
- **no red grouper bag limit (catch up to the aggregate)**
- **aggregate grouper bag limit of 3 fish per person**
- **February 1 through March 15 closed season on gag, black and red grouper (47% reduction in gag, 22% increase in red grouper, 322 day season)**

Alternative 6. Establish

- **a gag bag limit of 1 fish per person per day within the aggregate bag limit**

- **a 24-inch TL gag recreational minimum size limit**
- **two red grouper bag limit**
- **aggregate grouper bag limit of 3 fish per person**
- **February 15 through March 31 closed season on gag, black and red grouper (49% reduction in gag, 19% increase in red grouper, 320 day season)**

Alternative 7. Establish

- **aggregate grouper bag limit of 2 fish per person**
- **no red grouper or gag bag limit**
- **a 24-inch TL gag recreational minimum size limit**
- **January 1 through March 31 closed season on gag, black and red grouper (47% reduction in gag, 5% increase in red grouper, 275 day season)**

Discussion:

Increasing the gag minimum size limit (**Alternatives 5-8**) is expected to provide the least benefit to the physical environment, since this measure will not substantially reduce fishing effort or habitat-gear interactions. In fact, effort may increase if anglers spend more time fishing to catch their bag limit of legal-sized grouper. Decreasing the gag bag limit (all alternatives, except **Alternative 7**) may benefit the physical environment if anglers stop fishing once the bag limit is met. However, because the red grouper bag limit is being increased or eliminated and few trips harvest more than three aggregate grouper per trip, effort is not likely to be greatly changed. Overall, all of the alternatives in this action are expected to provide small, unquantifiable benefits to the physical environment.

Alternatives 2-8 all modify the gag bag limit, eliminate or reduce the red grouper bag limit, maintain or reduce the aggregate bag limit, and extend the length of the recreational closed season. **Alternatives 5-8** also increase the gag minimum size limit from 22- to 24-inches TL. **Alternatives 2-8** are all estimated to reduce gag harvest by 45 percent or more. This reduction would be sufficient to end overfishing of gag immediately and reduce harvest to the Council's target fishing mortality level (Foy). The reduction in fishing mortality would allow spawning stock biomass (SSB) to gradually increase over time to SSB_{OY}. Reducing fishing mortality would allow more gag to survive to older ages and larger sizes.

The proposed seasonal closures in **Alternatives 2-8** would include portions of the spawning seasons for gag and red grouper, as well as black grouper. Gag spawn in the Gulf of Mexico from mid-January until mid-April, with a peak in spawning during March (SEDAR 10 2006). Red grouper spawn from February until mid-July, with peak spawning occurring in March, April and May (Fitzhugh et al. 2006). The closure would protect red grouper and gag, as well as black grouper, during spawning. Prohibiting fishing during the spawning season would allow more fish to successfully spawn and reproduce before being harvested. The longer the closure, the greater the protection afforded to grouper during spawning.

Alternatives 2, 3, **5, 6**, and **8** all propose a one gag bag limit. **Alternative 4** proposes a 2-gag bag limit and **Alternative 7** would not specify a gag bag limit. **Alternatives 2**, **4**, **5, 7**, and **8** propose eliminating the red grouper bag limit (i.e., setting it equal to the aggregate bag limit). **Alternatives 3** and **6** propose doubling the red grouper bag limit. **Alternatives 2-6 and 8** propose either a 3- or 5-fish aggregate bag limit, whereas **Alternative 7** proposes a 2-fish aggregate bag limit. It is estimated a one-fish gag bag limit would reduce harvest by 26.3 percent. This bag limit would affect 14-17 percent of fishing trips, which reported landing on average greater than one gag per angler per trip (SERO 2007).

Alternatives 5-8 are estimated to decrease red grouper dead discards by 1-3 percent. Changes in gag and red grouper dead discards could be greater or less than presented above and are highly contingent on how angler behavior changes in response to regulations.

Alternatives 5-8 all propose increasing the gag minimum size limit by 2-inches TL. Ortiz (2007) estimated this size limit increase would increase gag dead discards per recruit landed by 30 percent. The 2-inch size limit increase would also reduce yield per recruit by 4 percent (from 2.71 to 2.8 pounds/recruit), while the gag spawning potential ratio would increase by 4 percent (from 35.8 to 37.2 percent SPR; Ortiz 2007).

Action 10. Alternatives to Reduce Discard Mortality of Grouper

Alternative 2: Require the use of non-stainless steel circle hooks when using natural baits, and require the use of venting tools, and dehooking devices when harvesting and releasing grouper in the recreational and commercial grouper fisheries.

Alternative 4: Require the operators and crew of recreational for-hire and commercial reef fish fishing vessels to participate in mandatory training classes on the proper handling and release of reef fishes, with such classes to be developed and implemented by NOAA Fisheries Service. Private recreational fishermen would also be encouraged to attend such classes on a voluntary basis.

Alternative 5: Reduce the red grouper minimum size limit from 20-inches TL to:
- **Option a: 18-inches TL**
- **Option b: 16-inches TL**
- **Option c: 14-inches TL**
- **Option d: no minimum size limit (Note: would apply to suboption iv)**

This lower minimum size limit would apply to the:
- **Suboption i: Commercial and recreational fishery**
- **Suboption ii: Recreational fishery**
- **Suboption iii: Commercial fishery**
- **Suboption iv: Longline sector of the commercial fishery**

(Note: If the Council chooses Suboption i or ii, changes in recreational size limit alternatives would be addressed under Action 9).

Discussion:

Alternative 2 is similar to the proposed action in Amendment 27, except that this alternative only applies to grouper fishing rather than all reef fish fishing. If the Amendment 27 proposed action is implemented, then this alternative would be redundant. However, if the Amendment 27 proposed action is rejected, then this alternative will allow the action to be resubmitted with the more narrow focus of applying only to grouper fishing. Circle hooks are similar to traditional J hooks, but the tip of the hook curves inward toward the shank. Ideally, after the fish swallows the hook it slides out of the stomach and esophagus without catching, then hooks in the corner of the mouth around the lower jaw. Jaw-hooking is preferable to gut-hooking because injuries are less likely and less severe (Bacheler and Buckel 2004). The circle hook does not need to be set, and so is considered easier for inexperienced anglers to use. Venting tools release gas from expanded or ruptured swim bladders in fish raised from depth. A hypodermic needle or any sharp, hollow instrument can be effective if used properly. Dehooking devices help reduce handling and damage to fish when removing a hook.

Alternative 4 establishes training classes on the proper handling and release of reef fish. Attending these classes would be mandatory for the operators and crew of recreational for-hire and commercial reef fish fishing vessels, and would be voluntary for private recreational fishermen. As with **Alternative 3**, this is purely educational in nature. However, by making classes mandatory for individuals who spend more time on the water than the average private recreational fisherman, the lessons are more likely to translate into actual improvements in the handling and release of fish.

Stock assessments produced by SEDAR 12 indicate that the majority of discarded red grouper are below the minimum size limit of 20 inches TL. **Alternative 5** would reduce the minimum size limit which should decrease the number of discarded fish. However, more small fish would be removed that could no longer contribute to the reproductive output of the population or grow to be larger fish. This tradeoff must be balanced when determining the minimum size limit. A size limit change to the commercial sector should have a greater effect than a change to the recreational sector because the commercial sector lands more red grouper and experiences higher release mortality. In particular, longline fishing accounts for 61% of the commercial landings and has an estimated 45% release mortality, so reducing the size limit for the longline portion of the commercial fishery should result in the greatest reduction in dead discards.

Alternative 2 may have direct positive effects on the physical environment due to lower chance of snagging the bottom with circle hooks. The other alternatives would not have any direct effect on the physical environment. Indirect effects on the physical environment could occur if fishing effort changes because of changes in efficiency related to hook type (**Alternative 2**) or changes in the minimum size limit (**Alternative**

5). Conflicting results of studies on catch efficiency make it difficult to determine if those impacts would be positive or negative (see Section 5.10.1).

Proper handling and release of discarded fish would have a direct effect on the biological environment. The decrease in stress and injuries would increase survival rates for fish released after capture. The correct use of circle hooks, venting tools, or dehooking devices (**Alternatives 2 – 4**), could each contribute to increased survival of groupers (see Section 5.10.2). Lower size limits (**Alternative 5**) would decrease the number of discarded red grouper and the mortality associated with those discards. However, fishing mortality could increase and size structure of the population could change (See Section 5.10.2).

Alternative 2 would require development of definitions for acceptable gear. **Alternatives 3 and 4** would have substantial impact on the administrative environment. **Alternative 3** would require creating, producing, and distributing informational materials. **Alternative 4** would require developing and implementing training classes, plus administrative work involving registration and certification procedures. Because red grouper minimum size limits are already in place, no new administrative action would be needed for **Alternative 5**. All alternatives other than **Alternative 1,** and possibly **Alternative 5,** would require increased law enforcement duties. The alternatives in order of lowest to highest impact on the administrative environment would be **Alternative 1**, **Alternative 5**, **Alternative 2**, **Alternative 3**, and **Alternative 4** (See Section 5.10.4).

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15 INDEX

Accountability measures (AM), iv, 47, 52, 70, 240, 241, 243
Allowable biological catch (ABC), iv, ix, 2, 11, 68, 348, 390
Annual catch limit (ACL), iv, ix, xvi, xvii, 32, 37, 40, 47, 50, 51, 52, 53, 54, 55, 79, 240, 241, 242, 243, 324, 353, 368, 404
Annual catch target (ACT), ix, 357
Bag limit, vii, xi, xix, 1, 4, 17, 18, 20, 22, 23, 38, 46, 48, 67, 68, 70, 71, 72, 73, 75, 76, 79, 80, 83, 84, 85, 86, 87, 88, 89, 113, 115, 120, 173, 187, 193, 196, 198, 200, 201, 202, 266, 267, 268, 269, 270, 271, 272, 273, 277, 278, 279, 280, 315, 318, 322, 329, 331, 332, 336, 339, 345, 346, 347, 348, 354, 366, 369, 379, 380, 382, 383, 384, 385, 386, 388, 389, 390, 391, 392, 393, 408, 409, 410, 423
Biomass (B), iv, viii, 1, 2, 3, 7, 8, 9, 15, 16, 17, 25, 26, 27, 32, 33, 34, 36, 39, 40, 59, 66, 81, 193, 199, 204, 208, 209, 211, 212, 221, 222, 223, 224, 241, 245, 247, 264, 265, 327, 330, 331, 338, 340, 349, 383, 401, 402, 409, 413, 417, 418, 419, 421, 423, 431
B_{MSY}, 7, 9, 213, 330, 331

Bycatch mortality, 22, 187, 193, 197, 199, 201, 202, 343, 345, 346, 369, 385, 390, 399, 403, 416
Bycatch reduction, 91, 198, 281, 323, 382, 396
Captain and crew bag limit, 83, 388
Catch per unit effort (CPUE), iv, 37, 75, 271
Circle hooks, xi, 21, 90, 91, 117, 118, 188, 197, 199, 201, 281, 346, 379, 381, 383, 389, 391, 410, 411, 412, 414
Closed season, vii, xi, xix, 1, 2, 22, 38, 72, 73, 78, 79, 80, 83, 85, 86, 87, 88, 89, 98, 102, 104, 113, 173, 193, 196, 198, 200, 201, 202, 266, 267, 268, 269, 270, 271, 273, 277, 278, 279, 280, 294, 298, 322, 345, 346, 348, 355, 380, 385, 386, 388, 389, 390, 408, 409, 430, 431
Compliance, x, xiii, xxvi, 16, 20, 88, 101, 114, 279, 280, 281, 317, 318, 322, 342, 344, 348, 351, 358, 362, 373, 379, 380
Council on Environmental Quality (CEQ), iv, xxii, xxv, 320, 326, 329, 349
Cumulative effects, 204, 314, 320, 330, 332, 336, 345
Dehooker, 282
Direct effects, 28, 30, 35, 40, 65, 206, 207, 214, 218, 225, 226, 257, 263, 282, 351, 352, 354, 402
Discard, xi, xxvi, 3, 5, 6, 59, 74, 75, 84, 86, 87, 90, 91, 92, 93, 188, 189, 190, 191, 198, 199, 201, 202, 228, 256, 269, 281, 282, 283, 286, 290, 322, 324, 337, 345, 346, 355, 379, 384, 391, 392, 399, 404, 421
Discard mortality, xi, xxvi, 5, 6, 59, 75, 86, 90, 91, 93, 188, 190, 198, 199, 201, 202, 256, 281, 282, 286, 290, 322, 324, 337, 345, 346, 355, 379
EIS, iv, v
Environmental impact statement (EIS), iv, v, viii, xxvi, xxvii, 17, 119, 122, 124, 129, 332, 346, 376, 415
Essential fish habitat (EFH), iv, 20, 119, 120, 124, 129, 295, 334, 335, 336, 343, 375, 376, 416
Fishing community, 198
Fishing mortality (F), iv, v, xi, 2, 3, 4, 7, 8, 9, 11, 14, 15, 19, 26, 28, 31, 32, 33, 40, 47, 57, 59, 68, 69, 70, 72, 74, 75, 81, 82, 83, 84, 85, 87, 88, 92, 94, 95, 97, 100, 102, 112, 119, 176, 179, 183, 187, 193, 194, 195, 199, 201, 204, 205, 208, 209, 212, 213, 240, 247, 256, 268, 269, 271, 279, 280, 283, 284, 285, 299, 319, 327, 328, 330, 331, 337, 343, 345, 367, 370, 396, 402, 409, 412, 413, 414, 418, 419, 421, 423, 430, 431
F_{MSY}, ix, x, 11, 14, 27, 30, 31, 32, 33, 36, 37, 39, 40, 53, 54, 81, 211, 212, 213, 224, 226, 229, 240, 268, 330, 401, 402
F_{OY}, ix, xi, 9, 11, 14, 28, 30, 31, 32, 33, 34, 36, 37, 39, 40, 47, 49, 50, 51, 52, 53, 54, 67, 68, 69, 70, 76, 81, 82, 84, 86, 211, 212, 222, 226, 228, 229, 240, 241, 246, 269, 271, 279, 280, 323, 402, 430, 431
Fuel, xi, 32, 38, 47, 86, 167, 200, 304, 305, 306, 312, 325, 326, 338, 339, 341, 429
Hurricane, 32, 324, 429
Indirect effects, 45, 55, 147, 214, 239, 240, 243, 244, 246, 247, 254, 266, 320, 332, 402
Individual fishing quota (IFQ), v, 24, 59, 79, 104, 193, 322, 323, 337, 338, 342
J-hooks, 118, 281, 379
License, 1, 23, 130, 178, 181, 185, 380, 393
Marine mammals, 129, 187, 192, 200, 333, 350, 372
Marine Recreational Fisheries Statistics Survey (MRFSS), v, 4, 5, 37, 38, 42, 43, 47, 69, 73, 74, 85, 112, 122, 151, 152, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 189, 190,

191, 196, 271, 279, 315, 326, 345, 360, 383, 385, 390, 391
Marine reserves, xii, 2, 21, 95, 96, 99, 102, 103, 105, 119, 294, 296, 297, 300, 301, 302, 303, 304, 309, 322, 348, 351, 355, 369, 375, 417
Maximum fishing mortality threshold (MFMT), v, viii, 3, 4, 7, 11, 14, 15, 25, 26, 27, 28, 30, 32, 33, 52, 204, 205, 206, 207, 208, 209, 212, 327, 330, 332, 346, 351, 366
Maximum sustainable yield (MSY), v, viii, ix, 2, 3, 7, 8, 11, 13, 14, 16, 17, 25, 26, 27, 30, 36, 37, 39, 40, 47, 50, 52, 53, 54, 68, 69, 195, 205, 206, 207, 208, 209, 212, 221, 223, 240, 241, 245, 330, 367, 401, 402
Minimum stock size threshold (MSST), v, vii, viii, 1, 3, 7, 9, 11, 15, 16, 25, 26, 27, 28, 29, 30, 32, 34, 81, 204, 205, 206, 207, 208, 209, 212, 222, 268, 327, 330, 332, 346, 351, 366, 401, 402
National Environmental Policy Act (NEPA), v, xxii, xxv, xxvii, 319, 388, 396
Natural mortality (M), v, viii, 7, 11, 26, 27, 28, 29, 34, 36, 176, 178, 179, 183, 194, 209, 253, 279, 330, 366, 377, 400, 401, 402, 413, 414, 415, 417, 418, 419, 420, 421, 422, 423, 424
NEPA, 377
Optimum yield, xxii
Optimum yield (OY), v, viii, ix, xxii, xxvi, 11, 14, 15, 16, 17, 25, 26, 27, 28, 29, 30, 32, 36, 37, 39, 40, 41, 47, 49, 50, 51, 52, 53, 54, 56, 59, 60, 65, 68, 69, 81, 84, 85, 195, 199, 204, 205, 206, 207, 208, 209, 212, 219, 220, 221, 222, 226, 240, 241, 245, 247, 265, 268, 269, 270, 278, 323, 330, 332, 337, 338, 340, 343, 344, 346, 347, 349, 351, 366, 384, 388, 402, 430
Overfished, v, vii, viii, xxvi, 1, 2, 3, 7, 15, 16, 18, 25, 26, 27, 28, 29, 32, 33, 34, 39, 47, 81, 112, 114, 115, 127, 128, 129, 173, 193, 199, 200, 206, 207, 208, 209, 212, 223, 240, 247, 255, 314, 315, 319, 324, 327, 328, 330, 331, 332, 336, 337, 343, 346, 347, 370, 388, 401, 402, 432
Overfishing, v, vii, viii, x, xi, xiii, xxvi, xxvii, 1, 2, 3, 4, 7, 8, 14, 15, 16, 17, 19, 22, 25, 26, 27, 28, 30, 32, 33, 35, 36, 38, 39, 40, 41, 47, 52, 53, 54, 55, 57, 59, 60, 65, 66, 68, 70, 81, 82, 84, 85, 88, 89, 112, 113, 114, 115, 127, 128, 129, 173, 193, 198, 199, 200, 202, 204, 205, 206, 207, 208, 209, 211, 212, 213, 214, 219, 220, 221, 222, 223, 226, 239, 240, 241, 242, 243, 245, 247, 252, 255, 256, 264, 268, 269, 270, 271, 272, 278, 279, 280, 314, 315, 319, 322, 323, 324, 327, 328, 330, 331, 332, 336, 337, 338, 339, 343, 344, 346, 347, 349, 351, 353, 358, 363, 367, 368, 369, 370, 388, 390, 396, 398, 403, 405, 409, 416, 417, 430, 432
Protected areas, 97, 100, 103, 423
Quota, vii, ix, x, xv, xvi, xvii, xviii, xxvi, 17, 18, 21, 22, 23, 35, 38, 40, 42, 48, 49, 50, 51, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 78, 79, 91, 92, 93, 113, 114, 128, 195, 196, 198, 200, 201, 202, 211, 212, 213, 214, 215, 218, 221, 223, 225, 230, 239, 240, 241, 242, 243, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 281, 285, 315, 323, 331, 332, 336, 337, 338, 342, 346, 349, 352, 354, 357, 364, 366, 368, 383, 384, 389, 403, 404, 405, 432
Rebuilding plan, vii, viii, 16, 22, 23, 36, 42, 47, 56, 114, 315, 319, 322, 323, 343, 345, 347, 348, 420
Regulatory impact review (RIR), v, 17, 18, 19, 20, 21, 350, 358, 373
Sea turtles, 20, 129, 192, 332, 350, 416
Size limit, xi, xii, 1, 2, 4, 5, 17, 21, 43, 65, 67, 74, 75, 79, 80, 85, 86, 88, 90,

91, 92, 93, 95, 100, 187, 188, 189, 191, 193, 194, 195, 196, 197, 198, 200, 201, 202, 212, 213, 245, 254, 257, 260, 262, 263, 266, 267, 268, 270, 271, 272, 278, 279, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 331, 336, 338, 345, 346, 347, 348, 354, 355, 366, 369, 380, 384, 385, 389, 390, 391, 392, 393, 394, 398, 399, 408, 409, 410, 411, 412, 420
Social impact assessment (SIA), v, xxii
Spawning potential ratio (SPR), v, viii, 1, 2, 3, 4, 7, 8, 9, 14, 15, 18, 19, 21, 25, 26, 27, 28, 30, 32, 33, 88, 92, 95, 194, 195, 199, 204, 205, 208, 209, 211, 212, 271, 283, 284, 285, 327, 330, 410
Status determination criteria, 25, 401
Stock assessment, vii, ix, x, 1, 2, 3, 4, 7, 11, 15, 16, 21, 27, 29, 31, 34, 37, 39, 42, 47, 53, 54, 57, 61, 81, 90, 92, 94, 97, 127, 128, 188, 190, 199, 208, 209, 222, 226, 227, 240, 247, 255, 268, 321, 323, 327, 328, 330, 331, 336, 345, 347, 372, 381, 383, 394, 402, 403, 413, 415, 422, 424, 431, 432
Stock recovery, 127, 202, 315, 336
Sustainable Fisheries Act (SFA), v, vii, viii, 7, 25, 26, 27, 28, 30, 208, 209, 327, 329, 351, 367
TAC, 226
Total allowable catch (TAC), 1, v, viii, ix, xxvi, 15, 16, 18, 20, 30, 31, 32, 33, 35, 36, 37, 38, 39, 40, 41, 44, 46, 56, 58, 61, 67, 68, 69, 84, 85, 198, 199, 202, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 232, 233, 235, 237, 238, 239, 245, 246, 248, 250, 257, 269, 289, 322, 325, 332, 338, 339, 345, 346, 347, 352, 353, 354, 366, 367, 383, 384, 385, 388, 389, 390, 398, 405, 416, 430, 431
Venting tool, xi, 21, 90, 91, 92, 188, 197, 199, 201, 281, 282, 346, 379, 383, 389, 393, 410, 412

16 Comments on the DEIS from the EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

September 23, 2008

Mr. Roy E. Crabtree, Ph.D.
Regional Administrator
Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, Florida, 33701

Dear Mr. Crabtree:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality Regulations (CEQ) for Implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the Draft Environmental Impact Statement (DEIS) for Draft Red Fish Amendment 30B: Gag-End Overfishing and Set Management Thresholds and Targets: Red Grouper-Set Optimum Yield, Total Allowable Catch (TAC), and Management Measures; Area Closures; and Federal Regulatory Compliance.

EPA classified your DSEIS and proposed action as "LO," i.e., EPA has "Lack of Objections" to the proposed action. Our classification will be published in the Federal Register according to our responsibility under Section 309 of the Clean Air Act, to inform the public of our views on proposed Federal actions.

EPA appreciates the opportunity to review the DEIS. We request that you send our office one (1) copy of the Final EIS at the same time that it is sent to the Office of Federal Activities (2251A), EPA, 1200 Pennsylvania Avenue, N.W., Washington, D.C. 20044.

Sincerely yours,

for Cathy D. Gilmore, Chief
Office of Planning and
Coordination (6ENXP)

2008 SEP 29 PM 1:54

17 Response to Comments on DEIS

Including comments from the EPA, eight comments were received from individuals and organizations during the 45-day comment period on the DEIS. The following is a response to these comments. The EPA classified the DEIS and proposed actions as "LO" (Lack of Objections) and will publish these findings in the *Federal Register*. The following are responses to other comments.

Comment: Because of high fuel costs and past hurricane activity, recreational fishing effort has decreased. As such, proposed management measures, particularly for gag, do not need to be as restrictive as those proposed in Amendment 30B

Response: As stated in Amendment 30B, the Council did receive public comments during the development of Amendment 30B that a portion of the 41 percent reduction needed constrain gag harvest to the yield associated with fishing at F_{OY} has already been achieved through reductions in recreational effort due to high fuel prices or other factors. However, landings have remained near historical highs in recent years despite rising fuel costs and very active hurricane seasons. Thus a reliable value to assign to this reduction could not be determined. The Council ultimately selected 2004-06 as the baseline years to reflect recent changes in the fishery possibly resulting from lower recruitment and changes in fishing conditions (e.g., reduced effort due to higher fuel prices, etc.). The Council did discuss changing the baseline to 2005-07 landings once 2007 landings became available. However, needed reductions in harvest using this baseline were similar to and consistent with the reductions necessary to end overfishing using the original 2004-06 baseline. Thus the 2004-06 baseline was maintained for the analyses. Based on the 2004-06 baseline, a minimum reduction in TAC of 25 percent is necessary to provide a greater than 50 percent probability of ending gag overfishing. Therefore, management measures evaluated by the Council are designed to achieve this level of reduction.

Comment: Given apparent high numbers of juvenile gag in 2006 and 2007, the population does not appear to be in trouble and so management measures for this stock do not need to be as restrictive as those proposed in Amendment 30B.

Response: As indicated in Amendment 30B, the most recent stock assessment of gag (SEDAR 10) indicated gag were undergoing overfishing but the stock status had not reached an overfished state. This assessment and the assessment inputs were reviewed several times. The most recent occurred in May 2008 when the Council convened its SSC to review several aspects of the assessment, including updated abundance indices through 2007. All indices indicated consistent and declining trends in gag abundance since 2004, the last year used in the gag stock assessment. This may suggest that the population abundance for gag has declined since 2004, but is still not as low as it was during the 1990s. Updated assessments for gag and red grouper are currently scheduled for 2009. If in recent years large numbers of juveniles are recruiting to the stock, the assessments will adjust the stock status accordingly and could result in revised management recommendations.

Comment: Red grouper appear to be plentiful, and so the bag limit should be greater than that proposed in Amendment 30B.

Response: Based on the Council's preferred alternative in Action 4, increasing red grouper TAC to equilibrium OY and allocating TAC based on 1986-2005 landings would allow the recreational red grouper TAC to be increased from 1.25 mp gw to 1.82 mp gw. However, it should be noted that the 1.25 mp gw TAC did not constrain recreational harvest in 2004 (3.0 mp) or 2005 (1.6 mp). In 2006 and 2007, landings declined to around 1 mp gw. The decrease in landings during 2005-07 may be partially explained by more restrictive management measures and a reduction in effort, but the reduction may also be due to a decline in stock biomass, which has reduced the availability of red grouper to anglers. Because of uncertainty in how much recreational red grouper harvest can be increased, a range of management measures to achieve fishing mortality rates that are at or near F_{OY} were examined in Action 9. The goal of this action is to ensure total fishing mortality on red grouper does not increase since fishing mortality in 2005 was right at the target level (F_{OY}).

In selecting the preferred alternative for Action 9, the Council needed to balance reductions in harvest necessary for gag while also allowing for red grouper to be harvested at or near F_{OY} in such a way to minimize the risk of overfishing. Under these restrictions, the Council could have increased the bag limit for red grouper; however, this would have meant having a longer seasonal closure. Based on public comment, the Council selected a two-fish bag limit and two month seasonal closure which allowed a bag limit increase while minimizing the amount of time the fishery would need to be closed. Should the season closure and other measures be insufficient to restrict the recreational harvest to its ACL proposed in Action 6, proposed AMs would allow for the fishing season to be adjusted in subsequent years to ensure landings remain at or near target levels and chronic overfishing does not occur.

Comment: Seasonal closures should apply to both commercial and recreational fishermen.

Response: Although both the commercial and recreational seasonal closures were implemented to protect grouper, particularly gag, the rationale for continuing the closures and the effectiveness of the closures are different. The existing February 15 to March 15 commercial closed season on gag, black grouper and red grouper was implemented in 2001 to protect spawning aggregations of gag during a portion of their peak spawning season, and to reduce fishing mortality of gag and red grouper. It was projected that the closed season would reduce gag/black grouper harvest by 10 percent and red grouper by 8 percent. However, a comparison of 1999-2000 (when there was no closed season) with 2001 (closed season in effect) showed that the February-March contribution to the annual gag/black grouper and red grouper harvest reductions was only 2 percent when the closed season was in effect. This effect is likely a result of effort shifting to the weeks that were open at the beginning of February and end of March. The time/area closure proposed in Action 11 would replace the Gulf-wide seasonal closure. Since the area defined in

Action 11, Preferred Alternative 2 is only a percentage of the total gag spawning area, it's effectiveness in protecting gag spawning aggregations will also be limited, but since all fishing (except for HMS species) within the area will be prohibited during the closed period rather than just grouper fishing, the protection given to that portion of the gag spawning aggregations within the defined area may be greater with the area closure than with the current February 15 to March 15 season closure.

The Council initially established a recreational grouper closure from February 15 to March 15 which became effective for the 2007 fishing year. This closed season was implemented to reduce red grouper fishing mortality and prevent or minimize bycatch of gag and black grouper as a result of more restrictive red grouper regulations. The closure presently occurs simultaneously with the commercial grouper closure and includes important spawning seasons for gag, red grouper, and black grouper. The closure is estimated to reduce gag harvest by approximately 7.8 percent unless there is effort shifting to the open season by trips that would have occurred during the closed season. The Council is proposing to extend the season from February 1 to March 31. In extending this closure, the Council considered several factors such as required reductions in gag harvest levels, associated socio-economic effects on the recreational sector, possible increases in red grouper harvests, expected recreational season length, and the length and timing of the recreational shallow-water grouper closure. The extended closure, in conjunction with other management measures, would reduce recreational gag landings by 26 percent and increase red grouper landings by 17 percent, while yielding a 306 day recreational season. To allow greater bag limits for either red or gag grouper would require a longer closure period.

Comment: The TAC proposed for red grouper in Action 4 should be maintained at the current 6.56 million pounds.

Response: Projections from the most recent stock assessment indicate red grouper stock biomass will continue to increase with a 7.57 mp gutted weight TAC, although more slowly than if the no action alternative (6.56 mp gw) was selected. The Council selected the 7.57 mp gw TAC as preferred in Action 4 because it would attain a fishery-wide catch at equilibrium OY, in part because the red grouper stock was at or above SSB_{OY} in 2004. This alternative, consistent with National Standard 1, also accomplishes the Council's intent to manage all reef fish species at OY levels once a stock is rebuilt. The fishery would be managed at the equilibrium OY target level until a new stock assessment is completed. After completion of the next red grouper stock assessment, red grouper TAC would be set either equal to equilibrium OY or the yield at F_{OY}, whichever is less.

The Council did recognize that because the fishery is being supported by a strong 1999 year-class, the stock biomass may begin to decline as this year class moves through the fishery. Updated indices of abundance have shown a decline from a peak in 2004 and may suggest the population abundance has been declining. But the stock size still is not as low as it was during the 1990s. If the population is declining and continues to decline, then assessment projections may be overly optimistic with regard to the condition of the stock. This would increase the risk that overfishing may occur and the stock could become overfished if overfishing were allowed to continue. However, the Council did take into consideration preliminary landings for the first four to five months of 2008 show an increase in index values over 2007 landings and a red grouper stock assessment is scheduled for 2009. The Council did select ACLs and AMs in Action 6 to ensure overfishing to minimize the chance of overfishing the stock.

Comment: The preferred alternative for Action 7 fails to ensure other shallow-water grouper species will be protected from overharvest and that Alternative 3 should be selected as preferred to be risk adverse.

Response: Action 7's Alternative 2 and Preferred Alternative 3 adjust the commercial red grouper quota, and set a new commercial gag quota, based on the TACs and allocations selected in previous actions, plus an allowance for other shallow-water groupers. Where the alternatives differ is how the shallow-water grouper aggregate quota is determined. Both represent the average annual harvest of the remaining shallow-water grouper species during two baseline series. Alternative 2 uses the baseline years of 1999-2001, as used in Secretarial Amendment 1. This results in an "other" shallow-water grouper allowance of 0.32 mp gutted weight. Preferred Alternative 3 uses the baseline years of 2001-2004, which is the original baseline used in the gag stock assessment. This results in an "other" shallow-water grouper allowance of 0.41 mp. The "other" shallow-water grouper allowance is not a quota. Exceeding this allowance will not result in any quota closure action as long as the shallow-water aggregate quota has not been reached. However, exceeding the "other" shallow-water grouper allowance infers that either or both of the gag and red grouper landings will be below their quotas when the aggregate shallow-water grouper quota is reached. In the past years when the shallow-water grouper fishery has been closed, it has been the red grouper quota that has been reached and triggered the quota closure. Projections using the proposed gag quota indicate in the near future, it will be gag landings that trigger the quota. Therefore, it is unlikely the other shallow-water grouper allowance will be exceeded. The Council is developing an amendment which will require ACLs and AMs for the other shallow-water grouper species as required by the reauthorized MSFCMA. These measures, once implemented, will provide further protection for these species.

Comment: To provide the greatest protection for gag in "The Edges" seasonal area closure, all fishing should prohibited from November to April and surface trolling should only be allowed from May to October.

Response: The council considered four sub-options for closure periods and selected as a preferred alternative to close "The Edges" from January to April. In selecting the sub-options, the Council weighed the protection to gag spawners with the likely revenue reductions of fishermen based on closure period length. Although the preferred time/area closure does not encompass the entire gag spawning season as the option identified in the comment, it does include the peak gag spawning season (February though March) and a portion of the peak red grouper spawning season (April-May). Because the preferred alternative's closure period is shorter, revenue losses by the fishery are also reduced

Comment: Further consideration should be given to a closure of some portion of the continental shelf in December and January to protect highly-aggregated female gag during pre-spawning.

Response: Information on pre-spawning female gag aggregations is preliminary. Initial information indicates these aggregations form in December and January in waters less than 30 fathoms deep. As new information becomes available, the Council may wish to consider time area closures should these aggregations become better defined. It should be noted that through this amendment, the Council is proposing other measures to end gag overfishing and minimize the risk the stock could become overfished.