FINAL

REEF FISH AMENDMENT 30A:

GREATER AMBERJACK - REVISE REBUILDING PLAN, ACCOUNTABILITY MEASURES

GRAY TRIGGERFISH - ESTABLISH REBUILDING PLAN, END OVERFISHING, ACCOUNTABILITY MEASURES, REGIONAL MANAGEMENT, MANAGEMENT THRESHOLDS AND BENCHMARKS

Including Supplemental 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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Abbreviations Used in This Document

ACL	Annual Catch Limit
ALS	Accumulated Landings System (commercial fishing statistics)
AM	Accountability Measures
ASPIC	A Stock Production Model Incorporating Covariates
B	Biomass
CEA	Cumulative Effects Analysis
CEQ	Council on Environmental Quality
CFLP	Coastal Fisheries Logbook Program
CFR	Code of Federal Regulations
CMP	Coastal Migratory Pelagic
CPI	Consumer Price Index
CPUE	Catch Per Unit Effort
CZMA	Coastal Zone Management Act
DSEIS	Draft Supplemental 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
FSEIS	Final Supplemental 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
HAPC	Habitat Area of Particular Concern
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
OY	Optimum yield
RA	Regional Administrator, SERO
RFA	Regulatory Flexibility Act
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
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
VPA	Virtual Population Analyses
wF	West Florida
VMS	Vessel Monitoring System

Executive Summary

Greater amberjack have been under a rebuilding plan since 2003. In 2006, a new stock assessment was completed and determined the stock was not recovering at the rate previously projected. The stock continues to be overfished and is undergoing overfishing. Gray triggerfish are also undergoing overfishing and would be declared overfished based on the preferred threshold selected by the Gulf of Mexico Fishery Management Council (Council) in this amendment. This amendment is necessary to end overfishing of greater amberjack and gray triggerfish and adjust catch levels and management measures to rebuild these stocks. Additionally, this amendment sets accountability measures for both species and sets management targets and thresholds for gray triggerfish.

Actions and management alternatives considered by the Council to address overfishing and rebuilding of greater amberjack and gray triggerfish are described in Section 2.0. This amendment proposes 10 separate actions consisting of 39 alternatives and 6 sub-alternatives which would: 1) Modify the greater amberjack rebuilding plan and consider greater amberjack accountability measures; 2) evaluate greater amberjack recreational and commercial management alternatives; 3) establish thresholds and benchmarks for gray triggerfish; 4) develop a gray triggerfish rebuilding plan and evaluate gray triggerfish accountability measures; 5) consider gray triggerfish regional management measures; and 6) evaluate gray triggerfish recreational and commercial management alternatives. The following briefly discusses the major conclusions of each separate action in this amendment and FSEIS, including the choice of preferred alternatives. For a more detailed discussion of the environments affected by these actions and the environmental consequences associated with each of the alternatives see Sections 2 and 5.

It should be noted the Council removed two actions that addressed allocations for greater amberjack and gray triggerfish. At their November meeting, the Council recognized the possible inequities these actions may cause and established an Allocation AD HOC Committee of Council members to examine fair and equitable ways to allocate all Fishery Management Plan (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 fishery.

Major Conclusions

<u>Action 1: Modifications to the Greater Amberjack Rebuilding Plan</u> - This action considers three modifications to the greater amberjack rebuilding plans. The Council rejected several other rebuilding plans previously considered in this amendment because they were less conservative than the current rebuilding plan. A ten-year rebuilding plan was approved by NOAA Fisheries Service in Secretarial Amendment 2 to the Reef Fish FMP. Preferred Alternative 1 would maintain the three-year stepped rebuilding plan and update it with new assessment information; total allowable catch (TAC) would increase in three-year increments. Alternative 2 would establish a constant F_{OY} (fishing mortality rate at optimum yield) rebuilding plan; i.e., TAC would be allowed to increase annually based on a constant fishing mortality rate. Alternative 3

uses a linearly increasing approach based on maintaining the same four-year total landings as for the stepped approach in Preferred Alternative 1 and therefore, is the conservation equivalent to that alternative. All rebuilding plans eliminate overfishing immediately and reduce greater amberjack harvest by 32 percent in 2008 and rebuild the stock by the end of 2010, two years sooner than required. Alternative 2 would allow greater landings than Alternatives 1 or 3, thus providing slightly less benefits to the biological environment by slowing stock recovery. Higher landings that increase annually would afford slightly greater benefits to the economic and administrative environments relative to Alternative 1 or 3. Impacts to the physical environment are expected to be small for all alternatives since greater amberjack are primarily pelagic and caught in the water column.

Action 2: Accountability measures for the Greater Amberjack Rebuilding Plan - The 2007 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires Councils to establish accountability measures (AMs) by 2010 for species undergoing overfishing. AMs are intended to ensure landings are maintained near target levels, and below overfishing levels. Alternative 1 would not establish AMs. A future amendment by the Council would have to be completed prior to 2010 to implement these measures. Preferred Alternative 2 would provide the Regional Administrator (RA) authority to close the fishery in-season if annual landings for a sector exceed the specified annual TAC. Alternative 3 is similar to Alternative 2, but would allow for landings overages of up to 20 percent in 2008, 10 percent in 2008-2009, and 0 percent in 2008-2010 and thereafter. Both alternatives would benefit the biological environment by controlling fishing mortality rates. However, they would also increase the burden on the administrative environment to monitor landings, implement AMs and enforce closures. In the short term, Alternative 3 allows for relatively higher harvest levels and so would have less adverse economic impacts than Preferred Alternative 2. However, Alternative 3 could negatively affect the biological environment by decreasing the likelihood the rebuilding target is achieved on time if more fish are harvested at the beginning of the rebuilding plan.

Action 3: Greater Amberjack Recreational Management Alternatives - This action considers five alternatives to reduce recreational harvest. All the alternatives, except no action, reduce recreational landings by 18-26 percent. Alternative 1 would maintain status quo regulations. The stock would continue to undergo overfishing and likely remain overfished. Alternatives 2-5 propose various size limit, bag limit (zero captain and crew), and/or seasonal closure combinations. Preferred Alternative 4 would maintain the recreational daily bag limit of one fish, increase the recreational size limit to 30-inches FL and eliminate the bag limit for captain and crew of for-hire vessels. This is estimated to reduce landings by 18 percent. When this alternative is combined with the preferred accountability measures in Action 2, recreational harvest is estimated to be reduced by 26 percent. Alternatives 2-5 will all benefit the physical environment by reducing fishing effort; however, benefits to the physical environment will be small since greater amberjack are pelagic and anglers primarily catch greater amberjack in the water column, rather than on bottom habitat. Benefits to the biological environment are expected to be similar for each alternative, since each reduces harvest by a similar amount when combined with corresponding accountability measures (see Action 2) and commercial management measures (see Action 4). Increasing the minimum size limit is expected to provide greater benefits to the social and economic environments than imposing a fractional bag limit (see

Section 13) or implementing a lengthy recreational closure. Increasing the minimum size limit will likely increase regulatory discards, but release mortality rates are relatively low for this species. Additionally, strict accountability measures are proposed in Action 2 to regulate harvest and fishing mortality. Preferred Alternative 4 would result in the smallest loss in economic value relative to the status quo of any of the alternatives considered.

<u>Action 4: Greater Amberjack Commercial Management Alternatives</u> - This action considers five alternatives to reduce commercial harvest. All the alternatives, except no action, reduce commercial landings by at least 38 percent. Alternative 1 would maintain status quo regulations and continue to allow overfishing. Alternatives 2-5 propose various trip limits, quotas, and/or seasonal closures. Preferred Alternative 4 would establish an annual commercial quota for greater amberjack. This is expected to increase the burden on the administrative environment to monitor landings. Effects on the physical environment are expected to be positive and minimal since greater amberjack are pelagic and primarily caught in the water column rather than over bottom habitat. Benefits to the biological environment are also expected to be similar for each of the alternatives, since each reduces harvest by approximately the same amount and would end overfishing. Preferred Alternative 4 would result in the smallest economic losses of any of the alternatives.

<u>Action 5: Thresholds and Benchmarks for Gray Triggerfish</u> - The MSFCMA requires that each FMP define reference points and status determination criteria for measuring fishery status and performance. Alternative 1 would not specify new reference points or status criteria for gray triggerfish. Preferred Alternative 2 and Alternative 3 would define the maximum fishing mortality threshold, minimum stock size threshold (MSST), and optimum yield for gray triggerfish. These alternatives differ only in how MSST is set, with Preferred Alternative 2 providing a more conservative definition than Alternative 3. The definition for MSST in Alternative 3 is more risky than the definition in Alternative 2 and would allow gray triggerfish biomass to decrease to as little as 50 percent before the stock would be classified as overfished. This action is not expected to effect the physical environment. Since there would be no direct effects on resource harvest or use, there would be no direct economic effects on fishery participants, associated industries or communities. However establishing these criteria and definitions may have indirect economic effects associated with future management.

<u>Action 6: Gray Triggerfish Rebuilding Plan</u> - Based on the preferred alternative in Action 5, gray triggerfish is overfished and a plan is required to rebuild the fishery. In the absence of fishing mortality, the stock could rebuild in approximately two years, but selecting such a strategy would have negative economic effects. The maximum time period allowed to rebuild the stock would be 10 years, or by 2017. Alternative 1 would not establish a rebuilding plan. The stock would remain below the Council's overfished threshold and harvest would be well below maximum sustainable yield (MSY) if no rebuilding plan and associated management measures were implemented. Alternatives 2 and 3 establish either a constant F_{OY} or stepped F_{OY} rebuilding plan for gray triggerfish. The effects on the various environments would be similar to those described for Action 1. Both plans eliminate overfishing immediately and benefit the biological environment. Alternative 3 would allow the stock to rebuild slightly faster (5 years) than Preferred Alternative 2 (6 years). Preferred Alternative 2 would allow more landings than Alternative 3, providing greater benefits to the economic environment. There are no direct

effects on the administrative environment associated with this action, unless a rebuilding plan is not implemented.

Action 7: Accountability Measures for Gray Triggerfish - Similar to Action 2 above, the Council will be required to establish AMs for all species undergoing overfishing by 2010. Alternative 1 would not establish AMs and the Council would be required to establish these measures in a subsequent amendment prior to 2010. Alternatives 2 and 3 establish specific annual catch levels that cannot be exceeded. If they are exceeded the RA would implement temporary regulations (Alternative 2) or reduce the length of the season (Alternative 3) in the following year. Preferred Alternative 4 and Alternative 5 would use a multi-year running average of recreational landings to determine if catch limits are exceeded. For the commercial fishery, annual landings would be compared to annual catch limits. If the commercial quota (see Action 10) is projected to be met then the RA would close the fishery during the season. If commercial landings exceed the annual catch limit, then the quota in the subsequent season would be reduced by the amount the catch limit was exceeded in the previous year. If the recreational annual catch limit is exceeded, the season length would be reduced in the following fishing year (Preferred Alternative 4) or temporary regulations (Alternative 5) would be implemented to prevent future overages from occurring. Alternatives 2-5 are all expected to benefit the biological environment by reducing the likelihood of overfishing. Action 7 has no direct effect on the physical environment. Indirect effects may include reductions in fishing effort and habitat-gear interactions associated with implementation of accountability measures. Alternatives 2-5 would result in short-term economic losses if accountability measures are triggered. Economic losses will depend on the measures implemented. Alternatives 2 and 5 provide greater flexibility when implementing AMs and therefore would likely result in less economic losses than the other alternatives. Administrative costs are expected to be highest for Alternatives 2 and 5, since these alternatives would require the RA to analyze and evaluate a range of temporary measures. Alternatives 3 and Preferred Alternative 4 would provide the RA with authority to implement seasonal closures; the RA currently closes fisheries when quotas are projected to be met.

Action 8: Gray Triggerfish Regional Management - Eighty-two percent of gray triggerfish are landed in the eastern Gulf and concern was expressed that the 2006 assessment did not reflect the condition of the stock throughout its range. Preferred Alternative 1 would manage gray triggerfish on a Gulf-wide basis while Alternative 2 would require management measures for gray triggerfish be implemented only in the eastern Gulf. Preferred Alternative 1 would benefit the biological environment by requiring harvest reductions throughout the stocks range. Alternative 2 would reduce fishing mortality disproportionately and may result in continued overfishing in the western Gulf. Alternative 1 would also result in greater benefits to the administrative environment, because regulations would be consistent Gulf-wide. Economic losses would be greater in the eastern Gulf and less in the western Gulf if gray triggerfish is managed regionally rather than Gulf-wide. This is because reductions in harvest would be greater in the eastern Gulf, resulting in more restrictive management measures.

Action 9: Gray Triggerfish Recreational Management Alternatives - This action considers five alternatives to reduce recreational gray triggerfish harvest. All the alternatives reduce recreational landings by at least 45 percent. Alternative 1 would maintain status quo regulations. The stock would continue to undergo overfishing and likely remain overfished. Alternatives 2-4 propose various bag limit and size limit combinations. Preferred Alternative 2 would increase the recreational minimum size limit to 14-inches FL. Alternative 3 would establish an 8-fish bag limit and 13-inch FL size limit. Alternative 4 would establish a 1-fish bag limit. Alternatives 2-4 are not expected to benefit the physical environment since effort and habitat-gear interactions will not likely be reduced because gray triggerfish are not a primary target species on most trips. Preferred Alternative 2 would eliminate overfishing and reduce landings more than any other alternative, therefore providing the greatest benefits to the biological environment. Because gray triggerfish have low release mortality (1.5 percent), regulatory discards are not expected to negatively affect the biological environment. Positive benefits associated with ending overfishing include: increased abundance and spawning stock biomass, lower fishing mortality, and a greater number of fish surviving to older ages and larger sizes. All the alternatives are expected to have small or no effects on the administrative environment because the proposed measures are commonly used fishery management tools for regulating harvest. Preferred Alternative 2 would result in small, slightly greater economic losses when compared to the other alternatives.

<u>Action 10: Gray Triggerfish Commercial Management Alternatives</u> - This action considers five alternatives in addition to the status quo to reduce commercial harvest of gray triggerfish. Alternative 1 (status quo) would not establish any new regulations. The stock would continue to undergo overfishing and most likely remain overfished. Alternatives 2-6 propose various size limits, trip limits, and/or quotas to regulate commercial gray triggerfish harvest. Preferred Alternative 6 proposes increasing the commercial minimum size limit to 14-inches FL and establishing a commercial quota. All of the alternatives are expected to benefit the biological environment by reducing harvest by at least 61 percent and ending overfishing. None of the alternatives are expected to significantly effect the physical environment because gray triggerfish are rarely targeted and proposed actions will not likely reduce fishing effort or habitat-gear interactions. Effects on the administrative environment are expected to be small because the proposed regulations are already commonly used to regulate and enforce gray triggerfish and other fisheries. Preferred Alternative 6 would increase the burden on fishery managers to monitor a commercial quota. Alternative 2 is estimated to result in the greatest economic losses of any of the alternatives.

Major Areas of Controversy

<u>Greater Amberjack Management Measures</u>
The major source of controversy in this amendment and FSEIS is associated with disagreements between recreational and commercial sectors about responsibility for the current condition of the greater amberjack stock and who should bear a larger share of the burden for rebuilding. The preferred alternatives selected by the Council in Actions 3 and 4 would modify the percentage of landings allocated to the recreational and commercial sectors while the Council develops an amendment addressing allocations between recreational and commercial fisheries for all FMP resources. The Council recognized that the most prudent course of action was to establish an interim allocation that shifted the allocation near the historical long-term average allocation (1981-2004: 71 percent recreational vs. 29 percent commercial). Through their selection of preferred alternatives, the Council reduced recreational landings proportionally less than commercial landings because of perceived inequities in the effects of previous management

decisions and greater amberjack's value as a recreational sportfish. The proposed interim allocation (73:27) would be in effect until the Council, through the recommendations of an Ad Hoc Allocation Committee, could implement an amendment addressing allocations that fair and equitably allocate FMP resources between recreational and commercial fisheries.

Regional Management

Gray triggerfish are predominately landed in the eastern Gulf by the recreational fishery. Some concerns were expressed that the 2006 stock assessment did not reflect the condition of the stock throughout its range. Fishing mortality rates in the Eastern Gulf were determined to be greater than fishing mortality rates in the Western Gulf; however, both exceeded F_{MSY}. Geographic differences in catch and fishing pressure were taken into account in the assessment model.

Fishery Impact Statement

Regulations impose restrictions on fishery participants, which can result in adverse effects on fishermen and fishing communities. Amendment 30A to the Reef Fish Fishery Management Plan (FMP) proposes to: (1) Revise the greater amberjack rebuilding plan to end overfishing immediately and rebuild the stock by 2011 through adjustments in the total allowable catch (TAC) with the concomitant establishment of a commercial quota, increase in the minimum recreational size limit, and, elimination of the captain and crew bag limit (Actions 1, 3, and 4); (2) Establish accountability measures to maintain greater amberjack and gray triggerfish landings in the commercial and recreational sectors within their respective allotted shares (Actions 2 and 7); (3) Set SFA-compliant benchmarks and thresholds for gray triggerfish (Action 5); (4) Establish a gray triggerfish rebuilding plan to end overfishing immediately and rebuild the stock by 2012 with accompanying measures increasing the recreational minimum size limit (Actions 6 and 9) and establishing a commercial quota and increasing the commercial minimum size limit (Action 10).

Management measures to reduce greater amberjack and gray triggerfish landings are expected to have short-term impacts on the commercial and recreational fisheries. In the commercial sector, a 38 percent reduction in greater amberjack landings and a 60 percent decrease in gray triggerfish harvest are planned. These planned reductions are also expected to adversely impact communities depending on these fisheries and result in direct losses in economic value stemming from net revenue decreases suffered by commercial fishermen.

In the recreational sector, intended regulatory measures would reduce greater amberjack and gray triggerfish landings by 26 percent and 60 percent, respectively. In addition to their adverse impact on communities depending on these fisheries, planned decreases in recreational harvest are anticipated to result in short term losses in economic value due to negative producer surplus changes affecting charterboat and headboat operators, consumer surplus decreases experienced by for-hire consumers, and, consumer surplus losses in the private recreational sector.

If greater amberjack commercial and/or recreational landings exceed a sector's allotted share, accountability measures would trigger and decrease the commercial quota and/or shorten the recreational season, resulting in direct adverse economic impacts. Similarly, overages in the recreational or commercial gray triggerfish fisheries could result in negative economic impacts due to shorter recreational seasons or reduced commercial quotas.

The implementation of intended regulatory measures is expected to result in temporary losses in economic value in the recreational and commercial greater amberjack and gray triggerfish fisheries and adverse impacts on dependent fishing communities. It is however expected that, as the stock recovers in the long run, substantial and lasting economic benefits, and associated positive impacts on fishing communities, would result from future increases in recreational and commercial landings.

Final Supplemental Environmental Impact Statement (FSEIS) Cover Sheet

Responsible Agencies and Contact Persons

Gulf of Mexico Fishery Management Council
2203 N. Lois Avenue, Suite 1100
Tampa, Florida 33607
Assane Diagne (assane.diagne@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

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Abstract
The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires NOAA Fisheries Service and the Gulf Council to prevent overfishing, and achieve, on a continuing basis, the optimum yield from federally managed fish stocks. Greater amberjack in the Gulf of Mexico have been under a rebuilding plan since 2003. In 2006, a new stock assessment was completed and determined the stock was not recovering at the rate previously projected. The stock continues to be overfished and is undergoing overfishing. Similarly, gray triggerfish in the Gulf of Mexico were determined to be undergoing overfishing based on a 2006 stock assessment; and, based on the preferred definition of overfished in Action 5, the stock is overfished. This amendment is necessary to end overfishing of greater amberjack and gray triggerfish and adjust catch levels and management measures to ensure these stocks are rebuilt to sustainable levels. Additionally, management targets and thresholds, annual catch limits, and accountability measures are needed for gray triggerfish to comply with the MSFCMA.

Table of Contents for FSEIS

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 SEIS format, however, elements of the FSEIS are present and identified in the following table of contents for the FSEIS.

1. INTRODUCTION

1.1 Background

Greater Amberjack, *Seriola dumerili*, is one of four jacks of 42 species of reef fish in the management unit for the Fishery Management Plan for Reef Fish Resources of the Gulf of Mexico (Reef Fish FMP), implemented in November 1984. Gray triggerfish *Balistis capriscus* is the only balistid in the management unit. Two serranids are not managed, leaving 15 groupers, 14 snappers, five tilefishes, four jacks, one triggerfish and one wrasse. The jurisdiction of the Reef Fish FMP includes all waters of the Gulf of Mexico (GOM) bounded outside by 200 nautical miles (nm) and inside by the state's territorial waters which are 3 nm in Alabama, Mississippi and Louisiana and 3 leagues or about 9 nm in Florida and Texas.

<u>Greater Amberjack landings history and relationship to previous amendments</u>

Landings from the commercial fishery for greater amberjack are available from the Accumulated Landings System (ALS) since 1962 and the most recent assessment used data from 1963 through 2004. Recreational landings have been collected since 1979 through the Marine Recreational Fishing Statistical Survey (MRFSS). Table 1.1.1 shows commercial and recreational landings from 1979 through 2004 as used in the current stock assessment, with landings for 2005 added. During this historical time period, the recreational fishery took about 70 percent of the harvest while the commercial fishery took the remaining 30 percent. Overall, catch increased rapidly to approximately 7 million pounds (mp) in 1982, fluctuated significantly through 1989 when catch peaked at 7.8mp. Thereafter, landings decreased through 1999 and have generally increased since then. Landings appear to have been affected by regulations in 1990 through Amendment 1 that set minimum size limits to 28 inches FL for the recreational and 36 inches FL for the commercial fisheries and established a bag limit of three fish for the recreational fishery (Figure 1.1.1). A recreational bag limit reduction to one fish in 1997 and a commercial closed season in 1998 may also have caused reductions in landings, although it is less clear than for the size limit changes in 1990.

Table 1.1.1. Greater amberjack landings in whole weight (pounds) from 1979 through 2005

Year	Recreational	Commercial	Total
1979	495,846	151,462	647,308
1980	614,345	178,386	792,731
1981	1,167,455	235,116	1,402,571
1982	6,627,526	223,509	6,851,035
1983	3,171,896	278,804	3,450,700
1984	1,618,454	525,782	2,144,236
1985	2,064,141	753,436	2,817,577
1986	5,458,441	1,100,107	6,558,548
1987	4,848,768	1,537,551	6,386,319
1988	1,558,424	2,030,980	3,589,404
1989	5,924,636	1,932,021	7,856,657
1990	1,114,172	1,210,045	2,324,217
1991	3,549,304	1,375,180	4,924,484
1992	2,651,556	991,156	3,642,712
1993	3,091,383	1,569,610	4,660,993
1994	2,256,131	1,269,953	3,526,084
1995	855,834	1,259,060	2,114,894
1996	1,495,759	1,266,832	2,762,591
1997	1,068,789	1,114,756	2,183,545
1998	736,152	698,681	1,434,833
1999	876,758	775,190	1,651,948
2000	1,051,917	921,795	1,973,712
2001	1,326,182	732,834	2,059,016
2002	2,088,426	790,403	2,878,829
2003	2,689,195	999,151	3,688,346
2004	2,140,039	954,788	3,094,827
2005	1,458,336	739,612	2,197,948

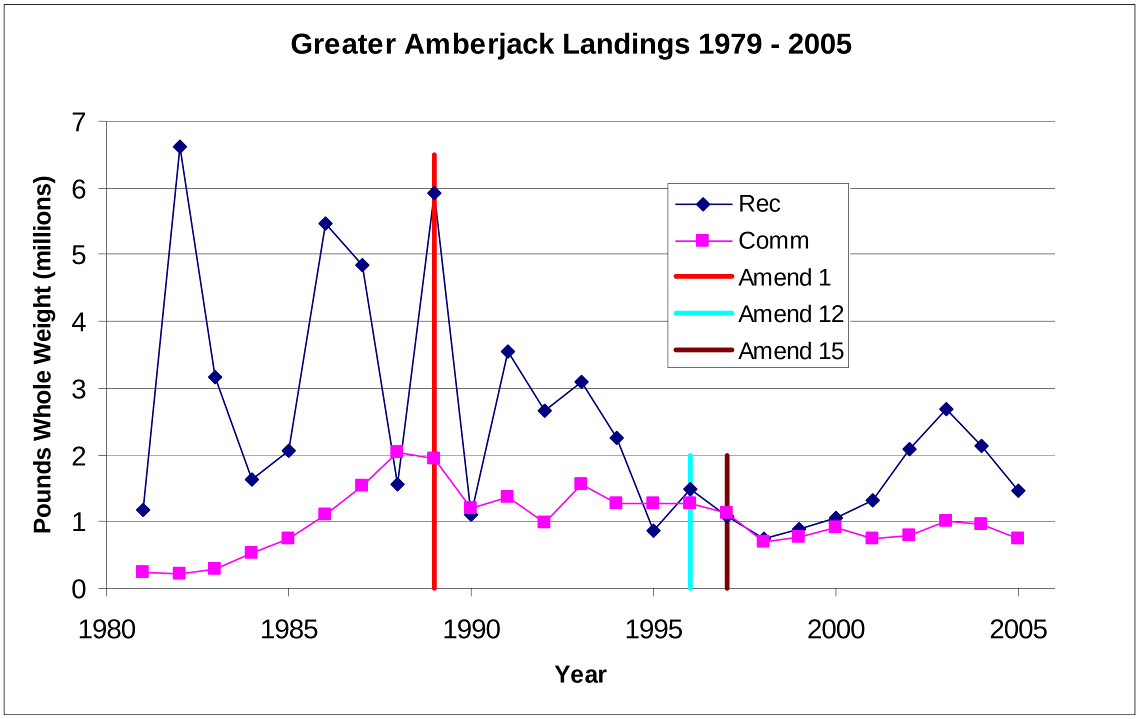

Figure 1.1.1 Recreational and commercial landings of greater amberjack from 1979 through 2005 with the implementation date for management regulations noted. Amendment 1 implemented a recreational three-fish bag, 28-inch fork length (FL) size limit, and a commercial 36-inch FL size limit. Amendment 12 reduced the bag limit to one fish. Amendment 15 set a commercial closed season from March through May.

<u>Gray Triggerfish landings history and previous amendments</u>

Table 1.1.2 shows commercial and recreational landings from 1981 through 2004 as used in the current stock assessment with landings for 2005 added. Over this historical time period, the recreational fishery took about 84 percent of the harvest while the commercial fishery took the remaining 16 percent. Overall, catch increased steadily to approximately 3 mp from 1985 to 1990, then declined steadily to a historical low of approximately 604,000 pounds in 2000. Thereafter, landings generally increased until 2005. A 20 reef fish aggregate recreational bag limit for all reef fish species not having a bag limit was set in 1997. Minimum size was set at 12 inches total length (TL) in late 1999. Landings do not appear to have been affected by these regulations (Figure 1.1.2).

Table 1.1.3 shows commercial and recreational landings by State from 2001 through 2004. Alabama and West Florida account for 86 percent of all Gulf landings; and more specifically, Alabama and the Panhandle Counties of Florida through Jefferson County account for an estimated 69 percent of all Gulf gray triggerfish landings.

Table 1.1.2. Gray triggerfish landings from 1981 through 2005. Directed fleet expressed in pounds, whole weight, while shrimp bycatch is expressed in the number of age - 1 equivalent fish.						
Year	Rec-E	Rec-W	Comm-E	Comm-W	Total Directed	Shrimp bycatch
1981	748,779	179,617	64,498	25,362	1,018,256	1,467,734
1982	2,032,601	362,711	62,959	33,714	2,491,985	1,206,518
1983	397,614	387,301	49,588	23,831	858,334	1,462,755
1984	120,970	844,623	37,445	32,749	1,035,787	304,994
1985	280,865	479,950	54,840	37,786	853,441	855,586
1986	898,096	79,077	72,858	22,771	1,072,802	279,374
1987	1,135,998	199,066	89,313	34,290	1,458,667	1,044,555
1988	1,638,073	158,328	137,978	57,084	1,991,464	1,364,168
1989	1,765,965	212,002	230,361	87,271	2,295,599	906,437
1990	2,313,261	184,941	359,686	99,351	2,957,239	1,286,703
1991	1,688,392	399,955	341,319	103,211	2,532,877	523,154
1992	1,434,485	688,825	338,119	112,076	2,573,505	3,100,516
1993	1,317,044	309,425	381,279	177,448	2,185,197	432,660
1994	1,152,103	186,425	251,578	153,141	1,743,248	1,951,471
1995	1,139,967	329,441	207,212	130,664	1,807,284	1,065,855
1996	618,125	226,006	142,185	125,332	1,111,647	1,498,133
1997	664,794	100,211	107,780	76,909	949,694	1,751,775
1998	560,509	93,309	106,153	70,571	830,542	1,004,208
1999	445,430	43,997	116,194	102,826	708,447	242,742
2000	337,241	109,209	63,042	95,095	604,586	1,656,166
2001	487,622	152,572	108,464	67,718	816,375	490,376
2002	721,872	77,016	148,600	86,963	1,034,451	5,115,407
2003	856,626	58,622	166,425	85,385	1,167,059	854,441
2004	951,559	78,092	141,411	77,122	1,248,184	167,162
2005	672,984		150,178		823,162	1,244,000

NOTE: E = statistical grids 1-12 and W = statistical grids 13 – 21. 2005 shrimp bycatch is estimated

Table 1.1.3. Commercial and Recreational landings (pounds) of gray triggerfish by State, 2001-2004				
Recreational Landings (MRFSS and headboat)				
	TX	LA	MS	AL&WFL
2001	20,938	35,942	23,728	407,225
2002	23,212	17,246	40,348	667,193
2003	27,867	32,558	31,004	758,749
2004	25,510	86,932	53,763	820,867
Commercial Landings (ALS)				
	TX	LA	MS	AL&WFL
2001	15,202	51,317	2,241	107,422
2002	14,548	71,144	1,538	148,126
2003	20,810	62,259	1,780	166,975
2004	27,695	48,740	1,690	140,430

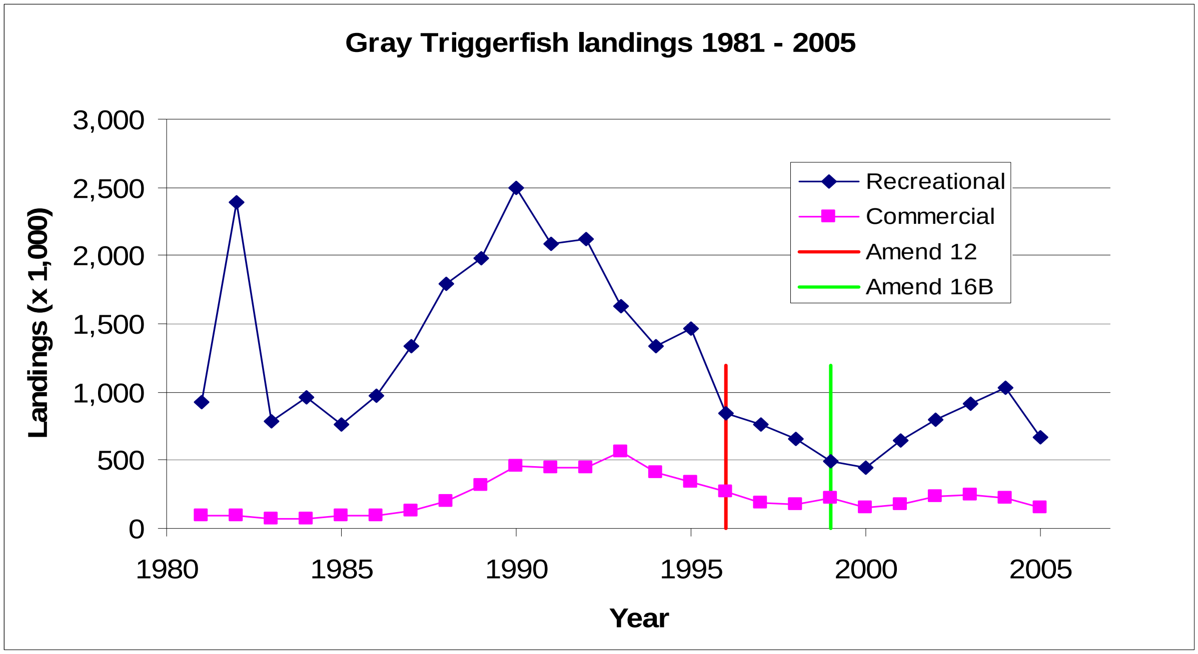

Figure 1.1.2 Recreational and commercial landings of gray triggerfish from 1981 through 2005 with the implementation date for management regulations noted. Amendment 12 implemented a recreational bag limit of 20 reef fish for all those species that did not have a bag limit beginning in 1997. Amendment 16B set a size limit of 12 inches TL beginning in November 1999.

1.2 Status of the Greater Amberjack and Gray Triggerfish Stocks in the Gulf of Mexico

Greater amberjack

Secretarial Amendment 2 to the Reef Fish FMP established a rebuilding plan for greater amberjack based on a stock assessment conducted in 2000. That assessment determined that the greater amberjack stock was overfished and undergoing overfishing as of 1998 (Turner 2000). The effects of management measures to reduce the recreational bag limit from three to one fish (January, 1997) and to close the commercial fishery from March through May (January, 1998) were not incorporated into the assessment because they were too new; however; the projected effects of these management measures were expected to eliminate overfishing; therefore, no new management measures were implemented.

A new assessment was conducted in 2006 using a simple surplus production model called A Stock-Production Model Incorporating Covariates (ASPIC Prager 2004). Other models, such as the calibrated Virtual Population Anaylsis (VPA) used in the 2000 assessment and an age-structured surplus production model were applied to the stock, but a lack of good-quality ageing data added an unknown amount of uncertainty to these methods and they were not considered adequate (SEDAR 9 2006a). Results from the ASPIC base model are:

Parameter	*Value*
Population parameters and management benchmarks	
MSY (million pounds)	5.039
B_{MSY}	8.873
F_{MSY}	0.568
Stocks parameters in 2004	
F_{2004}	0.863
F_{2004} / F_{MSY}	1.520
B_{2004}	4.250
B_{2004} / B_{MSY}	0.479

Based on the parameter estimates for 2004, the stock was overfished (B_{2004} / B_{MSY} < 1.0) and undergoing overfishing (F_{2004} / F_{MSY} > 1.0). Biomass (B) was less than half of B_{MSY} and fishing mortality was 52 percent too high in 2004. Stock biomass declined from at least 1986 through 1998 and then increased through 2003 (Figure 1.2.1). However, these results were very dependent upon the weighting applied to the catch rate indices by fishing sector. The base-case model weighted the indices by the proportion of total catch for each sector over the last eight years. When each catch rate is weighted equally, the stock remains overfished but less so than the base case, and is just barely in the overfishing state (SEDAR 9 2006a).

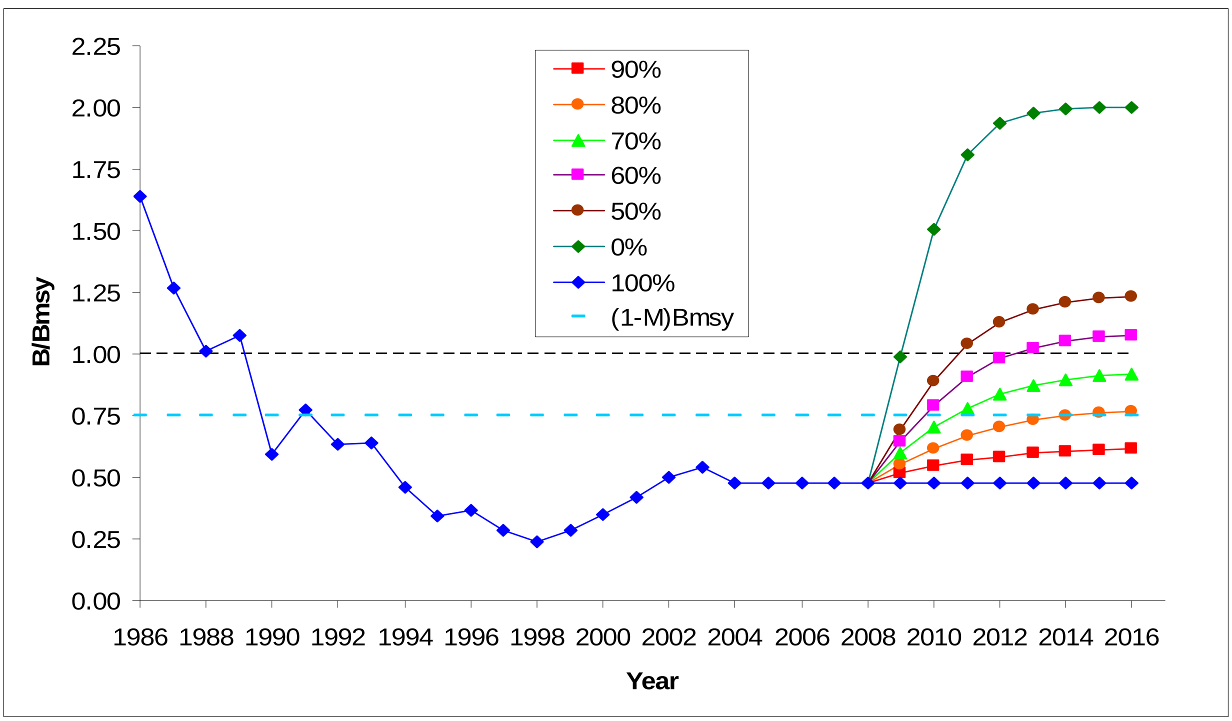

Figure 1.2.1. Greater amberjack relative biomass trends from 1986 to 2004 and relative biomass projections from 2005 through 2016 using constant fishing mortality rate trajectories at various levels of F relative to F during 2004. Reprinted from a PowerPoint presentation given to the SSC and Reef Fish AP on August 8, 2006 by Guillermo Diaz, SEFSC

Some of the uncertainty in the stock status derives from the indices of relative abundance being inconsistent between sectors in 2004 (Figure 1.2.2). Reasons stated by the Review Panel included: (1) the minor components of the fishery (recreational headboats and commercial longline) exhibited an increase while the major components of the fishery (recreational charter and private boats and commercial hand line vessels) exhibited different degrees of decrease and (2) there may be different selectivities between sectors, different fishing locations of each sector with some being more representative of the true stock status than others, or possibly a strong recruitment into the fishery combined with the selectivity by the charter boats for smaller fish. This makes the projections both uncertain and uninformative, so the SEDAR 9 Review Panel recommended that an update assessment be conducted in the next few years to determine the stock trajectory with more precision.

Subsequent to the SEDAR 9 report, the indices were updated to include the values for 2005 (Figure 1.2.2). The MRFSS and handline indices, representing 92 percent of the total catch, continued to decline in 2005 and the headboat index declined significantly in 2005 to near historic lows. Collectively these three sectors of the fishery represent over 97 percent of the total harvest. Only the commercial longline index representing 2.5 percent of the total harvest continued to increase. Therefore, the SEDAR 9 assessment including weighted indices by the proportion of catch by sector appears to be valid; the stock is continuing to undergo overfishing and remains overfished.

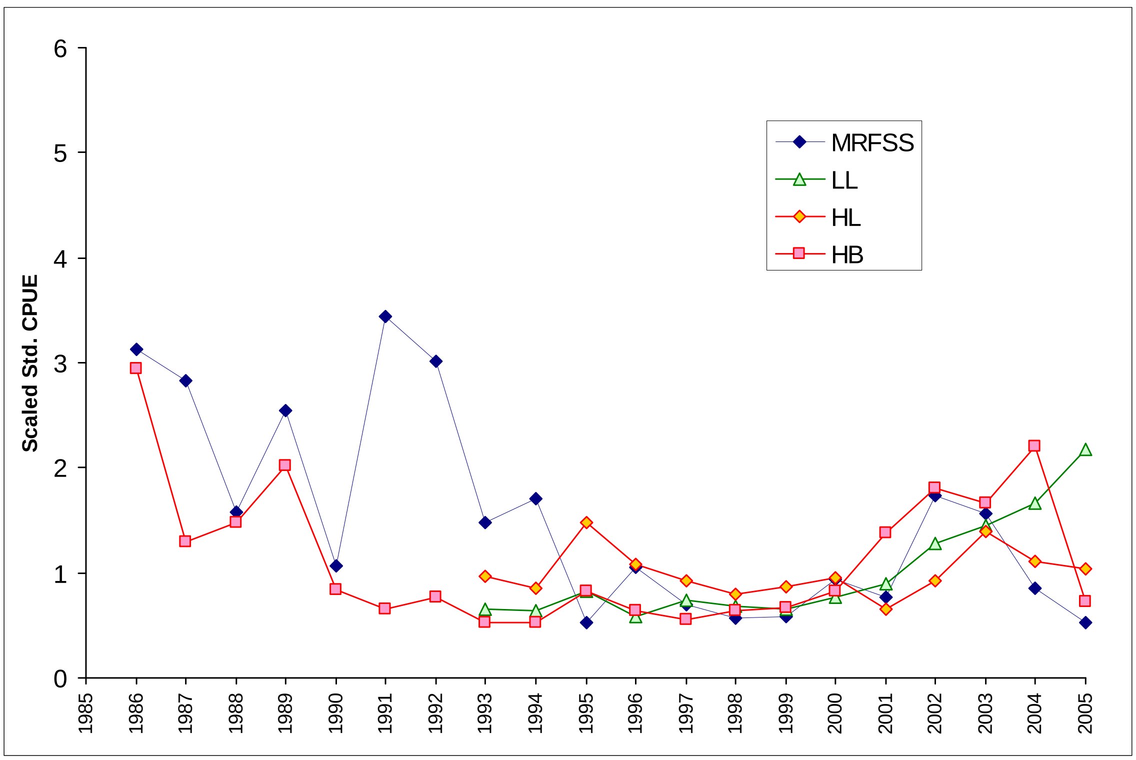

Figure 1.2.2. Greater amberjack catch per unit effort trends from recreational (MRFSS and Headboat, HB) and commercial (Longline, LL and Handline, HL) sectors from 1985 through 2005. Reprinted from a PowerPoint presentation given to the SSC and Reef Fish AP on August 8, 2006 by Guillermo Diaz, SEFSC

Sustainable Fisheries Act (SFA) compliant thresholds and targets were defined in Secretarial Amendment 2. The maximum fishing mortality threshold (MFMT) is defined as the fishing mortality rate at maximum sustainable yield (MSY). Minimum stock size threshold (MSST) is defined as (1-M)*B_{MSY} with natural mortality (M) equal to 0.25. MSY is the yield associated with F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium and optimum yield (OY) is the yield associated with $F_{40\% SPR}$ when the stock is at equilibrium. $F_{30\%SPR}$ was defined as the proxy for F_{MSY} for greater amberjack because biomass-based estimates were considered less accurate than SPR-based estimates in the 2000 assessment. However, the more recent SEDAR 9 assessment accepted the biomass-based estimates for these parameters.

Gray triggerfish

Two assessments of gray triggerfish were conducted in 2001 using different versions of a generalized surplus production model (Valle et al. 2001; Porch 2001). Both assessments indicated that the stock was significantly overfished and undergoing overfishing. Fishing mortality rates were 65 to 70 percent too high and biomass estimates were 15 to 42 percent of B_{MSY}. However, all the models run by Valle et al. (2001) and Porch (2001), were highly sensitive to parameter input restrictions and all but one indicated that the stock had been severely overfished from the beginning of the time series. This was considered unrealistic since historically gray triggerfish was not a desirable target species. Additionally, it was unknown what effect the 12-inch TL minimum size limit implemented in 1999 would have. So no new regulations were implemented at that time.

A new stock assessment was completed in 2006 using an age-structured production model (SEDAR 9 2006b). The stock was determined to be undergoing overfishing but it was uncertain whether the stock was also overfished (Table 1.2.1).

Table 1.2.1. Status determination criteria and stock status of gray triggerfish. Reproduced from SEDAR 9 Review Workshop Advisory Report, 2006.		
Parameter	Base Value	(Low-High Steepness)
Population parameters and management benchmarks		
$F_{20\%SPR}$	0.419	
$F_{30\%SPR}$ = MFMT	0.269	
$F_{40\%SPR}$	0.186	
F_{MSY}	0.45	(0.294-0.525)
SSB_{MSY} (measured as egg production)	1.21t	(1.78t-1.049t)
$SSB_{30\%SPR}$	2.094t	(1.967t-2.109t)
$SSB_{20\%SPR}$	1.316t	(1.083t-1.355t)
F_{OY}	Not defined	
MSY (lbs, including shrimp bycatch	1.638m	(1.441m-1.707m)
Stock parameters in 2004		
F_{2004}	0.435	(0.431-0.435)
F_{2004}/MFMT	1.62	(1.6-1.62)
F_{2004}/F_{MSY}	0.97	(1.47-0.83)
F_{2004}/OY	Not defined	
SSB_{2004} (eggs)	1.345t	(1.323t-1.351t)
$SSB_{2004}/SSB_{SPR20\%}$	1.02	(1.22-1)
$SSB_{2004}/SSB_{SPR30\%}$	0.642	(0.67-0.64)
SSB_{2004}/SSB_{MSY}	1.11	(0.74-1.29)

Based on the definition of MFMT ($F_{30\%SPR}$), the current fishing mortality rate is about 62 percent too high (Figure 1.2.3). The Review Panel also examined biomass based fishing mortality rates which were in the range of F_{MSY} but felt this measure was not acceptable because it was sensitive to the stock-recruitment relationship which is poorly estimated. The Review Panel stated that no conclusion could be made whether the stock is overfished although it appears to be approaching an overfished condition. Based on the Council's preferred definition for MSST in this amendment (1-(M)*$SSB_{30\%SPR}$), current stock biomass as measured in eggs is below this threshold and the stock is considered overfished (Figure 1.2.4). Projections of SSB to 2017 for MFMT (proxy for F_{MSY} = $F_{30\%SPR}$), for 90 percent of MFMT, and for 75% of MFMT are also depicted in Figure 1.2.4.

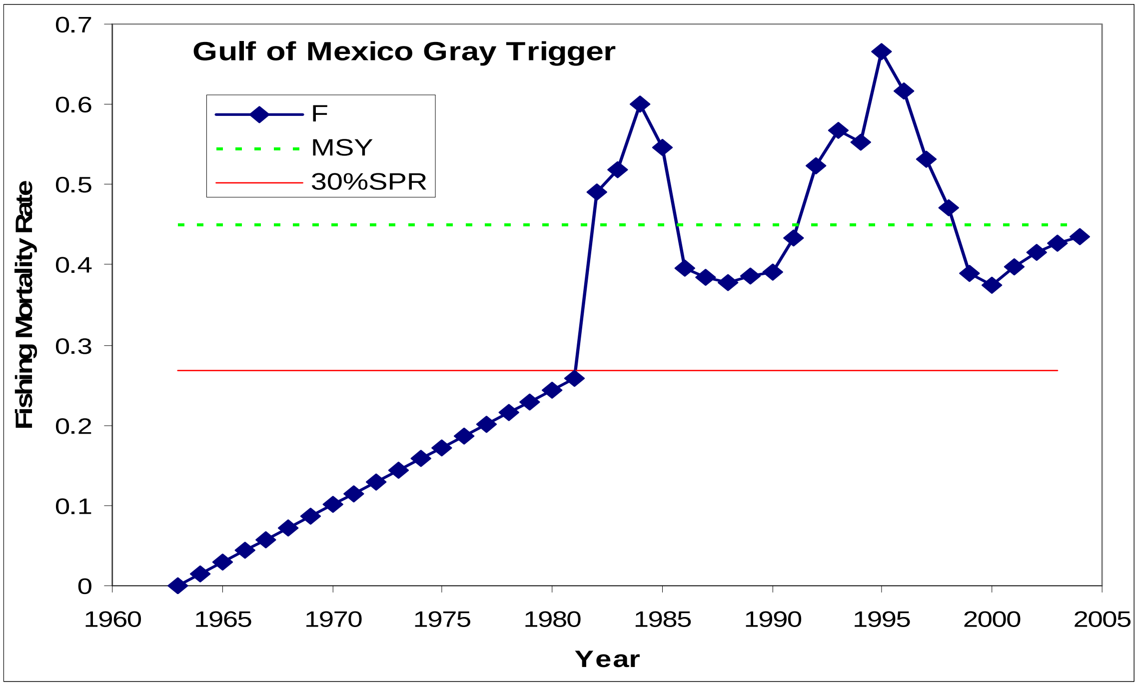

Figure 1.2.3. Gray triggerfish fishing mortality estimates from 1963 through 2004. Fishing mortality at MSY and 30% SPR are shown.

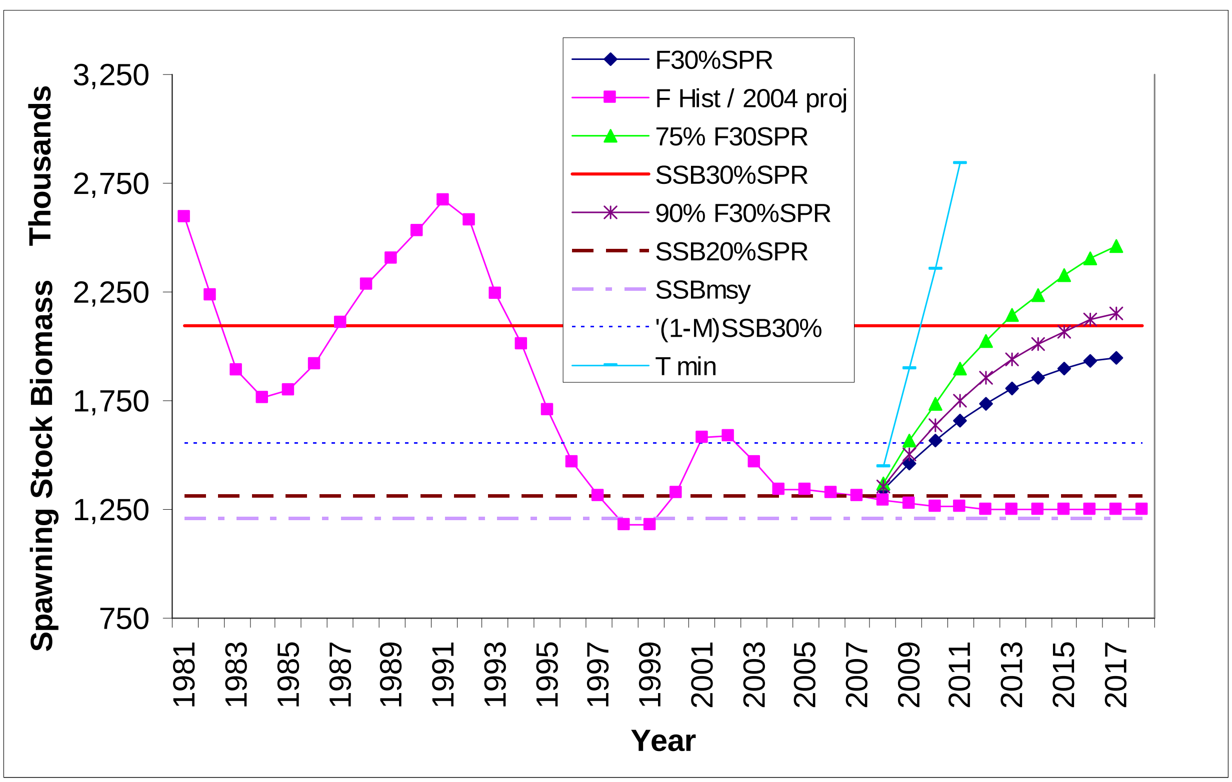

Figure 1.2.4. Gray triggerfish spawning stock biomass estimates from 1963 through 2004. Spawning stock biomass projections at MSY, F_0, 30 percent SPR, (1-M)*30%SPR, and 20 percent SPR are shown from 2008 through 2017.

Subsequent to the completion of the SEDAR 9 assessment and review of gray triggerfish, the Council requested an evaluation of the catch per unit effort (CPUE) indices using only trips which caught gray triggerfish rather than all trips that targeted reef fish typically caught with vermilion snapper. The Council's Reef Fish AP believed that gray triggerfish must be targeted using smaller hooks than would be used for typical reef fish fishing. The CPUE indices were rebuilt using only positive trips and then the base SEDAR 9 stock assessment model was rerun with the new indices (Sladek Nowlis 2006). Results using the new indices improved the biomass estimates slightly (3.6 percent), but the stock was still undergoing overfishing and considered overfished (based on the Council's preferred MSST definition in this amendment). The estimate of current F (2004) decreased by 10 percent which decreased the estimate of overfishing from 62 percent too high to 53 percent too high. However, Sladek Nowles (2006) recommended that the original base assessment with zero trip identified by the Stevens and McCall method (SEDAR9 2006b) is the most defensible method because there are times when fishers use methods that are capable of catching gray triggerfish but do not. Adding zero trips improves the likelihood that the CPUE indices are a reasonable representation of relative stock abundance.

No thresholds or benchmarks have been set specifically for gray triggerfish. Amendment 1 to the Reef Fish FMP, implemented in 1990 before the SFA, was passed, established the MSST 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, $F_{30\%SPR}$, was approved and implemented; however, those for OY and MSST were not.

1.3 Purpose and Need for Action

The MSFCMA requires NOAA Fisheries Service (NMFS) and regional fishery management councils to prevent overfishing, and achieve, on a continuing basis, the optimum yield from federally managed fish stocks. These mandates are intended to ensure fishery resources are managed for the greatest overall benefit to the nation, particularly with respect to providing food production and recreational opportunities, and protecting marine ecosystems. To further this goal, the MSFCMA requires fishery managers to specify through rebuilding plans their strategy for rebuilding overfished stocks to a sustainable level within a certain time frame, and to minimize bycatch and bycatch mortality to the extent practicable.

Greater amberjack have been under a rebuilding plan since 2003. However, a new stock assessment completed in 2006 concluded that the stock is not recovering as projected (SEDAR 9 2006a). It remains overfished and recently returned to an overfishing condition. This amendment is necessary to end overfishing and adjust total allowable catch (TAC) and management measures to bring the greater amberjack rebuilding plan back on course for recovery within the original ten-year time frame.

Gray triggerfish were declared to be undergoing overfishing in October 2006 based on the 2006 stock assessment (SEDAR 9 2006b). Overfished status was not determined because the Council had yet to adopt a definition for MSST. Based on the preferred MSST definition for gray triggerfish in this amendment, the stock is overfished. This amendment is necessary to set TAC and management measures to end overfishing of gray triggerfish, set management targets and thresholds, and establish a rebuilding plan for gray triggerfish.

This amendment proposes to reduce the harvest of greater amberjack by 32 percent and the harvest of gray triggerfish by 60 percent in order to end overfishing and allow the stocks to recover to B_{MSY} within each species' respective rebuilding schedule. These landings reductions will reduce fishing mortality to at or below F_{OY} levels, which equate to a 50 percent reduction in F for greater amberjack and 54 percent reduction in F for gray triggerfish. In addition, management thresholds and targets will be set for gray triggerfish that comply with the SFA and annual catch limits and accountability measures will be established for both species to comply with the recent reauthorization of the MSFCMA.

1.4 History of Management

The Reef Fish FMP [with its associated environmental impact statement (EIS)] was implemented in November 1984. The original list of species included in the management unit consisted of snappers, groupers, and sea basses. Gray triggerfish and *Seriola* species, including greater amberjack, were in a second list of species included in the fishery, but not in the management unit. The species in this list were not considered to be target species because they were generally taken incidentally to the directed fishery for species in the management unit. Their inclusion in the FMP was for purposes of data collection, and their take was not regulated [49FR 39548].

Amendment 1 [with its associated environmental assessment (EA), regulatory impact review (RIR), and initial regulatory flexibility analysis (IRFA)] to the Reef Fish FMP, implemented in 1990, added greater amberjack and lesser amberjack to the list of species in the management unit. It set a greater amberjack recreational minimum size limit of 28 inches (FL) and a 3-fish recreational bag limit, and a commercial minimum size limit of 36 inches FL. This amendment set as a primary objective of the FMP the stabilization of long-term population levels of all reef fish species by establishing a survival rate of biomass into the stock of spawning age to achieve at least 20 percent spawning stock biomass per recruit (SSBR), relative to the SSBR that would occur with no fishing. A framework procedure for specification of TAC was created to allow for annual management changes. This amendment also established a commercial vessel reef fish permit as a requirement for harvest in excess of the bag limit and for the sale of reef fish.

Amendment 4 (with its associated EA and RIR), implemented in May 1992, added the remaining *Seriola* species (banded rudderfish and Almaco jack) to the management unit, and established a moratorium on the issuance of new commercial reef fish vessel permits for a maximum period of three years.

Amendment 5 (with its associated supplemental environmental impact statement, RIR, and IRFA), implemented in February 1994, 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 12 (with its associated EA and RIR), submitted in December 1995 and implemented in January 1997, reduced the greater amberjack bag limit from three fish to one fish per person, and created an aggregate bag limit of 20 reef fish for all reef fish species not having a bag limit (including lesser amberjack, banded rudderfish, Almaco jack and gray triggerfish). NMFS disapproved proposed provisions to include lesser amberjack and banded rudderfish along with greater amberjack in an aggregate one-fish bag limit and to establish a 28-inch FL minimum size limit for those species.

Amendment 15 (with its associated EA, RIR, and IRFA), implemented in January 1998, closed the commercial greater amberjack fishery Gulf-wide during the months of March, April, and May. An August 1999 regulatory amendment (with its associated EA, RIR, and IRFA) closed two areas (i.e., create two marine reserves), 115 and 104 square nautical miles respectively, year-round to all fishing under the jurisdiction of the Gulf Council with a four-year sunset closure.

Generic Sustainable Fisheries Act Amendment (with its associated EA, RIR, and IRFA), partially approved and implemented in November 1999, set the MFMT for greater amberjack and gray triggerfish at $F_{30\%\ SPR}$. Estimates of MSY, MSST, and OY were disapproved because they were based on SPR proxies rather than biomass based estimates.

Amendment 16B (with its associated EA, RIR, and IRFA), implemented in November 1999, set a slot limit of 14 to 22 inches FL for banded rudderfish and lesser amberjack for both the commercial and recreational fisheries, and an aggregate recreational bag limit of five fish for banded rudderfish and lesser amberjack. This amendment also set a 12 inch TL minimum size for gray triggerfish.

Secretarial Amendment 2, implemented in July, 2003 for greater amberjack, specified MSY as the yield associated with $F_{30\%\ SPR}$ (proxy for F_{MSY}) when the stock is at equilibrium, OY as the yield associated with an $F_{40\%\ SPR}$ when the stock is at equilibrium, MFMT equal to $F_{30\%SPR}$, and MSST equal to (1-M)*B_{MSY} or 75 percent of B_{MSY}. It also set a rebuilding plan limiting the harvest to 2.9 mp for 2003-2005, 5.2 mp for 2006-2008, 7.0 mp for 2009-2011, and for 7.9 mp for 2012. This was expected to rebuild the stock in seven years. Regulations implemented in 1997 and 1998 (Amendments 12 and 15) were deemed sufficient to comply with the rebuilding plan so no new regulations were implemented.

2. MANAGEMENT ALTERNATIVES

2.1 Greater Amberjack

Action 1. Modifications to the Greater Amberjack Rebuilding Plan

The rebuilding plan established through Secretarial Amendment 2 set TAC based a ten-year stepped approach where harvest was set using a $F_{40\%SPR}$ yield trajectory (Turner and Scott 2002). This TAC combined both expected directed catch and dead discards. In Table 2.1.1, projected directed catch and dead discards are shown based on projected yields at $F_{40\%\ SPR}$ (proxy for F_{OY}) from the 2001 assessment (Turner and Scott 2002). Total harvest (directed catch and dead discards) over the first two years of the current rebuilding plan (2003 – 2004) have exceeded the rebuilding plan TACs of 2.9 mp by approximately 1.1 mp annually or about 38 percent. Landings during this same time period also exceeded the projected yield expected (2.259 mp) by approximately 1.1 mp annually or about 50 percent more than allowed under the rebuilding plan. CPUE estimates have declined significantly during this same time period so it is likely that stock availability has decreased as the SEDAR 9 assessment suggests (Figure 1.2.2).

The 2006 assessment and projections indicated that a 50 percent reduction in current fishing mortality is required starting in 2008 to continue the rebuilding plan (three year interval using the first year of each step) specified in Secretarial Amendment 2. If fishing mortality is reduced by 50 percent then the stock would rebuild one year earlier than specified in Secretarial Amendment 2. Projected yields for 2005 through 2007 were based on current fishing mortality rates (F_{2004}) (Figure 1.2.1, Table 2.1.2). The reduction in landings corresponding to a 50 percent reduction in F is approximately 32 percent based on the difference between the average 2000 through 2004 landings and 2008 projected landings of 1.871 mp. The minimum reduction required to rebuild the stock by 2012 as required by the current rebuilding plan would be a 40 percent reduction in current F (Figure 1.2.1). This reduction would set F at approximately 91 percent of F_{MSY}. Landings would have to be reduced by 21 percent from the average landings from the baseline time period 2000 through 2004.

Table 2.1.1. Historical landings and dead discards through 2005 and projections from the 2001 and 2006 greater amberjack assessments. Yield projections from the 2001 assessment are based on $F_{40\%SPR}$. Yield projections from the 2006 assessment are based on a 50 percent reduction in F_{2004} which equals $F_{40\%SPR.}$						
	Historical Yield		2001 Assessment		2006 Assessment	
Year	Directed	Discard	Directed	Discard	Directed	Discard
1991	4,924	917				
1992	3,643	650				
1993	4,661	923				
1994	3,526	689				
1995	2,115	636				
1996	2,763	650				
1997	2,184	549				
1998	1,435	422				
1999	1,652	446				
2000	1,974	526				
2001	2,059	808	1,988	579		
2002	2,879	649	1,500	436		
2003	3,688	659	2,259	658		
2004	3,095	608	2,788	812		
2005			3,346	974	3,062	607
2006			3,998	1,164	3,059	607
2007			4,605	1,340	3,057	607
2008			5,055	1,472	1,871	371
2009			5,433	1,581	2,545	505
2010			5,732	1,669	3,103	616
2011			5,951	1,732	3,485	691
2012			6,134	1,785	3,712	736
2013					3,836	761
2014					3,900	774
2015					3,933	781
2016					3,950	784

NOTE: values in the shaded boxes were estimated at the time of the assessment in order to start the projections when new regulations were likely to be implemented.

Table 2.1.2 summarizes the proposed alternatives to rebuild the stock. **Preferred Alternative 1** is taken directly from Secretarial Amendment 2 with a modification to indicate directed yield at F_{OY} from the 2006 assessment. Target directed yields for **Alternative 2** follows the constant F projections shown under the column labeled Assessment Projections for 50% F_{2004}. **Alternative 3** is a modified rebuilding plan which allows harvest to increase each year, but is limited to the total harvest from the stepped F_{OY} rebuilding plan in **Preferred Alternative 1** (i.e., 12,583 mp).

This Action initially had two additional alternatives based on assessment yield projections for 60% $F_{2004.}$ Both would have rebuilt the stock by 2012 as mandated by Secretarial Amendment 2 but would have allowed landings to be approximately 0.8 to 1 mp higher during the first four years of the rebuilding plan than 50% F_{2004} rebuilding plans. The Council moved these alternatives to Considered but Rejected (Section 13) because they provided no better than a 50 percent chance of rebuilding the stock by 2012. thus, they were deemed insufficient to end overfishing and rebuild the stock within the remaining five-year timeframe. Therefore, this Action examines the remaining three alternatives which have a better than 50 percent chance of rebuilding the stock by 2012.

Table 2.1.2. Alternatives for changing the greater amberjack rebuilding plan based on projections from the 2006 stock assessment. Alternatives 1 is modified from the 2001 assessment.

Year	Assessment Projections 60% F_{CURR} = 0.52 Directed Yield	Assessment Projections 50% F_{CURR} = 0.43 Directed Yield	Preferred Alternative 1 Updated Status Quo 50% F_{CURR} Directed Yield	Alternative 2 Constant F 50% F_{CURR} Directed Yield	Alternative 3 Conservation Equivalent to Status Quo 50% F_{CURR} Directed Yield
2006	3,059	3,059			
2007	3,057	3,057			
2008	2,155	1,871	1,871	1,871	1,871
2009	2,768	2,545	1,871	2,545	2,140
2010	3,273	3,103	1,871	3,103	2,409
2011	3,632	3,485	3,485	3,485	2,678
2012	3,863	3,712	3,485	3,712	3,485
2013	3,999	3,836			
2014	4,078	3,900			
2015	4,121	3,933			
2016	4,145	3,950			
2008-2011 Total	11,828	11,004	9,098	11,004	9,098
2008-2012 Total	15,691	14,715	12,583	14,715	12,583

NOTE: FMSY = 0.57, FOY = 0.43. Shaded cell indicates rebuilt to B_{MSY}.

Preferred Alternative 1. No action. Maintain the three-year stepped rebuilding plan based on a constant F_{OY} projection as specified in Secretarial Amendment 2. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F_{OY} projection from the 2006 assessment; 1.9 mp for 2008 through 2010 and 3.5 mp from 2011 through 2012.

Alternative 2. Modify the rebuilding plan specified by Secretarial Amendment 2. Directed TAC levels for 2008 through 2012 would be set at the directed yield for each year as defined by the constant F_{OY} projection from the 2006 assessment. TAC for 2008 would be 1.9 mp, TAC in 2009 would be 2.5 mp, TAC in 2010 would be 3.1 mp, TAC in 2011 would be 3.5 mp, and TAC in 2012 would be 3.7 mp.

Alternative 3. Modify the rebuilding plan specified by Secretarial Amendment 2. Directed TAC levels for 2008 through 2012 would be set at the directed yield for each year based on a proportion of the constant F_{OY} projection from the 2006 assessment. TAC for 2008 would be 1.9 mp, TAC in 2009 would be 2.1 mp, TAC in 2010 would be 2.4 mp, TAC in 2011 would be 2.7 mp, and TAC in 2012 would be 3.5 mp.

Discussion: The alternatives in this Action establish overall TAC reductions and will not directly affect the physical environment. Specifying reductions in 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 (See Actions 3 and 4). 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. All the alternatives would require a 32 percent reduction in TAC in the first year of the revised rebuilding plan. **Preferred Alternative 1** uses a stepped approach to managing TAC levels during rebuilding; overall catches are lower than for the comparable constant-F rebuilding trajectory used in **Alternative 2**. **Alternative 3** uses a linearly increasing approach based on maintaining the same four-year total landings as for the stepped approach in **Preferred Alternative 1** and therefore, is the conservation equivalent to that alternative. It is difficult to quantify if differences in allowable catch will result in differences in fishing effort and habitat-gear interactions. Total landings during the rebuilding period (2008-2011) are the same for **Preferred Alternative 1** and **Alternative 3** and about 21 percent higher for **Alternative 2** (Table 2.1.2). All alternatives will rebuild the stock by 2011. Any impacts to the physical environment are expected to be small for any of the alternatives since greater amberjack is pelagic and primarily caught in the water column.

Alternatives that specify TAC reductions will not directly affect the biological condition of the greater amberjack resource but will indirectly affect stock condition by requiring the implementation of measures to reduce landings and discards. The greater the reduction in landings, the more rapidly the stock will recover from the overfished condition. Projections from the 2006 assessment indicate that if no fishery were allowed, the stock would recover to B_{MSY} in slightly more than one year (Figure 1.2.1). After that time, the stock could be fished at the target yield F_{OY} or approximately 4.2 mp. All the alternatives in this Action eliminate overfishing immediately (2008) and rebuild the stock by 2011. **Preferred Alternative 1** and **Alternative 3** should provide the most short-term benefit by rebuilding the greater amberjack stock to B_{MSY} early in 2010. **Alternative 2** also rebuilds the stock by the end of 2010 but allows approximately 21 percent more landings (1.9 mp) than the other alternatives. Because all the plans are based on target F_{OY} fishing levels, each has a significantly better than 50 percent chance of rebuilding the stock before 2012; however, **Alternative 2** is not quite as conservative as **Preferred Alternative 1 and Alternative 3** which are unlikely to have any measurable differences.

There are two approaches used by the alternatives in this Action to rebuild the stock. **Preferred Alternative 1** uses three-year steps while the other alternatives increase landings annually based on either a constant fishing mortality rate (**Alternative 2**) or a linearly increasing approach (**Alternative 3**) based on maintaining the same four-year total landings as for the stepped approach. Most types of management measures (bag, size, or trip limits and season closures) allow catch to vary in proportion to the availability of the stock. Greater amberjack stock abundance appears to react positively and rapidly to a reduction in landings, so availability is expected to increase significantly during the second and third year of each step. For **Preferred Alternative 1**, it is important to select management measures that will reduce the likelihood that catch will increase with availability. Otherwise, overages are likely to occur causing negative effects to the administrative environment (see Action 2, Accountability). **Alternatives 2** and **3** use rebuilding methods that allow TAC to increase each year. These approaches assume that the stock will improve as predicted by the projections. 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. Management measures in the future are less likely to need modification and accountability measures proposed in Action 2 are less likely to be triggered. **Alternative 2** follows the constant F trajectory which matches stock recovery; whereas, **Alternative 3** follows a linearly increasing but slightly flatter trajectory and is slightly more likely to trigger accountability if the stock recovers as predicted.

This action has no direct effect on the economic environment since it would not directly alter the current harvest or use of a resource. Its indirect effects come in the form of conditioning the types of management measures to be adopted. Restrictive management measures could be necessary to rebuild the resource, and direct effects accrue to these measures

Preferred Alternative 1 implies more restrictive management measures over a longer period than **Alternative 2** or **Alternative 3**, and thus would more likely indirectly result in larger short-run adverse economic impacts. It should be noted, though, that **Preferred Alternative 1** and **Alternative 3** only slightly differ in their economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{msy}, the resulting post-rebuilding benefits under both alternatives would be approximately the same. In this case, the less costly alternative (**Preferred Alternative 1**) may be adjudged more beneficial than **Alternative 3**. The key condition in this conclusion is the extent to which specific management measures under each alternative are effective in aligning actual harvest to the alternative's target harvest trajectory. It appears that **Preferred Alternative 1** would offer a higher chance of faster recovery than the other alternatives.

Preferred Alternative 1, status quo, and **Alternatives 2 and 3,** are administrative and in the short term would not directly alter the current harvest so there would not be any direct effects on the fishermen, businesses, or fishing communities that depend on the greater amberjack fishery. When a rebuilding schedule is designed, in the short term, there would be indirect negative impacts on the fishermen, businesses, and communities that depend on the greater amberjack fishery, if the rebuilding plan requires a lower TAC than is currently in place. If the rebuilding plan is successful in rebuilding the stock in five years fishermen, businesses, and communities dependent on the greater amberjack fishery would then benefit from a higher TAC.

There are no direct effects on the administrative environment from this Action. Indirect effects may be associated with accountability measures (Action 2) and constraining harvest within allowable catch levels. There is no action required to establish a TAC beyond rule promulgation. However, the indirect implication is that management measures will have to be implemented that reduce landings which will affect enforcement and monitoring. The specific administrative effects are different depending on which methods are used to reduce landings and are described under Actions 3 and 4.

The Council selected **Alternative 1** as their preferred alternative for several reasons. This alternative has a greater than 50 percent probability of allowing the stock to recover within the specified time frame and is the most conservative of the above alternatives, particularly considering the accountability measures proposed in Action 2. From an economic perspective, **Preferred Alternative 1** has the greatest short-term economic costs, it should provide long-term benefits to the fishery by allowing the stock to recover sooner and allow higher TACs to be harvested.

Action 2. Accountability Measures for the Greater Amberjack Rebuilding Plan.

The greater amberjack rebuilding plan set 2012 as the date the stock must be rebuilt to B_{MSY}. The most recent assessment was conducted in 2006, and indicated the stock was undergoing overfishing. Because the stock cannot recover if overfishing is occurring, the rebuilding plan needs to be modified as soon as possible - likely in 2008. This timeline only leaves five years to rebuild the stock. If the modified rebuilding plan is not strictly adhered to, the plan is likely to fail. A new assessment is scheduled for 2010. The results won't be available until late 2010 leaving only one year to rebuild the stock if it is determined that the stock is not rebuilding as planned. If that were the case, it is possible that an emergency rule to close the fishery would be required. AMs are intended to ensure landings do not exceed TAC allowed by the rebuilding plan. The alternatives below provide specific guidelines under which the Regional Administrator will close the fishery to prevent overfishing from occurring.

Alternative 1. No action. Do not establish an accountability measure for the greater amberjack rebuilding plan.

Preferred Alternative 2: If annual landings for any sector as estimated by the SEFSC reach or exceed the annual share of TAC (i.e., annual catch limit) for that sector (see Table 2.1.3), the Regional Administrator shall issue a notice closing the fishery for the remainder of the year. In addition, if despite such a closure, landings exceed a sector's share of TAC, the RA will file a notice reducing the length of the sector's fishing season for the time necessary to recover the overage in the following fishing year. If, however, the Council establishes a commercial quota (see Action 4), the Regional Administrator shall issue a notice reducing the commercial quota in the following year by the amount the quota was exceeded in the previous year.

Alternative 3: If annual landings for any sector as estimated by the SEFSC are 20 percent greater than the TAC for that sector in 2008, 10 percent greater then the cumulative TAC for that sector in 2008-2009, or greater than the cumulative TAC for that sector in 2008-2010 (see Table 2.1.4), the Regional Administrator shall issue a notice reducing the length of the fishing season for that sector for the time necessary to recover the overage as soon as possible but not later than the end of the following fishing year. If, however, the Council establishes a commercial quota (see Action 4), the Regional Administrator shall issue a notice reducing the commercial quota in the following year by the amount the quota was exceeded in the previous year(s) as calculated above. During 2011 and 2012, no landings overages will be allowed.

Discussion: This Action has minimal direct or indirect affect on the physical environment because gear used to catch greater amberjack rarely interacts with the bottom. These alternatives have a direct effect on the biological environment by increasing the likelihood that the greater amberjack stock will be rebuilt by 2012 as required by the MSRA. If TAC is not strictly adhered to, the plan is likely to fail. The greater amberjack stock would not recover to B_{MSY} in the short-term and management measures would have to be changed to eventually recover the stock over the long-term. Greater amberjack stock abundance seems to be very sensitive to the level of harvest; so, if overages occur, corrective measures must be taken quickly to prevent much slowdown in the rebuilding program.

Alternative 1 is status quo, no accountability measures, and would require that currently available procedures would have to be used to implement changes if overages occurred. The Council's regulatory process currently takes at least one year to implement new rules and landings estimates are not available until after-the-fact; so it would be at least two years before the first corrections could be made. NMFS may develop emergency measures under MSRA section 305(c) which generally takes a minimum of three to six months to implement depending on the level of Council involvement. This procedure may also be too long to effectively control landings depending on when in the rebuilding period overages occur.

Table 2.1.3. Target greater amberjack TACs and accountability measure triggers (AM trigger = annual catch limit) for Alternative 2 in Action 2. Yields triggering AMs are based on a stepped (Action 1, Alternative 1) or constant (Action 1, Alternative 2) Foy rebuilding strategy or a conservation equivalent rebuilding strategy (Action 1, Alternative 3).

Recreational Fishery									
	stepped Foy plan			constant Foy plan			conservation equivalent plan		
Year	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.
2008	1,368	1,368	0	1,368	1,368	0	1,368	1,368	0
2009	1,368	1,368	0	1,860	1,860	0	1,564	1,564	0
2010	1,368	1,368	0	2,268	2,268	0	1,761	1,761	0
2011	2,547	2,547	0	2,547	2,547	0	1,957	1,957	0
2012	2,547	2,547	0	2,713	2,713	0	2,547	2,547	0
Commercial Fishery									
	stepped Foy plan			constant Foy plan			conservation equivalent plan		
Year	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.
2008	503	503	0	503	503	0	503	503	0
2009	503	503	0	685	685	0	576	576	0
2010	503	503	0	835	835	0	648	648	0
2011	938	938	0	938	938	0	721	721	0
2012	938	938	0	999	999	0	938	938	0

Sector TACs are based on allocating TAC 73 percent recreational and 27 percent commercial. Sector TACS will be adjusted depending on the approved alternatives for Actions 3 and 4.

Table 2.1.4. Target greater amberjack TACs and accountability measure triggers (AM trigger = annual catch limit) for Alternative 3 in Action 2. Yields triggering AMs are based on stepped (Action 2, Alternative 1) or constant (Action 2, Alternative 2) Foy rebuilding strategies or a conservation equivalent rebuilding strategy (Action 2, Alternative 3).

Recreational Fishery									
	stepped Foy plan			constant Foy plan			conservation equivalent plan		
Year	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.
2008	1368	1642	274	1368	1642	274	1368	1641	274
2008-09*	2736	3010	274	3228	3550	323	2932	3225	297
2008-10*	4104	4104	0	5496	5496	0	4692	4810	0
2011	2547	2547	0	2547	2547	0	1957	1957	0
2012	2547	2713	166	2713	2713	0	2547	2547	0
Commercial Fishery									
	stepped Foy plan			constant Foy plan			conservation equivalent plan		
Year	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.	TAC	AM trigger	Diff.
2008	503	604	101	503	604	101	503	604	101
2008-09*	1007	1108	101	1188	1307	119	1079	1203	109
2008-10*	1510	1510	0	2023	2023	0	1728	1771	0
2011	938	938	0	938	938	0	721	721	0
2012	938	938	0	999	999	0	938	938	0

* Target TACs and AM triggers for 2008-2009 and 2008-2010 represent cumulative landings during those time periods; target TACs and AM triggers for all other years (2008, 2011, 2012) represent a single year of landings.

Sector TACs are based on allocating TAC 73 percent recreational and 27 percent commercial. Sector TACS will be adjusted depending on the approved alternatives for Actions 3 and 4.

Preferred Alternative 2 and **Alternative 3** provide the Regional Administrator of SERO the authority to file a seasonal closure notification to constrain harvest and reduce the likelihood of overfishing. Total allowable catches for each sector, as specified in Tables 2.1.3 and 2.1.4 would function as annual quotas. If a sector's quota/TAC is projected to be met or exceeded, then the fishery would be closed by the RA. In addition, these alternatives provide the RA with authority to recover overages occurring in the previous year(s).For instance, if recreational estimated landings for Wave 3 of MRFSS (released in August) show that the TAC for the recreational sector has already been landed or is expected to be landed during the next two-month period (Wave 4), the RA would be able to issue a notice to close the recreational fishery for the remainder of the year. If the final harvest (landings) exceeds the TAC for that year, then a portion of the subsequent year would also have to be closed. The same procedure would apply to the commercial fishery using monthly ALS landings or a quota monitoring program. Catch may be shifted seasonally which could have some minimal biological effect on spawning but the average TACs for any two-to-three year period should not exceed target TAC for that period. The rebuilding plan will be adhered to and stock biomass will be given the best opportunity to recover. However, there could be natural variation in recruitment and regional availability outside the control of regulations that are not accounted for by the assessment projections. These natural variations in recruitment may not be detrimental to the rebuilding plan, but could change the catchability of the stock. For example, if a good year-class enters the fishery, landings may exceed annual TAC while fishing mortality does not exceed target levels. Revised MSRA regulations require that AMs for stocks undergoing overfishing be implemented by 2010 to address landings overages even when a new assessment has not been conducted and the current F value is unknown. **Preferred Alternative 2** requires AMs be imposed if TAC in any year is exceeded and therefore provides no buffer for natural variations in recruitment (see Table 2.1.3). Sector TACs in Table 2.1.3 and 2.1.4 are based on allocation of 73 percent to the recreational fishery and 27 percent to the commercial fishery. **Alternative 3** allows some variation around TACs to compensate for this natural variation but requires that cumulative TAC over the first three years and TACs for 2011 and 2012 not be exceeded (see Table 2.1.4). **Alternative 3** is equivalent to **Preferred Alternative 2** for the last three years of the rebuilding plan; however, landings could increase for the first two years (20 percent in the first year or 10 percent over the first two years; see Table 2.1.4). These differences are well within the variance of the TAC estimates. There could be a slight reduction in biomass trends over the rebuilding period if the increased landings were the result of changes in fishing practices rather than increases in availability even though total landings would not exceed the total TAC for the five years.

Of the three accountability alternatives considered, **Preferred Alternative 2** and **Alternative 3** have direct and indirect economic effects. As a no-action alternative, **Alternative 1** has no direct economic effects, but since corrective actions may still be needed, **Alternative 1** may be considered to have indirect economic impacts.

In the event overages occur, both **Preferred Alternative 2** and **Alternative 3** instruct the RA to shorten fishing seasons or reduce quotas the following fishing period. Either action by the RA would have direct consequences on the short-term revenues and potentially the costs of commercial fishing vessels as well as the benefits and costs of anglers and the for-hire segment of the fishery. Both the short season and quota options can shorten the fishing seasons. But the shorter season option has slightly less adverse economic impacts than the quota option, because it affords fishing participants better opportunity to plan their fishing activities.

One type of indirect effects from the various alternatives relate 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 and to the shift in fishing effort to other fisheries. Another type arises if the directly affected fishing participants shift their 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.

Although the general nature of economic effects of the **Preferred Alternative 2** and **Alternative 3** is similar, there are potential short-term and long-term differences in magnitudes. In the short term, **Alternative 3** allows for relatively higher target harvest levels and so would bring about less adverse short-term economic impacts than the **Preferred Alternative 2**. But **Alternative 3**, by allowing actual harvests to exceed target harvests in the first few years of the rebuilding period can potentially lower the likelihood of achieving the rebuilding target on time. Thus, it can possibly postpone the realization of benefits from rebuilding the stock. While **Alternative 1** may delay the occurrence of adverse economic impacts in the short term, it would also tend to delay even further the rebuilding of the fish stock and thus the realization of benefits from a rebuilt stock.

Alternative 1, status quo, would have no direct or indirect affect on the administrative environment; however, **Preferred Alternative 2** and **Alternative 3** would require monitoring landings on a monthly or seasonal basis similar to how quotas are managed. This would put a significant burden on NMFS Enforcement, Sustainable Fisheries, and SEFSC staff to collate and verify landings information, file a notification of a closure, and enforce closures or quota reductions.

The Council selected **Alternative 2** as preferred for several reasons. The AMs in **Preferred Alternative 2** provide the greatest protection to the stock as it recovers because there is no buffer allowing greater harvests to occur. While this may reduce the economic benefits to the fishery over the short term, this alternative provides long-term benefits by increasing the probability the stock will recover and allowing higher TACs to be harvested in the future.

Action 3: Greater Amberjack Recreational Management Alternatives

<u>Alternatives</u>
The first federal regulations on GOM greater amberjack were implemented through Amendment 1 to the Reef Fish FMP. Regulations for the recreational fishery were a 28-inch FL minimum size and a three-fish per angler bag limit. These regulations were intended to reduce landings by about 45 percent, equivalent to the expected reduction from the 36-inch minimum size limit proposed for the commercial fishery. In 1997, the recreational bag limit was reduced to one fish per angler at the request of the recreational fishery and then in 1998 a commercial closed season from March through May was implemented to reduce landings by a similar amount, approximately 22 percent. Secretarial Amendment 2 established a rebuilding plan for greater amberjack but did not change management regulations.

The following discussion provides background information on management measures (fractional bag limits, size limits and seasonal closures) considered by the Council for managing greater amberjack catch in the recreational fishery. The associated tables provide the range of reductions possible from each of the types of measures available. Examples of potential management measure changes required by the rebuilding plans in Action 1 are based on a recreational landings reduction of 32 percent. This represents an equal proportional Gulf-wide reduction consistent with past Council decisions.

<u>Fractional Bag Limits</u>
The Council has chosen to move all alternatives that use fractional bag limits to Section 13, Considered but Rejected and to maintain the bag limit at one fish daily; however, the analyses have been kept here for reference since it has been considered. Fractional bag limits, similar to vessel limits, reduce recreational catch per trip below one fish per person per vessel per trip. Table 2.1.5 shows the expected reduction obtained by setting the bag limit to one fish per two or three anglers. The lower portion of the table defines the number of fish allowed per number of anglers on board depending on how fractional fish are handled. If no allowance is given, the correct number of anglers must be on-board before one more fish can be retained. If an

allowance is given, an extra fish is allowed as soon as the calculated value includes a fractional fish. The stock assessment used a rate of 20 percent release mortality. Private anglers account for approximately 50 percent of the catch, charter vessels 41 percent, and headboats 7.5 percent. Headboats landings would be affected least by any fractional bag limit because few trips catch more than the bag limits being proposed; however, a fractional bag limit on headboats would also be the least understood leading to possible enforcement problems. Charter vessels would be most affected by fractional bag limits, where again they would have limited acceptance. Overall, a bag limit of one fish per three anglers with no allowance for fewer anglers would be required to reduce harvest by at least 32 percent. As for vessel limits, anglers can increase their overall landings under any bag limit restrictions by making more trips or the fishery as a whole can increase landings if more fishermen enter the fishery.

Table 2.1.5. Greater Amberjack Fractional Bag Limits. Source - MRFSS, Texas, and Headboat data averaged from 2003 through 2005. The SEDAR 9 stock assessment assumed 20 percent release mortality.

Release Mortality	Bag Limit	Allowance for fewer anglers	No allowance for fewer anglers
		Weighted % Reduction	Weighted % Reduction
0%	1	0%	0%
	1 per 2	25%	33%
	1 per 3	35%	52%
10%	1	0%	0%
	1 per 2	23%	30%
	1 per 3	31%	47%
20%	1	0%	0%
	1 per 2	20%	26%
	1 per 3	28%	41%

Bag Limits by number of anglers on-board							
Anglers	1	2	3	4	5	6	etc.
	With allowance for fewer anglers						
1 per 2	1	1	2	2	3	3	etc.
1 per 3	1	1	1	2	2	2	etc.
	With no allowance for fewer anglers						
1 per 2	0	1	1	2	2	3	etc.
1 per 3	0	0	1	1	1	2	etc.

<u>Captain and Crew bag Limits</u>

The captain and crew of charter vessels sometimes keep the bag limit of fish themselves or give them to their clients once the trip is completed to enhance the experience. For a few reef fish fisheries, such as groupers and red snapper, this practice is prohibited. For fisheries such as greater amberjack, where the bag limit per person is currently only one fish and proposed alternatives may reduce that further to fractional bag limits per angler or vessel limits, the practice can lead to significant decreases in the effectiveness of bag limit measures to reduce landings. Eliminating the bag limit for captain and crew in the greater amberjack fishery would reduce the landings by 4.47 percent assuming a 20 percent release mortality rate, as specified in the most recent stock assessment.

Size Limits
Recreational landings by size were derived from MRFSS, Headboat and TPWD data for the period 2003 through 2005 (Strelcheck, pers. comm.). The recreational size limit is currently set at 28 inches FL. There was little difference in the size of fish caught by mode (private recreational, charter, headboat), so all sectors and regions should be affected similarly. The size limit for the recreational fishery would have to be increased to 32-inches FL to obtain a 32 percent reduction in landings (Table 2.1.6). Any increase in the size limit will likely increase dead discards although less so than for the commercial fishery. Anglers can increase their effective catch under a size limit increase by high-grading if the bag limit is limiting. In the short-term, while availability of legal fish is low, anglers may make fewer trips. In the long-term, more legal fish will become available and catch will likely increase. Anglers may increase the number of trips and more anglers may target greater amberjack as stock abundance increases.

Table 2.1.6. Greater amberjack recreational weighted percent reductions in weight for various size limits and release mortality rates (All Modes, 2003-2005 average).

	Percent Reduction		
Size Limit	rel = 0%	rel = 10%	rel = 20%
28	0.0	0.0	0.0
29	7.8	7.0	6.2
30	17.9	16.1	14.3
31	28.8	25.9	23.0
32	39.9	35.9	31.9
33	49.4	44.4	39.5
34	54.9	49.4	43.9

Season Closures
Landings by month for the recreational fishery were averaged for the years 2003 through 2005 in Table 2.1.7. Primary seasons for greater amberjack fishing are March through June for charter vessels, May through August for private recreational fishermen, and April through June for the headboat fishery. Using a seasonal closure to reduce the recreational landings would require closing most of the peak season of May and June. Other closures would have to be three months or longer. Fishermen typically increase their landings under a season closure by shifting effort to months before or after the closure. In the long-term, as more legal fish become available, anglers may increase the number of trips and more anglers may target greater amberjack.

The recreational fishery currently is closed seasonally for several reef fish species. Red snapper is currently closed from November 1 through April 20. Reef Fish Amendment 27/Shrimp 14 proposes to close the red snapper fishery during the core period from October 1 through May 31. There is also a closed season for gag, red grouper, and black grouper from February 15 to March 15. These closures may shift some of the effort for greater amberjack to the times that other species are closed.

Table 2.1.7. Recreational percent landings by month for greater amberjack (2003-2005 average)	
Month	% of Landings
1	5.9%
2	6.7%
3	10.2%
4	10.5%
5	18.0%
6	16.7%
7	9.9%
8	9.6%
9	4.9%
10	5.1%
11	1.2%
12	1.2%

Quotas

If a quota was to be considered for the recreational fishery, it would likely have to be a closed season expected to reduce harvest to the target quota. Data collection in the recreational fishery is not timely enough to consider closures based on in-season analyses. Annual estimates of catch could be used to adjust the closure for the following season. This process would be equivalent to establishing a new closed season each year. To accomplish a 32 percent reduction in harvest during 2008, the season would be estimated to close at the end of June. Thereafter the season would be adjusted each year based on the previous year's landings.

Alternatives

Reducing total allowable catch requires fishery managers determine how to allocate reductions in harvest between sectors. Typically the Council reduces harvest of each sector proportionally. However, during draft development of this amendment the Council developed an Action for revising the greater amberjack allocation and reducing harvest disproportionately between sectors. In developing or revising allocations, National Standard 4 requires allocations 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. Additionally, 303(a)(14) of the MSFCMA states that FMPs shall "to the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery."

Historically, the Council had proportionally reduced harvest for the commercial and recreational sectors when approving past regulatory measures. However, in more recent years, landings have shifted considerably from the allocation specified in Amendment 1 to the Reef Fish FMP and the Council believed disproportional reductions in harvest may be more fair and equitable. The most recent greater amberjack stock assessment indicates the commercial fishery accounted for 32 percent of the total greater amberjack landings during 2000-2004 versus only 16 percent of the total greater amberjack landings during 1981-1987 (basis for Amendment 1 allocation). The Council was unwilling to shift the more recent allocation (68:32) entirely back to the approved allocation in Amendment 1 (84:16) because of uncertainties in historical data (i.e., volatile landings), questions over whether or not harvest reductions would be fairly and equitably distributed between sectors, and high fishing mortality rates in some years for both sectors, which resulted in overfishing and the stock becoming overfished As a result, the Council moved allocation to Section 13 (Considered but Rejected) after much discussion and no consensus. However, the Council recognized that the most prudent course of action was to establish an interim allocation that shifted the allocation near the historical long-term average allocation (1981-2004: 71 percent recreational vs. 29 percent commercial). Based on the selection of preferred management measures in Actions 3 and 4, the majority of the Council felt that landings in the recreational fishery should be reduced less than landings in the commercial fishery because of perceived inequities in the effects of previous management decisions and greater amberjack's value as a recreational sportfish. The proposed interim allocation would be in effect through the remainder of the greater amberjack rebuilding plan until such time that the Council, through the recommendations of an Ad Hoc Allocation Committee, could implement a separate amendment that fairly and equitably allocated FMP resources between recreational and commercial fisheries. This will allow for a more thorough and comprehensive analysis for consistently allocating reef fish resources and maximizing net benefits to the Nation.

In the past, the Council has made no provisions to allocate fish between private anglers and the for-hire sector within the recreational fishery. Measures to constrain recreational harvests such as bag limits, size limits, and seasonal closures apply to both sectors. The existing distribution of landings between the two sectors reflects the unregulated harvest trends between the two sectors, and would therefore be deemed fair and equitable as a mere reflection of the historical catch distribution. Prohibiting the captain and crew from keeping their bag limit could be construed as a shift in allocation by taking fish away from the for-hire sector, but this would only be true if those fish were then allocated to private recreational fishermen. For-hire vessels serve as a platform for recreational fishermen (for-hire clients) to fish the resource, with the captain and crew serving as employees of the platform. The for-hire clients would still be subject to the same regulations that apply to other recreational fishermen; therefore, the for-hire clients themselves would not lose fish. Assuming that the captain and crew would give their share of the catch to their for-hire clients, the loss of the captain and crew bag limit could decrease the number of fish caught on a particular trip. However, these fish are not necessarily lost by the for-hire sector, as the fish are still available for harvest by other for-hire clients. As a result, no change to the existing fair and equitable distribution of catch is anticipated.

The alternatives in this action range from a 73:27 recreational/commercial allocation, which would require a 26 percent reduction in recreational landings and a 43 percent reduction in commercial landings to a 65:35 recreational/commercial allocation, which would require a 35 percent reduction in recreational landings and a 25 percent reduction in commercial landings. The Council's preferred interim allocation is 73 percent recreational and 27 percent commercial.

The Council determined the preferred interim allocation was consistent with National Standard 4. The preferred allocation would fairly and equitably assist the Council in furthering the following objectives of the FMP: 1) minimize conflicts between user groups of the resource, and 2) optimize net benefits to the fishery. Although the interim allocation would impose a hardship on the commercial sector, the interim allocation represents a compromise between the more recent allocation (68:32) and the Amendment 1 allocation (84:16), thereby reducing potential conflicts between sectors resulting from a more drastic shift in allocation. Additionally, decreasing landings of greater amberjack less for the recreational fishery than for the commercial fishery may improve the resulting economic value of the resource to the Gulf region because the added value of the recreational landings may outweigh the loss in value by the commercial fishery (See Sections 5.3.3 and 5.4.3). A definitive determination of this outcome, however, cannot be made due to data issues and the resulting caveats and assumptions that are required to model expected impacts in both sectors. These issues, however, should not affect the ranking of alternatives associated with management measures within each sector and, instead, only evoke the need for caution in attempting to compare the outcomes across both sectors. The preferred interim allocation would promote conservation by encouraging a rationale, more easily managed use of the resource and address the perceived inequity in allocation shift by maintaining participation of commercial fishermen who have grown dependent on the fishery. Additionally, the preferred allocation may decrease fishery-wide dead discards because recreational anglers proportionally produce fewer dead discards per pound harvested than commercial fishermen. . Lastly, the interim allocation scheme would result in only a small shift in allocation (5 percent) and therefore would not allow one sector to acquire an excessive share of the harvest during the rebuilding plan. The allocation scheme would also maintain a balance of control between buyers and sellers. Larger shifts in allocation toward the recreational sector would increase consumer demand, reduce commercial supply, and potentially increase market prices.

During the November 2007 meeting, the Council decided not to consider any recreational alternatives that included fractional bag limits for the recreational fishery. Fractional bag limits were unacceptable because they would be very difficult to understand by individual anglers leading to enforcement difficulties (See discussion of fractional bag limits above and Table 2.1.5). For example, in the headboat for–hire sector, strangers would have to accept that they could not keep a large trophy fish because someone else already caught one. Therefore, the alternatives remaining rely on increased size limits, season closures and elimination of captain and crew. Recreational landings reductions proposed by the alternatives range from 26 percent to 35 percent. Corresponding commercial reductions would have to be 25 to 43 percent to assure a fishery-wide reduction in total (recreational and commercial) landings of 32 percent as required for proposed rebuilding plans in Action 1. Table 2.1.8 offers examples of ways to achieve acceptable recreational harvest reductions within the range of reductions being considered.

Table 2.1.8. Alternatives for reducing landings of greater amberjack in the recreational fishery. The shaded boxes are the proposed Alternatives.

Recreational	Foy Rebuilding plan		
Percent Reduction	35%	29%	26%
Size Limit	32" FL, No C&C 35% reduction	32" FL 32% reduction	31" FL, No C&C 26% reduction
Season closure	3/1 - 5/25 35% reduction	3/1 - 5/15 29% reduction	3/1 - 5/10 26% reduction
Size / No C&C / Season	31"FL, No C&C, Jan-Feb 35% reduction	30"FL, No C&C, Jan-Feb 28% reduction	30"FL, NO C&C, 1/1-2/20 26% reduction
Size / Season	31"FL, 1/1-3/12 35% reduction	31"FL, 1/1-2/12 29% reduction	31"FL, Jan 27% reduction

Alternative 1. No action. Maintain the recreational size limit of 28-inches FL and the bag limit of one fish per angler.

Alternative 2. Increase the recreational minimum size limit for greater amberjack to 32-inches FL. Reduces landings by 32 percent.

Alternative 3. Establish a recreational closed season from March 1 through May 15. Reduces landings by 29 percent.

Preferred Alternative 4. Maintain the one-fish per angler bag limit, increase the recreational minimum size limit for greater amberjack to 30-inches FL, and eliminate the bag limit for captain and crew. Reduces landings by 18 percent.

Alternative 5. Maintain the one-fish per angler bag limit, implement a January – February seasonal closure, eliminate the bag limit for captain and crew, and increase the recreational minimum size limit for greater amberjack to:

Option a: 30-inches FL. Reduces landings by 28 percent.
Option b: 31-inches FL. Reduces landings by 35 percent.

Discussion: The alternatives in this Action may benefit the physical environment by reducing fishing effort; however, it will be minimal or not detectable, because greater amberjack are pelagic and are primarily caught in the water column and not over bottom habitat. The alternatives in this Action will have a positive effect on the biological status of Gulf greater amberjack. Target recreational landings reductions of 26 to 35 percent are being considered to reduce fishing mortality. These recreational reductions, when combined with commercial management measures (see Action 4) are expected to reduce fishing mortality (F) to F_{OY}, end overfishing, and rebuild the stock to B_{MSY} by 2011. Section 1.2 contains a detailed discussion of the current status of greater amberjack as determined by the SEDAR 9 stock assessment.

Alternative 1 would maintain the recreational minimum size limit of 28 inches FL and the bag limit of one fish per angler per trip. The greater amberjack stock would continue to undergo overfishing and remain at approximately 48 percent of B_{MSY} over the long-term assuming that future fishing mortality remains at F_{2004} (M = 0.86). The stock is expected to remain at this biomass level through at least 2017 (Figure 1.2.1). The minimum size of 28 inches FL is slightly less than the size at 50 percent maturity, 29 inches FL. All females are mature at 34 inches FL or 4.2 years old (Harris, 2004). The 28 inch minimum size may be insufficient to prevent recruitment overfishing, particularly since the recreational fishery currently lands approximately 68 percent of the resource.

Alternative 2 would increase the minimum size limit to 32 inches FL, sufficient to reduce landings by 32 percent. This would end overfishing and rebuild the stock by 2011 assuming that commercial landings are also reduced by at least 32 percent. This alternative does not change the proportion of TAC between recreational and commercial fisheries. Increasing the minimum size limit to 32 inches FL would allow more than 90 percent of all females to mature before being landed (Harris, 2004). The size frequency of fish in the population should increase rapidly adding more fish to the spawning population. Increasing the availability of legal fish should also increase the likelihood that anglers will catch their bag limit and increase landings in the future. **Alternative 2** may be more likely to allow an increase in landings as specified by the conservation equivalent or constant F_{OY} rebuilding trajectory as compared to the preferred stepped F_{OY} rebuilding plan proposed in Action 1. As the size frequency of the stock adjusts to the change in size limit under **Alternative 2**, landings may increase similar to those expected for **Alternative 3**. **Alternative 2** is expected to allow dead discards to increase from about 12 percent by weight of current recreational harvest to about 24 percent by weight of total recreational landings. Although the percentage of dead discards to landings is estimated to increase, the magnitude of dead discards is actually estimated to decrease by 15 percent, because of the large reduction in recreational landings. When analyzing greater amberjack minimum size limits, discard mortality was accounted for when calculating needed harvest reductions (see Size Limit discussion above). Additionally, anglers can avoid targeting and catching greater amberjack as bycatch, unlike other species of reef fish, and increases to the minimum size limit may benefit yield-per-recruit (see Section 4). Also, greater amberjack grow quickly (i.e., it takes approximately 8 months for a greater amberjack to grow from 28 to 32 inches FL) and have a relatively low release mortality rate (~20 percent, although anecdotal information suggest it may be less), so any change in the proportion or magnitude of dead discards may be short-lived. Strict accountability measures proposed in Action 2 will also assist managers in controlling harvest and fishing mortality.

Alternative 3 would set a recreational closed season from March 1 through May 15. This season matches most of the current closed season in the commercial fishery and would prohibit fishing for this species during much of the greater amberjack peak spawning season. Landings would be reduced 29 percent provided that anglers do not shift effort to open seasons before or after the closure. **Alternative 3** should end overfishing and rebuild biomass to B_{MSY} by 2011 assuming that commercial landings are reduced by at least 38 percent. This reduction would increase the recreational proportion of TAC by two percent and decrease commercial proportion by a similar amount. Discards are expected to be reduced in proportion to the reduction in fishing effort expected since a seasonal closure is not likely to alter the proportion of discards in relation to landings. As stock biomass increases, availability of legal fish increases. When a seasonal closure is used to restrict landings, the effectiveness can decrease if anglers shift effort to open seasons or make more trips. During the open season, catch should increase in proportion to availability. **Alternative 3** would be more likely than **Alternative 2, 4, or 5** to allow an increase in landings that match the rebuilding plan specified by the constant F_{OY} rebuilding trajectory in the short-term.

Preferred Alternative 4 would increase the minimum size limit to 30 inches FL and eliminate captain and crew from retaining a bag limit of greater amberjack while under charter. Landings are expected to be reduced by 18 percent due to this regulation; but accountability measures (**Action 2**) will further constrain recreational harvest and insure the 26 percent reduction is achieved to accomplish the rebuilding plan established in **Action 1**. However, 2007 MRFSS recreational catch and effort data suggests that offshore fishing trips in the Gulf EEZ may have dropped by over 10 percent. If greater amberjack fishing effort is ten percent less than during the assessment period, collectively, the effective reduction in landings may be approximately 26 percent. Effort reductions caused by outside influences such as economic downturns or hurricanes are ephemeral; but, as stated above, accountability measures will hold the recreational fishery to their share of the resource regardless whether effort remains low. This should end overfishing and rebuild biomass to B_{MSY} by 2011 assuming that commercial landings are reduced by at least 43 percent.

This alternative would increase the recreational proportion of TAC five percent with a similar decrease in the commercial proportion of TAC. Over the short-term, landings would be reduced to match the yield at F_{OY}. Increasing the minimum size limit to 30 inches FL would allow slightly more than 50 percent of all females to mature before being landed (Harris, 2004). Size frequency should increase rapidly but not as rapidly as for **Alternative 2**, increasing the availability of legal fish. **Preferred Alternative 4** may be more likely to allow an increase in landings as specified by the conservation equivalent or constant F_{OY} rebuilding trajectory as compared to the preferred stepped F_{OY} rebuilding plan proposed in Action 1. **Preferred Alternative 4** is expected to allow dead discards to increase from about 12 percent by weight of current recreational landings to about 18 percent by weight of total recreational landings. Although the percentage of dead discards to landings is estimated to increase, the magnitude of dead discards is actually estimated to decrease by 13 percent because of the large reduction in recreational landings. When analyzing greater amberjack minimum size limits, discard mortality was accounted for when calculating needed harvest reductions (see Size Limit discussion above). Additionally, anglers can avoid targeting and catching greater amberjack as bycatch, unlike other species of reef fish, and increases to the minimum size limit may benefit yield-per-recruit (see Section 4). Also, greater amberjack grow quickly (i.e., it takes less than six months for a greater amberjack to grow from 28 to 30 inches FL) and have a relatively low release mortality rate (~20 percent, although anecdotal information suggest it may be less), so any changes in the proportion or magnitude of dead discards may be short-lived. As stated above, strict accountability measures proposed in Action 2 will also assist managers in controlling harvest and fishing mortality.

Alternative 5 would set a recreational closed season from January 1 through the end of February, eliminate captain and crew from retaining a bag limit of greater amberjack while under charter, and increase the minimum size limit to either 30 inches FL (**Option a**) or 31 inches FL (**Option b**). The core of **Alternative 5** (season closure and no captain and crew bag limit) reduce landings by 16 percent. Adding a 30 inch FL size limit (**Option a**) reduces landings by 28 percent and should end overfishing and rebuild biomass to B_{MSY} by 2011 assuming that commercial landings are reduced by at least 40 percent. This alternative would increase the recreational proportion of TAC four percent with a like decrease in the commercial proportion. Adding a 31 inch minimum size limit (**Option b**) is expected to reduce landings by 35 percent and should end overfishing and rebuild biomass assuming that commercial landings are reduced by at least 26 percent. This alternative would decrease the recreational proportion of TAC three percent with a like increase in the commercial proportion. Over the short-term, landings would be reduced to match the yield at F_{OY} for either **Alternative 5** Options. Slightly more than 50 percent of all females would mature before reaching 30 inches FL (**Option a**); whereas, approximately 75 percent would be mature before being landed under a 31 inch minimum size limit (**Option b**) (Harris, 2004). Size frequency should increase rapidly under any of the size limit increases, but the larger the size limit increase, the longer the stock will take to stabilize under the new regulation. Dead discards are expected to increase more under **Option b** (31 inches FL: from 12 percent to 21 percent) than under **Option a** (30 inches FL: 12 percent to 18 percent). Although the percentage of dead discards to landings is estimated to increase for both **Options a** and **b**, the magnitude of dead discards is actually estimated to decrease by 15-21 percent, because of the large reduction in recreational landings resulting from these options. Based on overall reductions in landings, **Alternative 5b** is the most restrictive, followed by **Alternative 2, 3, 5a**, and the least restrictive **Preferred Alternative 4**.

Overall, there appears to be little difference between all the alternatives in their respective effects on rebuilding assuming the combination reductions from commercial and recreational fisheries reduce yield to F_{OY} levels. However, biological differences are affected by the change in the numbers of dead discards when minimum size limits are changed. All the alternatives are assumed to reduce dead discards in proportion to the expected overall reduction in landings; however, those alternatives that increase size limits will counter that reduction. Increases in the proportion of dead discards as a function of landings, range from 18 to 24 percent depending on what size limit is proposed. For instance, the increase in minimum size limit to 30 inches FL in **Preferred Alternative 4** is expected to increase the percentage of dead discards relative to overall harvest from 12 percent to 18 percent. After accounting for the decrease in landings and a similar decrease in dead discards, the overall decrease in the magnitude of dead discards is estimated to be 13 percent relative to the status quo. Likewise, **Alternatives 2** and **5a** effectively reduces dead discards by 15 percent and **Alternative 5b** by 19 percent. Even if the magnitude of discards increases after the size limit increase, historical trends (see Figure 4.1) indicate dead discards will quickly decline as the greater amberjack size distribution adjusts to a larger minimum size limit.

Decreases in targeted fishing effort required to achieve reductions in greater amberjack recreational landings considered in this action would be expected to result in short-term consumer surplus losses to participating anglers and net revenue losses to charter and headboat operators. It is expected that, as the stock recovers in the long run, economic benefits would result from future increases in recreational landings. Analyses provided in this amendment focus on short-term effects. Results presented logically reflect the expectation that the greater the reduction in landings, the greater the short-term loss in economic value.

For the recreational sector, anticipated annual losses in economic value, i.e., consumer and producer surpluses, relative to the status quo range from approximately $888,000 under **Preferred Alternative 4** to approximately $1.2 million under **Alternative 5 b. Preferred Alternative 4** would maintain the one fish bag limit, increase the minimum recreational size limit to 30 inches and set the for-hire captain and crew bag limit to zero. **Preferred Alternative 4** contributes to the harmonization of bag limits for for-hire captain and crew operating in reef fish fisheries. The Gulf Council has, in recent amendments, set a zero bag limit for for-hire captain and crew in other reef fish fisheries, e.g., the red snapper fishery in Joint Reef Fish/Shrimp Amendment 27/14. **Option b** adds a two-month closure to management measures considered under **Preferred Alternative 4.** The status quo **(Alternative 1)** would maintain a 28-inch minimum recreational size limit and a possession limit of one fish per angler per trip. Under the status quo, short term adverse economic impacts are not anticipated. However, greater amberjack would continue to undergo overfishing and conservation goals would not be met. More severe management restrictions would have to be implemented in the future, resulting in sizeable losses in economic benefits in the long run. **Alternative 2** would increase the recreational size limit to 32 inches. Aggregate losses in economic value that are expected to result from the implementation of **Alternative 2** are estimated at $1.1 million, approximately. **Alternative 3** would establish a recreational closed season from March 1 through May 15. Losses in consumer and producer associated with **Alternative 3** would total $990,000, approximately.

The administrative environment is not likely to be affected by any of the alternatives in Action 3. Elimination of the bag limit for captain and crew on for-hire vessels is already required for groupers and red snapper so there should be no problems. Size limit changes in **Preferred Alternative 4 and Alternatives 2** and **5** should not change enforcement needs since a minimum size limit is already required for greater amberjack. **Alternatives 3** and **5** would require enforcement of a seasonal closure for greater amberjack in addition to those for red snapper and groupers.

The Council selected **Alternative 4** as preferred for several reasons. This alternative allows a one-fish per person daily bag limit while reducing recreational harvests to the level needed to for the rebuilding plan. As described above, the Council felt alternatives using fractional bag limits would be difficult to enforce and could provide difficulties in the for-hire industry should some people be able to keep fish, while others could not. While this alternative does allow some increase in discard mortality from the increased size limit, this higher size limit does allow more females to reach maturity before being susceptible to harvest. From an economic standpoint, this alternative has the least anticipated annual losses in economic value other than status quo.

Action 4: Greater Amberjack Commercial Management Alternatives

The following discussion provides background information on management measures (trip limits, size limits, seasonal closures and quotas) considered by the Council for managing greater amberjack catch in the commercial fishery. This background information and the associated tables provide a range of possible measures for reducing harvest. The discussions of effects are based on a 32 percent gulf-wide reduction in commercial landings to accomplish the rebuilding plan.

Trip Limits

Commercial catch per vessel were obtained from the NMFS logbook data from 2003 through 2005 (Strelcheck, pers. comm.). Catches were not separated by gear type but about 90 percent of the landings are from vertical line gear. Approximately two percent of the trips land in excess of 3,500 pounds gutted weight, but those trips account for about 13 percent of the landings. A trip limit of approximately 1,500 pounds gutted weight would be required to reduce commercial landings by 32 percent (Table 2.1.9)

Table 2.1.9 Commercial percent reduction in landings for various trip limits (pounds gutted weight)

	Year			
Trip limit	2003	2004	2005	2003-05
600	52.8	54.1	49.4	52.4
800	46.6	47.8	43.1	46.2
1000	41.9	42.8	38.0	41.2
1200	37.9	38.7	33.7	37.2
1400	34.5	35.2	30.2	33.7
1600	31.3	32.4	27.0	30.6
1800	28.5	29.9	24.2	27.9
2000	26.0	27.7	21.7	25.5
2200	23.7	25.7	19.6	23.4
2400	21.5	24.0	17.8	21.5
2600	19.7	22.5	16.2	19.8
2800	18.1	21.1	14.6	18.3
3000	16.6	19.9	13.3	17.0
3200	15.3	18.7	12.3	15.8
3400	14.2	17.7	11.3	14.7
3600	13.1	16.7	10.5	13.7
3800	12.1	15.7	9.7	12.8
4000	11.2	14.9	8.9	12.0
4200	10.3	14.1	8.2	11.1
4400	9.5	13.4	7.6	10.4
4600	8.7	12.7	7.0	9.7
4800	8.0	12.1	6.6	9.1
5000	7.4	11.6	6.2	8.6
6000	4.9	9.7	5.0	6.6
7000	3.2	8.2	4.0	5.2

Size Limits

Commercial sizes of fish landed were derived from the TIP sampling program (Strelcheck, pers. comm.). The minimum size limit is currently 36 inches FL for the commercial fishery. Vertical line fishermen land 90 percent of commercial greater amberjack, while longline fishermen catch only about ten percent of the commercially caught greater amberjack. Longline fishermen also catch the largest fish, averaging 44 inches FL versus about 39-40 inches for other gears. The minimum size limit would have to be increased to 40 inches FL to obtain close to a 32 percent reduction in commercial landings (Table 2.1.10).

Table 2.1.10. Greater amberjack commercial weighted percent reductions in weight for various size limits and release mortality rates (2003-2005 Average)

	Weighted Change in Landings		
Size limit	rel = 0	rel = 0.1	rel = 0.2
36	0	0	0
37	8	7	6
38	19	17	15
39	27	25	22
40	37	34	30
41	48	43	38
42	57	52	46
43	65	59	52
44	72	65	58
45	78	70	62
46	82	74	66

The commercial fishery currently has the largest proportion of dead discards, approximately 73 percent while they harvest about 31 percent of the landings. This may be due to the large 36-inch FL minimum size limit for the commercial fishery. Dead discards can be reduced if the commercial minimum size limit is reduced; however, reducing the minimum size increases the availability of legal sized greater amberjack to the commercial fishery. Table 2.1.11 shows estimates of the potential reduction in discards and increases in landings that would be expected by reducing the commercial minimum size limit. There are no commercial fishery data to measure the effect of reducing the minimum size limit until after it has been implemented. Research data from a MARMAP tagging study of commercially caught greater amberjack (2,381 tagged and released fish) in the South Atlantic was used in conjunction with Gulf TIP data to estimate changes. It is assumed for this analyses that the gear and fishing methods used by the commercial fishermen who participated in the MARMAP study are similar to those used in the Gulf. Results indicate reducing the minimum size limit to 32 inches FL in the commercial fishery would decrease discards by approximately 48 percent and increase landings by about 20 percent under the current release mortality rate of 20 percent.

Table 2.1.11. Estimated commercial greater amberjack percent increase in landings (by weight) and decrease in discards (by numbers) for various size limit decreases				
Size limit	Discards	rel = 0	rel = 0.1	rel=0.2
28	77	43	35	28
29	70	40	33	26
30	63	37	30	24
31	56	34	28	22
32	48	30	24	20
33	39	24	20	16
34	27	17	14	12
35	14	9	8	6

Season Closures

Landings by month from the commercial logbook program were averaged for the years 2003 through 2005 in Table 2.1.12. There is currently a closed season from March 1 – May 31 for the commercial fishery. Landings from the commercial fishery peak before and after the closed season. A 32 percent reduction in landings from the commercial fishery could be obtained by adding June through July 28 to the current closed season.

The commercial fishery for Gulf finfish currently has a number of closed seasons or quotas that restrict the availability of finfish species. Red, black, and gag grouper commercial fishing is closed from February 15 to March 15. The vermilion snapper fishery is currently closed from April 22 through May 31; however, that regulation has been rescinded by the Council in a regulatory amendment to take effect soon. Shallow water grouper, red grouper, deep water grouper and tilefish are under a quota system. The effect of this is periodic seasonal closures once the quotas are met. Recently, the tilefish and deep water grouper fisheries have closed in mid-summer and the red grouper and shallow-water grouper fishery has closed in October or November; although the quota was not met in 2006 and will not be in 2007. The king mackerel commercial fishery is also under a quota system by region and gear. The king mackerel fishery in the western zone is typically open from July 1 through fall (October – November). In the eastern, northern sub-zone, fishing extends from July 1 through November. In the eastern, southern sub-zone, hook-and-line fishing extends from July 1 through spring (March – June) and gill net fishing lasts for a few weeks in January – February. These closures could shift some of the fishing effort for greater amberjack to times that other species are closed but the only clear pattern of fishing is around the current closed season for greater amberjack (Table 2.1.12).

Table 2.1.12. Commercial percent landings by month for greater amberjack (2003-2005 average)	
Month	% of Landings
1	10.4%
2	10.6%
3	0.8%
4	0.2%
5	0.6%
6	19.0%
7	14.4%
8	16.6%
9	8.1%
10	6.4%
11	6.5%
12	6.5%

<u>Quotas</u>
Quotas could be established for the commercial or recreational sectors; however, typically, they are only applied to the commercial fishery. Based on the average commercial landings from 2000 through 2004, the commercial fishery would require a quota of 0.601 mp to accomplish a 32 percent reduction in 2008.

<u>Alternatives</u>
Historically, the Council had proportionally reduced harvest for each sector when approving past regulatory measures. However, in more recent years, landings of greater amberjack have shifted considerably from the allocation specified in Amendment 1 to the Reef Fish FMP and Council believed disproportional reductions in harvest may be more fair and equitable. The most recent greater amberjack stock assessment indicates the commercial fishery accounted for 32 percent of the total greater amberjack landings during 2000-2004 versus only 16 percent of the total greater amberjack landings during 1981-1987 (basis for Amendment 1 allocation). The Council was unwilling to shift the more recent allocation (68:32) entirely back to the approved allocation in Amendment 1 (84:16) because of uncertainties in historical data (i.e., volatile landings), questions over whether or not harvest reductions would be fairly and equitably distributed between sectors, and high fishing mortality rates in some years for both sectors, which resulted in overfishing and the stock becoming overfished As a result, the Council moved allocation to Section 13 (Considered but Rejected) after much discussion and no consensus. However, the Council recognized that the most prudent course of action was to establish an interim allocation that shifted the allocation near the historical long-term average allocation (1981-2004: 71 percent recreational vs. 29 percent commercial). Based on the selection of preferred management measures in Actions 3 and 4, the majority of the Council felt that landings in the recreational fishery should be reduced less than landings in the commercial fishery because of perceived inequities in the effects of previous management decisions and greater amberjack's value as a recreational sportfish. The proposed interim allocation would be in effect through the remainder

of the greater amberjack rebuilding plan until such time that the Council, through the recommendations of an Ad Hoc Allocation Committee, could implement a separate amendment that fairly and equitably allocated FMP resources between recreational and commercial fisheries. This will allow for a more thorough and comprehensive analysis for consistently allocating reef fish resources and maximizing net benefits to the Nation.

Commercial landings reductions proposed by the alternatives in this action range from 38 percent to 43 percent. These alternatives are designed to accomplish an overall fishery-wide reduction of 32 percent in conjunction with most of the recreational management alternatives in Action 3. For a discussion of reasons for the recreational management alternatives being considered, please see Action 3, subsection Alternatives. Table 2.1.13 offers examples of ways to achieve commercial landings reductions within the range of reductions being considered as well as possible reductions to match any of the recreational alternatives. Alternatives using size limit increases have not been offered for the commercial fishery because dead discards would be increased further. Trip limits or additional closed seasons could be used to offset a reduced size limit and subsequently reduce dead discards.

Table 2.1.13. Alternatives for reducing landings of greater amberjack in the commercial fishery. The shaded boxes are the proposed Alternatives based on the preferred rebuilding plan in Action 1 and the range of alternatives in Action 3, recreational management measures.

Commercial	Foy Rebuilding plan		
Percent Reduction	25%	38%	43%
trip limit	2,000 pounds 25% reduction	1,100 pounds 38% reduction	900 pounds 44% reduction
Season	Add 6/1 - 7/13 25% reduction	Add 6/1 - 8/9 38% reduction	Add Feb & 6/1 - 7/29 43% reduction
Trip & Season	3,200 #s & Add Feb 25% reduction	2,500 #s & Add June 38% reduction	1,500 #s & Add June 42% reduction
Size reduction / Trip	33" & 1,300 #s 25% reduction	33" & 800 #s 37% reduction	33" & 700 #s 41% reduction
Quota starting at	658,000 25% reduction	546,000 38% reduction	503,000 43% reduction

Alternative 1: No action. Maintain the greater amberjack commercial minimum size limit of 36 inches FL and the closed season from March through May.

Alternative 2: Establish a commercial greater amberjack trip limit of 1,100 pounds; Reduces landings by 38 percent.

Alternative 3: Reduce the commercial greater amberjack minimum size limit to 33 inches FL and the commercial trip limit to 700 pounds; Reduces landings by 41 percent.

Preferred Alternative 4: Establish a quota for the commercial fishery (Reduces landings by 38 percent). The annual commercial quota under a stepped F_{OY} rebuilding plan TAC for

2008 through 2010 would be 503,000 pounds and TAC for 2011 and 2012 would be 938,000 pounds; Reduces landings by 43 percent.

Alternative 5: Add June 1 through August 9 to the current three-month closed season; Reduces landings by 38 percent.

Discussion: The alternatives in this Action reduce landings by 38 percent or more which may have a minimal benefit to the physical environment by reducing fishing effort; however, any benefit will be difficult to detect because greater amberjack are pelagic and are primarily caught in the water column. That benefit may be slightly different based on how fishing effort is reduced but is un-measurable. For instance, these alternatives are likely to alter aerial and temporal distribution of fishing effort; however, there is no information to suggest how that will occur until after the fact.

Alternative 1 would maintain the commercial minimum size limit of 36 inches FL and the closed season from March through May. The greater amberjack stock would continue to undergo overfishing and remain at approximately 48 percent of B_{MSY} over the long-term assuming that future fishing mortality remains at F_{2004} ($M = 0.863$). The stock is expected to remain at this biomass level through at least 2017 (Figure 1.2.1). Dead discards are expected to remain at approximately 30 percent by weight of the commercial landings, driven most likely by the 36-inch FL minimum size. The minimum size of 36 inches FL exceeds the size at 100 percent female maturity (Harris, 2004).

Alternative 2 would establish a 1,100 pound commercial trip limit. Annual landings would be reduced by 38 percent, provided fishermen don't take more trips. Selecting this alternative would require a recreational reduction of at least 29 percent to meet the 32 percent fishery-wide reduction in landings. As the availability of legal fish increases over the first few years of rebuilding, it will be easier to catch the trip limit. Reducing the days fished may reduce costs somewhat but increased fuel prices and other costs may prevent those saved days from being combined into another fishing trip. In the first year, **Alternative 2** would match the TAC requirements of either the constant F_{OY} rebuilding plan **(Alternative 2, Action 1)** or the stepped rebuilding plan using constant catch at the first year of the F_{OY} projected landings **(Alternative 1, Action 1)**. The stock is expected to respond quickly to decreases in fishing mortality and as stock biomass increases under either of these rebuilding plans, availability of legal fish increases. **Alternative 2** may restrain future landings similar to **Alternative 3** and better than **Alternative 5** as availability increases and, therefore, better match the yearly TAC requirements of the stepped rebuilding approach than the constant F approach in Action 1. **Alternative 2** should reduce discards proportionally to the reduction in landings.

Alternative 3 would reduce the greater amberjack size limit to 33 inches FL and establish a trip limit of 700 pounds. Reducing the size limit from 36-inches FL to 33-inches FL would increase availability of legal fish and would be expected to increase annual landings by approximately 16 percent. To compensate for this increase, the trip limit would be reduced to 700 pounds which by itself would be expected to reduce landings by 49 percent. Collectively, these two measures reduce annual landings by 41 percent, provided fishermen do not take more trips. Selecting this alternative would require a recreational reduction of at least 27 percent to meet the 32 percent fishery-wide reduction in landings. In the first year, **Alternative 3** would match the TAC requirements of either the constant F_{OY} or the stepped rebuilding plan (see Action 1). Because all of the reduction in landings is the result of a trip limit, **Alternative 3** should constrain future landings as availability increases. **Alternative 3** should reduce discards significantly more than the equal reduction expected from **Alternative 2**. Changing the minimum size limit from 36 inches FL to 33 inches FL is expected to reduce discards by as much as 39 percent. Combined with the overall landings reduction of 41 percent, **Alternative 3** is likely to reduce overall discards in the commercial fishery by more than 64 percent. **Alternative 3** is the only commercial management measure that would reduce dead discards beyond what is expected from reducing landings.

Preferred Alternative 4 would establish a hard quota for the commercial fishery based on a 43 percent reduction in harvest. TAC for 2008 through 2010 would be 503,000 pounds. In 2011 and 2012, TAC would be 938,000 pounds. This latter increase in TAC would be contingent on the results of the next stock assessment, which is scheduled for late 2010. **Preferred Alternative 4** would match the TAC requirements of the stepped F_{OY} rebuilding plan **(Action 1, Preferred Alternative 1)** provided a recreational reduction of at least 26 percent is established. The increases in quota are taken directly from the stepped F_{OY} projections and are expected to match the increases in stock biomass. However, there will be no information to verify that these increasing quotas are appropriate until the new stock assessment is conducted in 2010. The stock is expected to respond quickly to decreases in fishing mortality and as stock biomass increases under any of the rebuilding plans, availability of legal fish should increase. The quota should reduce discards in proportion to the overall reduction (43 percent) in annual landings. **Preferred Alternative 4** is expected to reduce commercial landings the most; whereas, **Alternative 3** reduces landings by 41 percent. **Alternatives 5** and **2** each reduce landings by 38 percent.

Alternative 5 would add June 1 through August 9 to the current commercial closed season of March 1 through May 31, extending the total closed season for over five months. The additional months would be expected to reduce landings by 38 percent. This is sufficient to meet the initial reduction necessary for any rebuilding plan in Action 1 provided a recreational reduction of at least 29 percent is established. The stock is expected to respond quickly to decreases in fishing mortality and as stock biomass increases, availability of legal fish will increase. **Alternative 5** is the least likely to constrain catch as availability increases and therefore, better matches the constant F approach to rebuilding. **Alternative 5** should reduce discards in proportion to the overall reduction (38 percent) in annual landings. However, it is expected that some effort will shift to the remaining open season reducing the effectiveness of the additional closure under **Alternative 5**. Landings prior to the implementation of the closed season were relatively stable at nine to ten percent per month between January and September and somewhat less during the last three months of the year. After the closed season was implemented, landings shifted mostly to the three months (June, July and August) after the closure (See Table 2.1.12). With so little of the year left, it may be difficult to shift much of the effort to the fall or late winter.

Reductions in greater amberjack commercial landings considered in this action would be expected to result in economic losses to the fleet. For the commercial sector, anticipated annual economic losses during the rebuilding schedule, relative to the status quo range from approximately $1.11 million under **Preferred Alternative 4,** which would establish a hard quota for the commercial greater amberjack fishery, to approximately $2.25 million under **Alternative 3,** which would reduce the commercial greater amberjack minimum size limit to 33 inches FL and the commercial trip limit to 700 pounds. **Alternative 2**, which would establish a commercial greater amberjack trip limit of 1,100 lbs is anticipated to result in economic losses estimated at $1.95 million. Under **Alternative 5**, the June 1 through August 9 extension to the existing closed season is expected to result in economic losses of $1.41 million to the commercial sector. Additional losses may be associated with this management alternative, due to the difficulties that would exist in maintaining a viable market for a product that is not available for more than half of the year.

The alternatives in this Action will have a significant effect on enforcement and monitoring. **Alternative 2** and **3** implement trip limits, which would require increased compliance monitoring and enforcement. **Preferred Alternative 4** establishes a hard quota, which would require both increased enforcement as well as seasonal monitoring to determine the closure date. Commercial fishermen are used to trip limits and hard quotas in the grouper fishery and should have no difficulty adapting to them for greater amberjack. **Alternative 5** would increase the closed season by more than two months, extending the enforcement time commitment. **Alternative 3** changes the minimum size limit which shouldn't require changes in enforcement procedures.

The Council selected **Alternative 4** as preferred. This alternative meets the reductions in harvest needed for the commercial sector in rebuilding the stock. This alternative, which just establishes a hard quota, has the lowest economic losses of the alternatives relative to the no action alternative.

2.2 Gray Triggerfish

Action 5: Thresholds and Benchmarks for Gray Triggerfish.

The MSFCMA requires that each FMP define reference points in the form of MSY and OY, and specify objective and measurable criteria for identifying when a fishery is overfished or undergoing overfishing. Status determination criteria are defined by 50 CFR '600.310 to include a MSST, i.e., the overfished criterion, and a MFMT, i.e, the overfishing criterion. Together, these four parameters (MSY, OY, MSST, MFMT) are intended to provide fishery managers with the tools to measure fishery status and performance. By evaluating current stock biomass (B) and F in relation to MSY, OY, MSST, and MFMT, fishery managers can determine the status of a fishery at any given time and assess whether management measures are achieving established goals. Currently there is a target of OY of 20 percent SPR and an overfishing threshold of $F_{30\%SPR}$. The latter value was established through the generic SFA amendment in 1999.

As mentioned in Section 1.1, the 2001 assessment for gray triggerfish was problematic due to the limited time series of catch and effort data. Consequently, estimates of stock condition were uncertain and threshold and benchmarks were not established. The 2006 assessment was able to assess stock condition and was able to estimate a variety of potential benchmark levels. The SEDAR 9 assessment report indicated F_{MSY} and its associated yield, while calculated, were sensitive to the stock-recruitment relationship, which was poorly estimated due to limitations in the data. Therefore, SEDAR 9 as well as the Council's SSC, recommended $F_{30\%SPR}$ be used as a proxy for F_{MSY}.

Alternative 1: No Action: Do not establish a minimum stock size threshold (MSST), maintain optimum yield (OY) as the yield associated with $F_{20\%SPR}$, and maintain the maximum fishing mortality threshold (MFMT) at $F_{30\% SPR}$

Preferred Alternative 2: Set MFMT equal to F_{MSY} (proxy = $F_{30\%SPR}$); set MSST equal to (1-M)*SSB_{MSY} (proxy = (1-M)*$SSB_{30\%SPR}$); and set OY as the yield associated with:

<u>Preferred Option a</u>: 75 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium.
<u>Option b</u>. 90 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium.

Alternative 3: Set MFMT equal to F_{MSY} (proxy = $F_{30\%SPR}$); set MSST equal to 0.5*SSB_{MSY} (proxy = (0.5*$SSB_{30\%SPR}$); and set OY as the yield associated with:

<u>Option a</u>: 75 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium.
<u>Option b</u>: 90 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium.

<u>Discussion:</u> **Alternative 1** would retain the status quo definitions of OY and MFMT. The status quo definitions of OY, overfished, and overfishing are designed to maintain a minimum level of spawning stock biomass per recruit relative to that which would occur with no fishing. The fishing mortality rate associated with harvesting at OY ($F_{20\%SPR}$) is near the value of F_{MSY} provided by SEDAR-9 and is substantially higher than current estimates of $F_{30\%SPR}$. Consequently, while the no action alternative could provide for a higher yield in the short term, it is in conflict with the current overfishing definition. This overfishing definition indicates overfishing is occurring on the stock. Additionally, this alternative would not set an overfished threshold (MSST), which is a requirement of the MSFCMA.

Both **Preferred Alternative 2** and **Alternative 3** set MFMT on a proxy of $F_{30\%SPR}$.as approved by the Council in the generic SFA Amendment when MSY-based estimates are not valid. Using the F value of F_{MSY} as the basis for these values was considered, but rejected by the SEDAR Review Panel because of limitations of the data used in the stock assessment, as described above. Where the alternatives differ is in the definition of MSST. Restrepo et al. (1998) recommended a proxy for MSST be defined as a function of the equilibrium biomass expected when fishing constantly at F_{MSY}: MSST = c*B_{MSY}; where c equals 0.50 or (1-M), whichever is greater. The natural mortality rate (M) of a species provides an indication about the species productivity, such that a species with a low M generally is not as productive (or capable of recovering to B_{MSY} as quickly) as a species with a high M. By setting c equal to 0.50 or (1-M), whichever is greater, this formula ties MSST to the productivity of a stock, such that MSST could be set further below B_{MSY} for those stocks that are highly productive and capable of recovering to B_{MSY} more quickly. But it would prevent MSST from being set at less than one-half the MSY level even for highly productive stocks, thereby reducing the risk that a highly productive stock could reach a level so low that it would have difficulty recovering to B_{MSY} within ten years. Applied to the gray triggerfish stock, this proxy is equal to $0.73*B_{MSY}$ because M is estimated to be equal to 0.27 (SEDAR 9, 2006). The less conservative (**Alternative 3**) proxy would set MSST equal to $0.5*B_{MSY}$. This definition is more risky in that it would allow gray triggerfish biomass to decrease to as little as 50 percent of the MSY level before the stock would be classified as overfished.

The range of alternative OY values evaluated for gray triggerfish was also derived from technical guidance on the use of precautionary approaches provided by Restrepo et al. (1998). This guidance recommends that the target fishing mortality rate (F_{OY}) be set equal to the average yield available on a continuing basis from fishing at $0.75*F_{MSY}$ (or F_{MSY} proxy). Studies using Mace's deterministic model (Mace, 1994) indicate that, when a stock is at equilibrium, fishing at $0.75*F_{MSY}$ would produce biomass levels between 125 percent and 131 percent of B_{MSY}, and yields that are equal to 94 percent of MSY or greater (Restrepo et al., 1998). Each alternative bundle also contains a less conservative alternative setting F_{OY} equal to $0.90*F_{30\%\ SPR}$.

With respect to the physical and biological/ecological environments, alternatives in this action should have minimal affects. This action is primarily administrative and should not directly effect these environments. Direct effects only accrue to actions that alter harvest or other use of the resource. These actions are likely to affect current and future gray triggerfish management in the long term to ensure overfishing does not occur and the stock does not become overfished. While this may reduce fishing effort on gray triggerfish, the extent of any reductions in effort would likely be low because gray triggerfish is not generally targeted on reef fish fishing trips, thus overall reef fish fishing effort would remain relatively 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. 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.

Alternative 1, no action, would not have any impacts on the fishermen, businesses, or communities that depend on the commercial gray triggerfish fishery in the short term because there would not be any changes made to the fishery. In the long term, if no changes are made, the fishery will continue to undergo overfishing and will not rebuild which would have negative impacts on the fishermen, businesses, and communities that depend on this fishery in the future. **Preferred Alternative 2** and **Alternative 3** would not have any short term impacts on the fishermen, businesses, or fishing communities that depend on the gray triggerfish fishery because they do not alter landings. If these alternatives aid in rebuilding the stock and ending overfishing in the gray trigger fish fishery then in the long term it will benefit the fishermen, businesses, and communities that depend on the fishery because it will allow for a higher TAC once the fishery is rebuilt. With respect to the administrative environment, effects would also be minimal because monitoring the stock and conducting periodic assessments needed to assess the stock are a part of current management activities.

The Council selected **Alternative 2** for several reasons. This alternative is the most precautionary, or conservative, because it sets the overfished threshold at a higher level than either status quo or **Alternative 3**. Thus, should the stock be overharvested, the higher MSST value is more likely to be triggered sooner and the amount the stock needs to rebuild will be less. This could have negative short-term implications to the economic environment for this fishery should the threshold be crossed. However, the stock could be more easily rebuilt benefiting the long-term economic environment with higher TACs once the stock is rebuilt.

Action 6. Gray Triggerfish Rebuilding Plan

Prior to development of Amendment 30A, the Council had not defined an overfished definition (i.e., MSST) for gray triggerfish. In Action 5, the Council selected (1-M)*$SSB_{30\%SPR}$ as their preferred overfished definition. The natural mortality rate for gray triggerfish is 0.27, indicating the stock would be classified as overfished if spawning stock biomass (SSB) falls below 73 percent of the SSB associated with 30 percent SPR. In 2004, the last year of the gray triggerfish stock assessment, the ratio of SSB to $SSB_{30\%SPR}$ was estimated to be 0.64, indicating the stock was overfished.

The MSFCMA requires the Council to implement conservation and management measures to rebuild overfished populations managed under a FMP. Any FMP, plan amendment, or proposed regulations prepared to rebuild overfished populations must identify a timeframe for rebuilding. The timeframe must be as short as possible. The shortest amount of time it would take to rebuild a stock, Tmin, is determined by how long it would take the stock to be rebuilt in the absence of fishing mortality (F_0), including bycatch mortality. SEFSC rebuilding projections for gray triggerfish (Sladek-Nowlis 2007a) indicate that Tmin is approximately 2.5 years (Table 2.2.1, F_0).

In determining the rebuilding timeframe, however, the MSFMCA specifies that the status and biology of the overfished population, as well as the needs of fishing communities and interactions of the population with the marine ecosystem be taken into account, functionally establishing considerations that may justify extending the rebuilding timeframe to be longer than Tmin. These considerations have important relevance in the determination of the preferred rebuilding timeframe for gray triggerfish. All state and federal reef fish and shrimp trawl fisheries would need to be closed under the Tmin scenario in order to effectively eliminate all directed and bycatch gray triggerfish mortality. The annual commercial ex-vessel value of just two of these fisheries, the red snapper fishery and the shrimp trawl fishery, are approximately \$12 million (2007) and \$400 million (2006), respectively, compared to the 2005 commercial gray triggerfish ex-vessel value of approximately \$157,000. Given the lesser economic importance of gray triggerfish relative to these associated fisheries, such a large-scale closure could not be justified due to the severe social and economic losses to fishermen and fishing communities that would ensue.

In recognition of the significant economic importance of the fisheries in which bycatch mortality of gray triggerfish occurs, a modified Tmin strategy could entail just closure of the directed gray triggerfish fishery. Because bycatch mortality would continue under this strategy, the fishery closure would by necessity be longer than Tmin and stock recovery is estimated to occur only 30-40% faster than the earliest schedule evaluated (2012, **Alternative 3**). The benefits to the stock under this scenario do not justify the increased adverse social and economic impacts that would accrue to fishermen and associated fishing communities. For the species in question, closure of a fishery creates substantial problems with maintaining consumer demand, product price, and market access. While these problems occur to varying degrees with closures of any duration, the problems are magnified the longer a closure is in place. While total market loss may not be a logical outcome, market access and demand as a result of multi-year closures may be so severely damaged that fishermen are unable to benefit from allowable harvests when the resource is rebuilt and the fishery reopens.

Even assuming that the market can be recaptured, a fishery may not have the opportunity to recover revenues lost during the closure period. The specific question that must be examined is would allowable harvests and associated revenues upon reopening of the fishery be greater than the harvests and revenues lost during the closure? For gray triggerfish, the answer to this question is no. Under an T_{min} strategy, which would require the gray triggerfish fishery to be closed for 2.5 years, the fishery would cumulatively lose approximately 1.97 mp and 1.72 mp of gray triggerfish relative to **Preferred Alternative 2** and **Alternative 3,** respectively, during the closure. Thereafter, through 2022, the fishery would be allowed to land the yield at F_{OY}, which would be more per year than under either **Preferred Alternative 2** or **Alternative 3.** However, the total cumulative gray triggerfish harvest under the T_{min} strategy would still be approximately 1.36 mp (approximately 91,000 pounds annually) less than under **Preferred Alternative 2** and approximately 0.815 mp (approximately 54,000 pounds annually) less than under **Alternative 3**. After 2022, annual harvests would be equal under all scenarios. Thus, the fishery would never be able to recover the cumulative losses of the T_{min} closure period. These cumulative losses would increase under a modified T_{min} strategy where just the directed fishery and not the shrimp fishery is closed since the closure necessary to rebuild would be longer than T_{min}.

Additional social and economic problems would be expected to ensue from total closure of the directed gray triggerfish fishery as a result of fishermen shifting effort to other species in an attempt to maintain revenues (commercial vessels), customer bookings (for-hire vessels), and fishing pleasure (recreational anglers). Since gray triggerfish is part of the reef fish complex, effort shift would logically be expected in the direction of other reef fish species, many of which are currently subject to severe harvest pressure and increasingly restrictive management. Thus, while effort shift would mitigate some of the social and economic losses directly associated with closure of the gray triggerfish fishery, the cumulative social and economic losses associated with potentially worsening conditions in other fisheries could result in greater harm than simple closure of the gray triggerfish fishery with no redirection of effort.

Finally, consideration must be given to the cumulative adverse social and economic impacts associated with an extended closure of the gray triggerfish fishery on communities impacted by recent management measures for other species. Two of the three communities, Destin and

Panama City, Florida, identified as substantially involved in the gray triggerfish fishery (see Section 5.4) are also communities that are substantially involved in the red snapper fishery. The red snapper TAC was reduced from 9.12 mp in 2006 (and previous years) to 6.5 mp in 2007 and may be further reduced to 5.0 mp in 2008 in order to end overfishing and meet recovery goals. While gray triggerfish was not viewed as a substitute species to mitigate losses in the red snapper fishery due to the condition of the gray triggerfish resource, closure of the gray triggerfish fishery would compound the adverse social and economic impacts on these communities since reductions in revenues and associated benefits would occur for both species. In summary, because T_{min} or modified- T_{min} strategies would result in unacceptable levels of adverse social and economic impacts on fishermen and associated communities, they were not considered viable alternatives for rebuilding the gray triggerfish resource.

The MSFCMA also specifies that no rebuilding plan shall exceed ten years unless either biological or environmental conditions dictate otherwise. Since rebuilding projections indicate the gray triggerfish stock can rebuild in less than ten years, a rebuilding plan not exceeding ten years is required. Action 6 considers two alternative rebuilding strategies in addition to the status quo. These rebuilding strategies are based on fishing at a rate that optimizes yield (F_{OY}), where F_{OY} is defined as $0.75*F_{30\%SPR}$ and the stock rebuilds in six years **(see Action 5, Preferred Alternative 2)**. Additionally, two other rebuilding plans are presented in Table 2.2.1. These plans are based on a maximum fishing mortality rate that would allow the stock to be rebuilt in 7-9 years ($0.9*F_{30\%SPR}$). In all cases, the gray triggerfish stock is estimated to rebuild in ten years or less. Fishing at a rate that produces MSY (proxy = $F_{30\%SPR}$) would not allow the stock to rebuild in ten years (Sladek-Nowlis 2007a).

Table 2.2.1. Alternatives for gray triggerfish rebuilding plans based on projections from the 2006 stock assessment. Yields are in thousands of pounds. Cells highlighted in gray indicate the year the stock would be rebuilt. SSB ratio = $SSB_{yearX}/SSB_{30\%SPR}$.

	Alternative 1		Alternative 2		Alternative 3		$0.9*F_{30\%SPR}$		stepped $0.9*F_{30\%SPR}$		F_0
Year	Yield	SSB ratio	Yield	SSB ratio	Yield	SSB ratio	Yield	SSB ratio	Yield	SSB ratio	SSB ratio
2007	971	0.62	999	0.63	999	0.63	999	0.63	999	0.63	0.63
2008	955	0.61	499	0.65	499	0.65	591	0.65	591	0.65	0.69
2009	948	0.60	580	0.75	499	0.75	666	0.72	591	0.72	0.90
2010	948	0.60	659	0.83	499	0.85	738	0.78	591	0.80	1.12
2011	948	0.60	731	0.90	731	0.94	803	0.84	803	0.87	1.36
2012	948	0.60	793	0.97	731	1.01	857	0.88	803	0.92	1.59
2013	948	0.60	843	1.02	731	1.07	900	0.92	803	0.97	1.82
2014	947	0.60	881	1.07	881	1.13	931	0.95	931	1.00	2.06
2015	947	0.60	908	1.11	881	1.17	953	0.98	931	1.03	2.30
2016	946	0.60	928	1.15	881	1.21	968	1.00	931	1.05	2.53
2017	946	0.60	942	1.18	942	1.23	979	1.02	979	1.07	2.73
2018	946	0.60	953	1.19	942	1.25	988	1.03	980	1.08	2.90

Alternative 1: No action. Do not establish a rebuilding plan for gray triggerfish.

Preferred Alternative 2: Establish a constant F rebuilding plan for gray triggerfish defined by the constant F_{OY} projection from the 2006 assessment. Directed TAC levels for the 2008 through 2012 would be set at the directed yield for each year; TAC for 2008 would be 0.5 mp, TAC in 2009 would be 0.58 mp, TAC in 2010 would be 0.66 mp, TAC in 2011 would be 0.73 mp, and TAC in 2012 would be 0.79 mp.

Alternative 3: Establish a three-year stepped rebuilding plan for gray triggerfish based on the constant F_{OY} projection specified in the 2006 stock assessment. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F_{OY} projection; 0.5 mp for 2008 through 2010 and 0.73 mp from 2011 through 2012.

Discussion: Based on the Council's preferred definition for MSST (see Action 5, Preferred Alternative 2), the gray triggerfish stock is overfished. The stock first became overfished (dropped below MSST = (1-M)*$SSB_{30\%SPR}$) in 1996, increased above MSST during 2001 and 2002, and returned to an overfished condition in 2003 and 2004 (Figure 1.2.4).

Alternative 1 would maintain status quo conditions and would not establish a rebuilding plan for gray triggerfish. This alternative could only be selected if the Council selects a less conservative definition for MSST, i.e., 0.5*$SSB_{30\%SPR}$ (see Action 5, **Alternative 3**). SEFSC projections using current fishing mortality rates (Sladek-Nowlis 2007a) indicate the stock would remain below the Council's overfished threshold and well below MSY if no management measures were implemented to end overfishing and rebuild the stock. In 2004, SSB was estimated to be 64 percent of the SSB associated with 30 percent SPR.

Preferred Alternative 2 and **Alternative 3** propose rebuilding plans for gray triggerfish based on either a constant or stepped F_{OY} rebuilding strategy. **Preferred Alternative 2** would establish a constant F_{OY} (= 0.75*$F_{30\%SPR}$) rebuilding plan for gray triggerfish, which would allow TAC to increase annually. **Alternative 3** is a modification of the constant F_{OY} rebuilding plan, and sets TAC constant in three year intervals. Both rebuilding plans would require an initial 49 percent reduction in directed harvest to end overfishing immediately in 2008. Thereafter, total allowable catch would increase consistent with a constant fishing mortality rate that optimizes yield (**Preferred Alternative 2**) or in three year stepped intervals (**Alternative 3**), with TAC in each interval set equal to the first year of the corresponding TAC in the constant F_{OY} rebuilding projection. By holding TAC constant in three year intervals, fishing mortality would be reduced to a greater extent than **Preferred Alternative 2**, allowing the stock to rebuild slightly faster. Projections indicate **Preferred Alternative 2** would allow the stock to increase above MSST by 2009 ($SSB_{2009}/SSB_{30\%SPR}$ = 0.73) and rebuild within six years ($SSB_{2013}/SSB_{30\%SPR}$ > 1.0) to $SSB_{30\%SPR}$ allowing a directed yield of 0.793 mp. Continuing the constant F_{OY} rebuilding plan through 2023 would allow SSB to build to SSB_{OY} with a directed yield of approximately 0.976 mp. **Alternative 3** would allow the stock to increase above MSST by 2009 ($SSB_{2009}/SSB_{30\%SPR}$ = 0.73) and be fully rebuilt within five years ($SSB_{2012}/SSB_{30\%SPR}$ > 1.0) to $SSB_{30\%SPR}$ allowing a yield of 0.730 mp. Maintaining the constant F rebuilding plan through 2022 would allow the stock reach SSB_{OY} with a directed yield of approximately 0.976 mp.

As a comparison, the shortest time to rebuild (T-min) would be 2.5 years with no harvest (F_0), including no dead discards. The stock would rebuild to SSB_{MSY} by mid-2010 and to SSB_{OY} by mid-2011. Annual landings could then be allowed at the yield associated with F_{OY} or approximately 0.976 mp. From 2008 through 2011, there would be on average approximately 22 to 23 percent more fish in the water annually under the F_0 strategy. The initial effects would be a healthier gray triggerfish stock which may provide some minimal improvement in ecosystem function. Thereafter, the F_0 strategy would keep SSB at SSB_{OY}, allowing greater harvests than either **Preferred Alternative 2** or **Alternative 3** rebuilding plans until 2024 or 2023 respectively when the stock is rebuilt to the SSB_{OY} level. The more rapid short-term increases in SSB under the F_0 strategy would provide some short-term improvement in the biological environment; but in the longer-term the populations would be the same under any of the strategies.

All of the alternatives in Action 6 are expected to have small or no effects on the physical environment. **Alternative 1** would maintain status quo conditions, while **Preferred Alternative 2** and **Alternative 3** would both reduce harvest of gray triggerfish by 49 percent. Although the reduction in harvest is significant, it is not expected to greatly change fishing effort and habitat-gear interactions relative to status quo conditions because few recreational anglers and commercial fishermen target gray triggerfish.

A rebuilding schedule does not directly affect the economic environment since it would not alter the current harvest or use of a resource. It does however have indirect effects by conditioning the types of management measures to be adopted. The no action alternative (**Alternative 1**) becomes a viable alternative only if the selected MSST is less conservative so that the stock may not be considered overfished and therefore no rebuilding strategy is required. In that event, **Alternative 1** would have no direct or indirect economic effects on fishing participants and associated industries and fishing communities. Considering the Council's current preferred alternative of a more conservative MSST under which the stock is considered overfished, maintaining status quo would not rebuild the stock. One implication of this is that setting a more conservative MSST and rebuilding the stock would bring about a higher sustainable stock level after the rebuilding period. Selecting **Alternative 1** then means that current economic benefits would be maintained at the cost of forgoing larger benefits in the future.

The other two alternatives are constant F strategies and require the same target rebuilding date of 2012. These features may be expected to result in similar indirect economic effects. The areas where the two differ are in the manner TACs are established and date the stock would be fully rebuilt. **Alternative 3** implies more restrictive management measures over a longer period than **Preferred Alternative 2**, and thus would impose larger short-run adverse economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{msy}, the resulting post-rebuilding benefits under both alternatives would slightly differ. The reason for this is that **Alternative 3** would fully rebuild the stock one year ahead of **Preferred Alternative 2**. If this difference in future benefits is not significant, the alternative with lower short-term cost (**Preferred Alternative 2**) may be adjudged more beneficial than Alternative 3. There are no direct effects on the administrative environment from Action 6. Indirect administrative effects include implementing management measures to reduce landings, which will affect enforcement and monitoring.

The Council selected **Alternative 2** for several reasons. This alternative allows harvest to increase annually. This alternative ends overfishing immediately, allows some harvest to occur, and should rebuild the stock within 6 years, less than the maximum time period allowed under MSFCMA (10 years). Under these conditions, while short-term economic losses may occur from lower harvests, long-term benefits are derived sooner by allowing a greater harvest once the stock is rebuilt.

Action 7. Accountability measures for Gray Triggerfish.

The gray triggerfish stock has been declared overfished based on the 2006 SEDAR 9 stock assessment and the preferred definition of thresholds proposed in Action 5. Action 6 proposes rebuilding plans using a constant F_{OY} approach. TACs are specified for each year of the rebuilding period. Landings must remain at or below these TACs in order for the stock to 50 percent chance of rebuild in ten years. The reauthorized Magnuson-Stevens Act as amended through January 12, 2007, requires the Council specify Annual Catch Limits (ACLs) for each stock/stock complex and that AMs will be implemented to ensure that these ACLs are not exceeded. These regulations are required by 2010 for all stocks that are currently undergoing overfishing and by 2011 for all others. Action 7 proposes AMs to ensure a high probability of successfully rebuilding the gray triggerfish stock combined with the management measures preferred in Actions 9 and 10.

The Council has chosen management measures for the gray triggerfish fishery that reduce catches by approximately 60 percent rather than the 49 percent required by the constant F_{OY} preferred rebuilding plan. The recreational size limit is expected to increase to 14 inches TL and reduce landings by 60 percent in the first year; whereas, the commercial fishery is expected to have a hard quota of 80,000 pounds in 2008 which reduces landings by 61 percent. These reductions were chosen by the Council partially because the recreational fishery was willing to accept the 14 inch minimum size in order to avoid a decrease in the bag limit; whereas, for the commercial fishery, this was their long-term average share of the resource and gray triggerfish are one of the least targeted commercial reef fish species. Collectively, the stock is likely to rebuild more quickly allowing TACs to increase more rapidly.

With target landings set 60 percent below current levels, accountability triggers are being set at F_{OY} levels for all of the accountability alternatives to insure that the rebuilding plan is adhered to. If accountability measures were set at the maximum values allowed by the MSA to prevent overfishing ($0.9*F_{30\%SPR}$) while the targets required a 60 percent reduction, the buffer would have been approximately 55 percent above the target instead of approximately 18 percent using F_{OY} triggers. A very large buffer might never trigger accountability causing the rebuilding plan to be exceeded; but if they are exceeded, the cuts necessary to bring landings back to the targets would be more than 50 percent. An 18 percent buffer is sufficient to prevent any significant overages while preventing major disruptions should accountability be triggered.

Alternative 1: No action. Do not establish an accountability measure for the gray triggerfish rebuilding plan. The Council could address landings overages and implement management measures to constrain harvest to TACs specified in the preferred rebuilding plan by developing a regulatory amendment to the Reef Fish FMP.

Alternative 2: If annual landings for any sector as estimated by the SEFSC exceed the yield associated with fishing at $0.75*F_{30\%SPR}$ (overfishing level) for that sector, as specified in Table 2.2.2, the Council shall request the Regional Administrator implement temporary regulations in the following year to return landings to the target annual TAC level as specified in Table 2.2.2. However, if the cumulative sum of landings for all sectors does not exceed the maximum allowable yield for rebuilding the stock, then no accountability measures would be required.

Alternative 3: If annual landings for any sector as estimated by the SEFSC exceed the yield associated with fishing at $0.75*F_{30\%SPR}$ (overfishing level) for that sector, as specified in Table 2.2.2, the Regional Administrator shall issue a notice reducing the length of the fishing season for that sector in the following year to return landings to the target annual TAC level as specified in Table 2.2.2. However, if the cumulative sum of landings for all sectors does not exceed the maximum allowable yield for rebuilding the stock, then no accountability measures would be required.

Preferred Alternative 4: If recreational gray triggerfish landings, as estimated by the SEFSC, exceed the three-year running average TAC (AM trigger) associated with fishing at F_{OY} (Table 2.2.3), then the Regional Administrator shall issue a notice reducing the length of the fishing season in the following fishing year to return recreational landings to the target annual TAC level as specified in Table 2.2.3. In year one of the rebuilding plan, the accountability measure trigger will be the landings associated with fishing at F_{OY} during 2008, in year two of the rebuilding plan overages will be based on average landings associated with fishing at F_{OY} during 2008 and 2009, thereafter, a three year running average will be used. If commercial landings, as estimated by the SEFSC , reach or are projected to reach the applicable quota specified in Table 2.2.3, the RA will file a notification with the Office of the Federal Register to close the commercial fishery for the remainder of the fishing year. In addition, if despite such closure, commercial landings exceed the applicable accountability measure trigger (Table 2.2.3), the RA will file a notification with the Office of the Federal Register, at or near the beginning of the following fishing year to reduce the quota for that following year by the amount the prior-year accountability measure trigger was exceeded.

Alternative 5: If recreational gray triggerfish landings, as estimated by the SEFSC, exceed the three-year running average TAC associated with fishing at F_{OY} (Table 2.2.3), then the Council shall request the Regional Administrator to implement temporary regulations in the following year to return recreational landings to the target annual TAC level as specified in Table 2.2.3. In year one of the rebuilding plan, the accountability measure will be the landings associated with fishing at F_{OY} during 2008, in year two of the rebuilding plan overages will be based on average landings associated with fishing at F_{OY} during 2008 and 2009, thereafter, a three year running average will be used. If commercial landings, as

estimated by the SEFSC , reach or are projected to reach the applicable quota specified in Table 2.2.3, the RA will file a notification with the Office of the Federal Register to close the commercial fishery for the remainder of the fishing year. In addition, if despite such closure, commercial landings exceed the applicable accountability measure trigger (Table 2.2.3), the RA will file a notification with the Office of the Federal Register, at or near the beginning of the following fishing year to reduce the quota for that following year by the amount the prior-year accountability measure trigger was exceeded.

Table 2.2.2. Sector accountability measure triggers (lbs) for Alternatives 2 and 3 in Action 7.

Recreational Fishery		
Year	Target TAC	AM trigger
2008	306000	394000
2009	356000	458000
2010	405000	521000
2011	449000	578000
2012	487000	627000
2013	518000	666000
Commercial Fishery		
Year	Quota	AM trigger
2008	80000	105000
2009	93000	122000
2010	106000	138000
2011	118000	154000
2012	128000	167000
2013	136000	177000

Table 2.2.3. Sector accountability measure triggers (lbs) for Alternative 4 and 5 in Action 7.		
Recreational Fishery		
Year	Target TAC	AM trigger
2008	306000	394000
2009	356000	426000*
2010	405000	457000**
2011	449000	519000**
2012	487000	575000**
2013	518000	624000**
Commercial Fishery		
Year	Quota	AM trigger
2008	80000	105000
2009	93000	122000
2010	106000	138000
2011	118000	154000
2012	128000	167000
2013	136000	177000

* average of 2008 and 2009 yield at Foy

** three-year running average based on yield at Foy

Discussion: Action 7 includes four accountability measure alternatives and status quo. With the exception of Alternative 1 (status quo), all of the alternatives are intended to reduce the likelihood of overfishing while successfully rebuilding gray triggerfish within the necessary timeframe.

Alternative 1 would maintain status quo regulations and would not require AMs to ensure harvest is constrained within TAC levels, as specified in the preferred rebuilding plan in Action 6. The Council could implement management measures through framework action to constrain harvest if 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 be allowed to exceed target TACs and/or fishing mortality levels, thereby slowing stock recovery. **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 2011 to meet the reauthorized Magnuson-Stevens Act mandate.

Alternative 2 proposes a mechanism for implementing AMs for each sector if the annual yield for a sector, as summarized in Table 2.2.2, is exceeded. Yields triggering AMs (i.e., annual catch limits) are set at 75 percent of $F_{30\%SPR}$ and are equal to the rebuilding plan TACs in Action 6 (see also Table 2.2.2), providing a buffer between the preferred alternatives to regulate the fishery and the yields triggering AMs. The SEFSC would estimate gray triggerfish landings by sector and if a sector's landings are determined to exceed the yield specified in Table 2.2.2, the Council would request the RA implement temporary regulations in the following year to return landings to the target annual TAC level as specified in Table 2.2.2 which are approximately 60 percent of $F_{30\%SPR}$. This allows the Council to specify regulatory changes to bag limits, size limits, or trip limits in addition to season closures.

If the cumulative sum of landings for all sectors does not exceed the cumulative yield triggering AMs, then no changes would be required. This would potentially allow one sector to exceed the yield triggering AMs if another sector was below the yield triggering AMs. This could result in a de facto shift in allocation if one sector regularly exceeds the yield triggering AMs while the other does not.

The effects of **Alternative 3** is identical to the effects of **Alternative 2**, except the Council would provide the RA authority to file a notification of a closure for each sector if landings exceed the specified yield triggering AMs (Table 2.2.2). **Alternative 3** would therefore provide less flexibility when setting management measures to constrain harvest if overages occur; however, using this authority, the RA could implement the closure more quickly than under **Alternative 2**. The Council would not be able to request the RA modify bag limits, size limits, trip limits, or other management measures. The RA would only have the authority to reduce the length of the fishing season. If a large overage occurs, this could result in a lengthy seasonal closure to return landings to specified TAC levels.

Preferred Alternative 4 proposes to use a three-year average based on F_{OY} yields to determine if recreational landings have been sufficiently constrained except for the first and second years of the rebuilding plan. During the first year (2008), the accountability trigger (= annual catch limit) would be the harvest associated with 75 percent $F_{30\%SPR}$ for 2008. This value is the yield at F_{OY} under a constant F rebuilding strategy that would allow the stock to rebuild within approximately six years (See Table 2.2.1). During year 2 of the rebuilding plan (2009) under this AM, only two years of landings (2008-2009) would be averaged based on F_{OY} yields to determine if harvest during this time frame has been sufficiently constrained. Thereafter, the trigger would be the three-year average of the F_{OY} yields. Landings would have to be approximately 25 percent above the F_{OY} AM trigger to exceed MFMT. By averaging across multiple years, year-to-year fluctuations in landings resulting from recruitment variability, regulatory restrictions on other species, and prevailing economic conditions would be diminished. If landings exceed the multi-year average, as summarized in Table 2.2.3, then **Preferred Alternative 4** would require the RA to issue a notice reducing the length of the recreational fishing season in the following fishing year to return landings to the target annual TAC level (see Table 2.2.3). **Preferred Alternative 4** assumes that the Council will choose a hard quota for the commercial fishery; so, quota monitoring would determine the closure date for the year. If final landings data indicate that the commercial AM trigger was exceeded, the RA would reduce the following year's quota by the amount that previous year's AM trigger was exceeded; no three-year averages would be used. Unlike **Alternatives 2** and **3**, this alternative would not allow the cumulative sum of landings for all sectors to exceed the cumulative yield triggering AMs.

The preferred accountability measures for gray triggerfish differ in several ways from the preferred accountability measures for greater amberjack (see Action 2). First, unlike greater amberjack, there is a buffer between the annual catch limit (AM trigger) and the annual catch target. Because the commercial gray triggerfish quota is small (80,000 pounds in 2008) relative to other species (e.g., greater amberjack = 503,000 pounds in 2008), it will be more difficult for NOAA Fisheries Service to monitor the gray triggerfish quota and accurately predict when the fishery will be closed. Creating a buffer will allow for overruns of the quota (up to ~30 percent) without resulting in overfishing or triggering accountability measures that may significantly reduce the commercial quota in subsequent fishing seasons. Another key difference is that recreational gray triggerfish catch limits (AM triggers) are based on multi-year averages, whereas greater amberjack catch limits are based on a single year of landings. As discussed above, multiyear averages allow for year-to-year fluctuations in landings and recruitment. Multiyear averages were not considered for greater amberjack because only five years remain until the stock must be rebuilt and more restrictive catch limits were deemed necessary to successfully rebuild the stock.

Another key consideration for gray triggerfish was differences in how commercial and recreational accountability measures are applied. Because the commercial fishery is managed with a quota, annual catch limits were considered appropriate for determining whether or not accountability measures would be triggered. In contrast, the recreational fishery is managed with a soft TAC and not a quota. An increase in the minimum size limit to 14-inches FL is estimated to reduce recreational gray triggerfish landings to target levels. However, unlike greater amberjack the Council did not elect to adopt catch limits that function like an annual recreational quota. Instead, multiyear averages were used because it is more difficult to monitor recreational landings in-season, especially for less frequently encountered species, such as gray triggerfish.

Alternative 5 uses the same three-year average as **Preferred Alternative 4** with modifications for the first two years to determine if landings have been sufficiently constrained. By averaging across multiple years, year-to-year fluctuations in landings resulting from recruitment variability, regulatory restrictions on other species, and prevailing economic conditions would be diminished. If landings exceed the multi-year average, the Council would request the RA implement temporary regulations in the following year to return landings to the target annual TAC level. Like **Alternative 2**, the Council would be able to request the RA modify bag limits, size limits, or other management measures to constrain landings. As with **Preferred Alternative 4**, a commercial hard quota is assumed and any excess above the AM trigger would be deducted from the following year's quota. Also like **Preferred Alternative 4**, this alternative would not allow the cumulative sum of landings for all sectors to exceed the cumulative yield triggering AMs.

Action 7 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 if AMs are implemented to constrain harvest. However, as discussed, changes in fishing effort and habitat-gear interactions relative to status quo conditions are expected to be small regardless of the management measure used to constrain harvest, because few recreational anglers and commercial fishermen target gray triggerfish.

Alternative 1 provides no biological benefits for rebuilding the gray triggerfish stock. The benefits resulting from **Alternative 2** and **Alternative 3** use the same yield trajectories for triggering AMs; however, **Alternative 3** is slightly more conservative because the regulations can be implemented more quickly. **Preferred Alternative 4** and **Alternative 5** use three-year averages that allow some natural variability in landings which has social and economic benefits while maintaining the same overall triggers as for **Alternatives 2** and **3**. **Alternative 5** is less conservative than **Preferred Alternative 4** only because the time it takes to implement a temporary rule; but is likely more conservative than **Alternatives 2** and **3**.

With the exception of **Alternative 1**, all other accountability alternatives have direct economic effects. **Alternative 1**, however, may be considered to have indirect economic impacts as it allows regulatory changes that can alter the economic conditions in the fishery.

If a sector's underage fully compensates another's overage, then AMs are required under **Alternatives 2 and 3**. Such situation would allow one sector to incur lower losses or generate more benefits than the other. The net effect depends on the values each sector gets out of the fishery. If AMs are triggered by overages, both **Alternatives 2 and 3** would impose restrictions that would result in economic losses to both sectors. The severity of the measures would be sector specific, and it is possible only one sector would face additional restrictions if the other did not exceed its trigger harvests.

Preferred Alternative 4 is more restrictive than the other measures in the sense that either sector's overage can trigger the implementation of AMs. **Preferred Alternative 4**, however, offers a better chance relative to **Alternative 2** and **Alternative 3** of effectively realigning sectors to their allocation when overages occur, would result in corrective action more quickly than **Alternative 5**, and provide a better chance of rebuilding the stock. Although, unlike **Alternative 2** and **Alternative 3**, **Preferred Alternative 4** (and **Alternative 5**) would impose corrective action in response to an overage even if the TAC were not exceeded, such action would have the dual benefits of preserving sector allocations (not correcting for one sector's overage may be viewed by the other sector as a defacto reallocation, thus inducing increased sector conflicts and associated adverse impacts), and potentially support faster stock rebuilding and the attainment of the increased associated economic benefits since not only would the sector overage be paid back, but the underage by the other sector would be "protected" such that a net underage over the respective period would be preserved). It should be noted that underlying this outcome is the assumption that the underage by the one sector is circumstantial and not the result of an inability for the sector to harvest their allocation as a result of the overage by the other sector, and the assumption that the "extra benefit" to the sector having the overage is offset by the subsequent payback, and avoidance of sector conflicts as a result of the preservation of sector allocations results in a net benefit.

Indirect effects will accrue to harvest changes in the gray triggerfish fishery itself and other fisheries if effort is re-directed as a result of gray triggerfish harvest reductions. These indirect effects would accrue to the supporting industries, such as fish dealers/processors and marinas, and associated fishing communities Any effort shift to other species/fisheries as a result of the AMs could result in deteriorating conditions for these species/fisheries, inducing increased restrictions, with associated economic losses. However, given the relatively minor importance of the gray triggerfish fishery (approximately 300,000 pounds or less per year since 2000 compared to approximately 30 million pounds per year of all Gulf finfish over the same period in the commercial sector and less than two tenths of a percent target effort in the recreational sector; Section 3.3), effort transfer is not likely to be substantial and spill-over effects on other fisheries should be minimal.

Action 7 would directly affect the administrative environment. **Alternative 1** would not require AMs for gray triggerfish. By not imposing AMs, the administrative environment may be negatively affected if harvest is not sufficiently constrained and stock recovery is slower than expected. This could increase the burden on Council and NOAA Fisheries Service to develop regulatory amendments in the future to address overfishing and constrain harvest. **Alternatives 2-5** would all provide a procedure for implementing AMs. Each alternative would require NOAA Fisheries Service to annually monitor landings, which would increase the burden on NOAA Fisheries Service to collate and verify landings information. Additionally, **Alternative 2** and **5** would require the RA to implement a temporary rule to constrain harvest. Depending on the NEPA analysis required, this could result in a significant burden on NOAA Fisheries Service when preparing a temporary rule. **Alternatives 3** and **Preferred Alternative 4** would provide the RA authority to file a notification of a closure to return landings to levels necessary to constrain harvest. Filing a notification of a closure is not expected to substantially increase the burden on the RA and NOAA Fisheries Service, since they routinely file notifications of a closure for various fisheries.

The Council selected **Alternative 4** as the preferred for several reasons. This alternative assists in keeping harvest to that allowed under the rebuilding plan. As described above, it is more restrictive than the other alternatives potentially could allow the stock to rebuild more quickly should a sector under harvest their portion of the TAC. This plan allows for payback and would not allow the cumulative sum of landings for all sectors to exceed the cumulative yield triggering AMs. Under these conditions, while short-term economic losses may occur, long-term benefits would likely occur once the stock is rebuilt.

Action 8. Gray Triggerfish Regional Management

Most gray triggerfish, approximately 82 percent, are landed in the eastern Gulf. Concern has been expressed that the 2006 gray triggerfish assessment did not reflect the condition of the stock throughout its range; rather it reflected the condition of the stock where most of the harvest occurs, Alabama and west Florida. Tagging information indicates gray triggerfish are highly site specific (Ingram 2001), thus the possibility for localized depletions within the stock may occur. None of the SEDAR 9 panels suggested the stock should be viewed regionally because there was no evidence to support more than one biological stock in the Gulf of Mexico. However, they did not preclude the possibility that localized depletion may occur in heavily fished sites. Additional information provided to the Council in July (Sladek Nowlis 2007b) indicates that portions of both eastern (Stat zones 1-12) and western (Stat Zones 13-21) stocks are undergoing overfishing. Other finer-scale boundaries were discussed; however, from an enforcement perspective, difficulty in tracking where harvest occurred compared to where fish were landed made these boundaries impractical for evaluation.

Table 2.2.4. Reductions in gray triggerfish necessary to end overfishing under the assumption of Gulf-wide or East only (Stat Zones 1-12) regional management. 2000-2004 averages			
Recreational	Gulf-wide	East	West
Average Landings	766,086	671,858	94,229
Proportion E/W		88%	12%
Required % Reduction	49%	56%	0%
Commercial	Gulf-wide	East	West
Average Landings	208,045	129,612	78,433
Proportion E/W		62%	38%
Required % Reduction	49%	78%	0%
Total	Gulf-wide	East	West
Average Landings	974,131	801,470	172,661
Proportion E/W		82%	18%
Required % Reduction	48%	59%	0%

Preferred Alternative 1: No Action. Manage gray triggerfish on a Gulf-wide basis. Implement Gulf-wide management measures to reduce gray triggerfish landings by 49 percent overall to end overfishing and rebuild the stock.

Alternative 2: Manage gray triggerfish on a regional basis. Reduce the eastern Gulf (Fishing Statistical Areas 1 – 12, Mississippi through Florida) landings of gray triggerfish by 59 percent to end overfishing Gulf-wide

Discussion: **Preferred Alternative 1** (no action) would manage the gray triggerfish stock across the Gulf as a single unit as regulations are currently structured. Overall landings would have to be reduced by 49 percent and rebuild the stock throughout the Gulf EEZ through recreational and commercial regulations implemented by Actions 9 and 10. All areas of the Gulf would be treated equally, with the same or comparable landings reductions.

Alternative 2 partitions the Gulf into two regions: the eastern Gulf (Florida to Mississippi) and the western Gulf (Louisiana and Texas). As indicated in the 2006 stock assessment, most gray triggerfish (82 percent) in recent years (2000-2004) are landed in the eastern Gulf but the gray triggerfish stock is considered a single Gulf-wide stock (SEFSC presentation). The eastern Gulf region would need to absorb the full Gulf-wide reduction in landings in order to end overfishing. Given that overall harvest needs to be reduced by 49 percent and average landings in recent years (2000-2004) have been 974,131 lbs, of which 801,470 lbs came from the eastern Gulf, the eastern Gulf harvest would have to be reduced by 59 percent to end overfishing (Table 2.2.4). However, the proportion of harvest by sector in the eastern Gulf is different. The eastern Gulf recreational sector harvests approximately 88 percent of Gulf-wide recreational landings; whereas, the eastern Gulf commercial sector lands approximately 62 percent. Regional management measures would have to reduce recreational landings by 56 percent in the eastern Gulf and would have to reduce commercial landings by 78 percent in the eastern Gulf to rebuild the stock throughout the Gulf EEZ (Table 2.2.4).

With respect to the physical and biological/ecological environments, alternatives in this action should have minimal effects. However, the biological effects of **Preferred Alternative 1** and **Alternative 2** are slightly different. **Preferred Alternative 1** would rebuild the stock proportionally throughout the Gulf; whereas, Alternative 2 would rebuild the stock disproportionately faster in the eastern Gulf. It is likely that this effect would still be minimal because the stock is a single Gulf-wide stock, so larval transport and general movement from more to less dense local areas is expected to occur.

Action 8 considers the establishment of differing regulatory measures between the eastern and western Gulf of Mexico to manage gray triggerfish. While it is not possible to predict changes in fishermen's behaviour once geographical discrepancies in regulation are introduced, foreseeable monitoring and enforcement difficulties would suggest that **Preferred Alternative 1**, the status quo, i.e., Gulf-wide management, constitutes a better management option.

Preferred Alternative 1, no action, would continue to manage gray triggerfish as one management unit and would reduce gray triggerfish landings by 49 percent. Fishermen, businesses, and communities dependent on the gray triggerfish fishery would not be impacted by the continuation of a management plan that managed the fishery as one unit. However, there would be negative impacts if the landings are reduced by 49 percent. **Preferred Alternative 1** would benefit the fishermen in the eastern gulf where most of the gray triggerfish are caught because the reductions would be shared throughout the gulf. This alternative would have negative impacts on fishermen in the western gulf because the same reductions would apply to them, even though they land a smaller percentage of gray triggerfish than the fishermen in the eastern gulf do.

Commercial fishermen who fish for gray triggerfish may lose profits if landings are reduced or they may target other species, putting pressure on other reef fish species. Any reduction in the commercial landings would have a negative impact on the processors and communities that depend on the commercial gray triggerfish fishery. If landings are reduced for the recreational fishery, the for-hire sector may experience a reduction in trips and therefore income and private recreational fishermen may take fewer fishing trips. This may also reduce the revenues coming in to communities that support this fishery. Fishermen may shift their fishing effort to other species in the reef fish complex, putting pressure on the other species.

Alternative 2 would manage gray triggerfish on a regional basis and reduce the landings for the eastern gulf by 59 percent. This alternative would not have any impact on the fishermen in the western gulf because their landings would not be reduced. Fishermen, businesses, and communities in the eastern gulf that are dependent on the fishery would be impacted by this alternative due to the reduction in landings. They would absorb all of the reductions which would be more severe than a reduction for the total gulf.

As with **Preferred Alternative 1**, any reduction in the amount of landings of gray triggerfish will have negative impacts on the communities that depend on the fishery in the short run. In the long term, reducing landings will help to stop overfishing and rebuild the stock which will benefit the fishermen, businesses, and communities dependent on the fishery.

With respect to the administrative environment, effects would also be minimal because monitoring the stock and conducting periodic assessments are a part of current management activities. Actions to regulate the fishery (e.g., size limits and bag limits) are currently in place. Should **Alternative 2** be selected, educational activities would need to be developed to reduce confusion about different management requirements for the eastern and western Gulf.

The Council selected **Alternative 1** as preferred for several reasons identified above. Mainly, this alternative would minimize monitoring and enforcement problems that could occur should the stock be managed differently in different regions. This would particularly be the case in the area where the border delineating the two resultant management regimes occurs.

Action 9. Gray Triggerfish Recreational Management Alternatives

The first federal regulations for GOM gray triggerfish were implemented through Amendment 12 to the Reef Fish FMP which set a 20-fish aggregate bag limit for reef fish species not otherwise regulated by bag limits. In 1999, the minimum size limit was set at 12-inches TL for both recreational and commercial fisheries. Neither of these regulations appeared to have had any impact on the recreational fishery (Table 1.1.2 and Figure 1.1.2).

The following discussion provides background information on management measures (bag limits, size limits and seasonal closures) considered by the Council for managing gray triggerfish catch in the recreational fishery. This background information and the associated tables provide the range of reductions possible from each of the types of measures available. Examples of potential management measure changes required by the rebuilding plans in Action 6 are based on a recreational landings reduction of 49 percent.

<u>Bag limits</u>
Recreational catch per angler has been as high as 18 fish but catches per angler above 10 fish represent less than two percent of recent landings (Table 2.2.5; SERO 2007b). Apparently, only one trip had fishermen who caught at 20 or more gray triggerfish between 2003 and 2005. Private recreational fishermen would be most affected by any reduction in the bag limit; charter vessels would be slightly less affected and headboats rarely catch more than two fish and would be unaffected (SERO 2007b). A bag limit of one fish would reduce recreational landings by 50 percent.

Table 2.2.5. Gray triggerfish weighted percent reduction for various recreational bag limits (all modes)				
	Year			
Bag Limit	2003	2004	2005	2003-05
20	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0
18	0.0	0.1	0.0	0.0
17	0.1	0.1	0.0	0.1
16	0.1	0.2	0.0	0.1
15	0.2	0.2	0.0	0.2
14	0.3	0.3	0.0	0.2
13	0.5	0.5	0.0	0.4
12	1.5	0.7	0.0	0.8
11	2.6	1.0	0.0	1.3
10	4.1	1.4	0.1	2.0
9	6.2	2.0	0.6	3.1
8	8.8	3.0	1.3	4.5
7	11.8	4.5	2.1	6.4
6	15.0	6.3	3.3	8.6
5	19.1	9.1	5.3	11.6
4	24.4	12.7	8.3	15.8
3	31.1	20.0	13.7	22.6
2	39.8	30.8	22.3	32.4
1	54.9	51.1	39.1	50.0

Size Limits

Recreational landings by size were derived from MRFSS, Headboat and TPWD data for the period 2003 through 2005 (Table 2.2.6; SERO 2007b). The recreational size limit for gray triggerfish is currently 12 inches TL. There was little difference in the size of fish caught by mode (private recreational, charter, headboat) so all sectors and regions should be affected similarly. Release mortality is estimated to be 1.5 percent so the effective reduction is based on that rate. The size limit for the recreational fishery would have to be increased to 16 inches TL or 14 inches FL to obtain at least a 49 percent reduction in landings. Any increase to the minimum size limit will increase dead discards.

Table 2.2.6. Percent reduction in weight of recreationally harvested gray triggerfish for various size limits and release mortality rates (2003-05 avg)

FL in	TL in	Weighted Reduction rel = 0%	rel = 1.5%
10.44	12.0	0.0	0.0
11	12.7	5.2	5.1
12	13.9	21.8	21.4
13	15.0	43.1	42.4
14	16.2	60.9	60.0
15	17.4	74.8	73.7
16	18.6	84.0	82.8
17	19.8	88.6	87.3
18	21.0	91.9	90.5
19	22.2	93.9	92.5
20	23.4	95.6	94.1

Season Closures

Landings from the MRFSS, Headboat Survey, and TPWD survey were used to estimate landings by month for the years 2003 through 2005 (Table 2.2.7; SERO 2007b). Recreational landings peak in May and June. Charter and private landings occur primarily from May through October, while Headboat and TPWD gray triggerfish landings occur during a more protracted time period from May through August. A three and a half month seasonal closure during the summer would be required to reduce gray triggerfish landings by 49 percent.

Table 2.2.7. Percent gray triggerfish recreational landings by month (2003 - 2005)

Month	Percent
Jan	2.1%
Feb	2.0%
Mar	8.5%
Apr	8.5%
May	13.8%
Jun	13.8%
Jul	12.2%
Aug	11.7%
Sep	9.7%
Oct	10.2%
Nov	3.7%
Dec	3.7%

Alternatives

The Council initially developed an Action for the gray triggerfish fishery to consider revising allocation but moved allocation to Section 13, Considered but Rejected. In its place, the Council established an Allocation AD HOC Committee to examine fair and equitable ways to allocate all FMP resources between recreational and commercial fisheries in the future. The alternatives in this action are based on a range of recreational landings reductions that could reduce the recreational and commercial sectors by the same proportion or could shift the available resource by as much as five percent toward the recreational fishery. The Council decided that the recreational management measures proposed for gray triggerfish should be as simple as possible and as a result eliminated seasonal closures as too restrictive in light of other northern Gulf fishery resource closures. It is nearly impossible to target specific reductions such as 49 percent using only size limits, bag limits or a combination; therefore, the proposed alternatives range from 45 percent to 60 percent. Corresponding commercial reductions are offered in Action 10 to accomplish reductions of 49 to 61 percent to assure a fishery-wide landings reduction of 49 percent required by the rebuilding plans in Action 6. Currently, the preferred alternatives for the recreational and commercial fisheries accomplish equal proportional reductions of 60 and 61 percent respectively. Table 2.2.8 offers examples of ways to achieve acceptable recreational harvest reductions within the range of management measures being considered. In the past, the Council has made no provisions to allocate fish between private anglers and the for-hire sector within the recreational fishery (see earlier discussion for Action 3). Measures to constrain recreational harvests such as bag limits, size limits, and seasonal closures apply to both sectors. The existing distribution of landings between the two sectors reflects the unregulated harvest trends between the two sectors, and would therefore be deemed fair and equitable as a mere reflection of the historical catch distribution. The for-hire fishery would be subject to the same regulations that apply to other recreational fishermen; therefore, no change to the existing fair and equitable distribution of catch is anticipated.

Table 2.2.8 Alternatives for reducing landings of gray triggerfish in the recreational fishery based on the FOY rebuilding plan. Proposed measures necessary to end overfishing based on the preferred alternatives selected in Actions 6 and 8 are shaded.

Percent Reduction	49%	45%
Bag limit	1 fish 51% reduction	1 fish 51% reduction
Size limit	14 inches FL 60% reduction	14 inches FL 60% reduction
Bag & Size	5 fish & 13" FL 49% reduction	8 fish & 13" FL 45% reduction

Alternative 1: No Action. Maintain the 12-inch TL minimum size limit and include gray triggerfish in the 20 fish aggregate reef fish bag limit.

Preferred Alternative 2: Increase the recreational size limit to 14 inches FL; Reduces landings by 60 percent.

Alternative 3: Establish a bag limit of 8 gray triggerfish within the 20 reef fish aggregate and increase the size limit to 13 inches FL; Reduces landings by 45 percent.

Alternative 4: Establish a bag limit of 1 gray triggerfish within the 20 reef fish aggregate; Reduces landings by 51 percent.

Discussion: Gray triggerfish were assessed through the SEDAR process in 2006. The SEDAR panel concluded gray triggerfish were undergoing overfishing; fishing mortality in 2004 was 1.6 times greater than the Council's approved MFMT $F_{30\%SPR}$). Based on the Council's preferred definition for MSST (1-M)*$SSB_{30\%SPR}$) in Action 5 the stock is also overfished. A minimum 49 percent reduction in gray triggerfish recreational fishery landings relative to 2000-2004 average landings is needed to end overfishing (see Actions 6) provided that a compatible reduction is obtained from the commercial fishery to attain at least an overall 49 percent reduction fishery-wide. If any of these assumptions are changed, the reduction and associated recreational management measures for this action would also change. 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.

Alternative 1 would maintain status quo recreational regulations, which include a 12-inch TL minimum size limit and 20-fish aggregate bag limit. Fishing mortality has been well above $F_{30\%SPR}$ since the early 1980s and has increased in recent years after declining during the mid-to-late 1990s (Figure 1.2.3). Spawning stock biomass on the other hand has declined significantly over time. Based on the Council's preferred definition for MSST selected in Action 5, the gray triggerfish stock has been overfished since the mid 1990s (Figure 1.2.4).

The 20-fish aggregate bag limit was implemented in January 1997 for all reef fish that did not have a bag limit and the 12-inch TL minimum size limit was implemented in November 1999. The minimum size limit corresponds to the size-at-first maturity, which is approximately 12 to 14.5 inches TL (Ingram 2001; SEDAR 9 2006b). This minimum size limit may be too small to allow a sufficient number of gray triggerfish to spawn prior to being harvested. Similarly, there was only one MRFSS intercept during 2003-2005 that reported 20 or more gray triggerfish per angler. The current aggregate bag limit is therefore not limiting to anglers and will allow overfishing to continue. Allowing overfishing would negatively effect the age and size-structure of the stock and cause spawning stock biomass to decline further. If overfishing is not ended, population abundance would decrease resulting in less fish for anglers to catch and land.

Preferred Alternative 2 would increase the recreational minimum size limit from 12 inches TL (10.44 inches FL) to 14 inches FL (16.2 inches TL). Increasing the minimum size limit is estimated to reduce landings by 60 percent (SERO 2007b). Unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish are hardy fish that have a very low release mortality rate. Only a small percentage (1.5 percent) of gray triggerfish die after release. The number of eggs produced by a gray triggerfish increases exponentially by size and age (SEDAR 9 2006b), allowing for increased spawning potential. The average 14-inch FL gray triggerfish produces 2.7 times more eggs per spawning event than the average 12-inch TL gray triggerfish (SEDAR 9 2006b). Additionally, increasing the minimum size limit to 14 inches FL would delay harvest of gray triggerfish by two years, allowing gray triggerfish to spawn two additional seasons before becoming susceptible to fishing mortality.

Combined with the preferred alternative for reducing commercial gray triggerfish landings by 61 percent in Action 10, fishery-wide landings are expected to be approximately 22 percent lower initially than necessary to rebuild the stock. The stock will likely recover at a faster rate, roughly equivalent to a fishing mortality rate of 60% $F_{30\%SPR}$ for the first several years until the size frequency distribution of the stock stabilizes at the new minimum size limit. As more fish grow to 14 inches FL and above, availability of legal fish will increase and landings may improve substantially above the 60 percent expected by changing the minimum size limit to 14 inches FL. **Alternative 3** would increase the minimum size limit from 12 inches TL (10.44 inches FL) to 13 inches FL (15 inches TL) and establish an eight-fish bag limit for gray triggerfish within the 20-fish aggregate bag limit. Increasing the minimum size limit by 2.56 inches (13 inches FL minus 10.44 inches TL) is estimated to reduce landings by 42 percent and reducing the bag limit to eight fish is estimated to reduce landings by 5 percent (SERO 2007b). Cumulatively, both measures are estimated to end overfishing and reduce landings by 45 percent. Similar to **Preferred Alternative 2**, increasing the minimum size limit will delay the age at first harvest (by approximately 1.2 years), allow more gray triggerfish to survive to larger sizes and older ages, and increase spawning potential (a 13-inch FL gray triggerfish produces twice as many eggs per spawn as a 12-inch TL gray triggerfish). Because gray triggerfish are typically caught as a secondary species on most fishing trips, reducing the bag limit will limit the number of gray triggerfish anglers are able to land while targeting other species. An eight-fish bag limit would affect only a small percentage of trips and would not likely result in anglers deciding to end their trip once the bag limit is met. Therefore, imposing a lower bag limit will reduce fishing mortality by requiring anglers to release gray triggerfish once reaching their bag limit.

Alternative 4 would establish a one-fish bag limit, which is estimated to reduce landings by 51 percent and end overfishing. Reducing the bag limit will reduce fishing mortality and prevent anglers from harvesting large numbers of gray triggerfish while targeting other reef fishes, such as snappers and groupers. This will allow more gray triggerfish to survive to older ages and sizes. The one-fish bag limit would not likely deter fishing trips from occurring, since gray triggerfish is typically caught as a secondary species while targeting snappers and groupers. The bag limit would increase discards, but discard mortality is very low (1.5 percent) and was incorporated in analyses evaluating harvest reductions for various bag limits. Unlike **Preferred Alternative 2** or **Alternative 3**, **Alternative 4** would maintain the 12-inch TL gray triggerfish minimum size limit. Although the bag limit is expected to increase the survival of gray triggerfish to older ages, allowing the harvest of smaller gray triggerfish (12 inches TL vs. 13 or 14 inches FL) may affect spawning potential and success (reduce number of spawning seasons before becoming susceptible to harvest).

Overall, **Preferred Alternative 2** would reduce landings more than any other alternative considered in Action 9, and therefore would provide the greatest benefits to the biological environment. **Alternative 4** would reduce landings slightly more than **Alternative 3**, but less than **Preferred Alternative 2**, and therefore would have intermediate benefits to the biological environment. Positive benefits would include: increased abundance and spawning stock biomass, lower fishing mortality, and a greater number of fish surviving to older ages and larger sizes. If overfishing ends, and fishing mortality is reduced to F_{OY}, then SSB would increase by greater than 50 percent over the next five years and the stock would be rebuilt by 2013 (Figure 1.2.4).

All alternatives in Action 9 are expected to have minimal direct or indirect effects on the physical environment. Gray triggerfish are rarely the primary target species on a recreational fishing trip and therefore any change in regulations is expected to have a small effect on overall fishing effort and habitat-gear interactions.

Decreases in targeted fishing effort required to achieve reductions in gray triggerfish recreational landings considered in this action would be anticipated to result in short-term net revenue losses to for-hire operators and consumer surplus losses to participating anglers. As the stock recovers in the long run, it is expected that economic benefits would result from future increases in recreational landings. The evaluation of management alternatives considered in this section focus on short-term effects. Estimates provided logically reflect the expectation that the greater the reduction in landings, the greater the corresponding short-term loss in economic value.

For the recreational sector, anticipated annual losses in economic value, i.e., consumer and producer surpluses, relative to the status quo range from approximately $1.1 million under **Alternative 3,** which would establish a bag limit of 8 gray triggerfish within the 20 reef fish aggregate and set a 13-inch (fork length) recreational size limit for gray triggerfish, to approximately $1.5 million under **Preferred Alternative 2,** which would increase the recreational minimum size limit from 12-inch (total length) to 14-inch (fork length). **Alternative 4,** which would set a bag limit of one gray triggerfish within the 20 reef fish aggregate, would result in aggregate consumer and producer surplus losses valued at $1.3 million, approximately. Although **Alternative 3** may appear superior because it minimizes losses in economic value, **Preferred Alternative 2** and **Alternative 4** achieve greater reductions in gray triggerfish recreational landings, thereby improving the probability of success of the rebuilding plan.

All Action 9 alternatives are expected to have small or no effects on the administrative environment. **Alternative 1** would result in no additional regulatory measures to implement or enforce. **Preferred Alternative 2** would result in a small increase to the time and cost of implementing and enforcing a new, higher minimum size limit. Because the method of measurement would change (FL vs. TL), administrative effects may be initially greater due to potential reductions in angler compliance associated with changes in the measurement method. Administrative effects associated with **Alternative 3** would be similar to those of **Preferred Alternative 2**. Effects would largely be associated with implementation and enforcement of a higher minimum size limit and lower bag limit. Reducing the bag limit from a maximum of 20 gray triggerfish to eight (**Alternative 3**) or one (**Alternative 4**) gray triggerfish would reduce the burden on enforcement when determining compliance with regulations (less fish to count and measure), unless angler compliance with these lower bag limits are reduced.

The Council selected **Alternative 2** as preferred because it represented the simplest and the most acceptable way to reduce landings by the amount necessary by recreational fishers. The minimum size limit needed to be changed to fork length to make measurement more consistent with the morphology of the species and any other minimum size required additional measures to obtain the required landings reduction. Because the selected size limit results in the largest reduction in recreational landings; it has the highest probability of rebuilding success. Unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish have a very low release mortality rate; about 1.5 percent of gray triggerfish die after release.

Action 10. Gray Triggerfish Commercial Management Alternatives

The following discussion provides background information on management measures (trip limits, size limits and seasonal closures) considered by the Council for managing gray triggerfish catch in the commercial fishery. This background information and the associated tables provide the range of reductions possible from each of the types of measures available. Based on the preferred alternatives selected by the Council in Actions 6 and 8, a 49 percent or greater reduction in commercial landings is needed to end overfishing and achieve the yield at F_{OY}. Harvest reductions greater than 49 percent will allow for faster stock recovery and a greater probability that overfishing is ended.

<u>Trip Limits</u>
Reductions obtained from commercial trip limits are shown in Table 2.2.9 (SERO, 2007b). A 70-pound trip limit would be required for the commercial fishery to attain at least a 49 percent reduction in harvest.

Table 2.2.9. Percent reduction of commercial gray triggerfish landings based on various trip limits. Source: 2003-2005 commercial logbooks		
Trip	Reduction in Yield	
Limit	Pounds	Percent
0	209,489	100.0
20	160,129	76.4
40	132,042	63.0
60	112,920	53.9
80	98,966	47.2
100	88,026	42.0
120	79,290	37.8
140	72,104	34.4
160	66,070	31.5
180	60,917	29.1
200	56,386	26.9
220	52,349	25.0
240	48,714	23.3
260	45,463	21.7
280	42,566	20.3
300	39,959	19.1
320	37,545	17.9
340	35,349	16.9

Size Limits

Commercial sizes of fish landed were derived from the TIP database. Size limits are currently set at 12 inches TL. Longline fishermen catch about ten percent of the commercially caught gray triggerfish, but the average size of gray triggerfish caught is 23 inches TL versus about 16.5 inches for other gear types. Vertical line fishermen, who land 90 percent of commercial gray triggerfish, will be affected most by an increase to the minimum size. The size limit would have to be increased to 18.6 inches TL or 16 inches FL to attain at least a 49 percent reduction (Table 2.2.10)

Table 2.2.10. Percent reduction in weight of commercially harvested gray triggerfish for various size limits and release mortality rates (2003-05 avg)

FL in	TL in	Weighted Reduction rel = 0%	rel = 1.5%
10.44	12.0	0.0	0.0
11	12.7	0.9	0.9
12	13.9	6.6	6.5
13	15.0	17.1	16.8
14	16.2	31.3	30.8
15	17.4	48.8	48.1
16	18.6	64.3	63.3
17	19.8	77.3	76.1
18	21.0	86.1	84.8
19	22.2	89.5	88.2
20	23.4	92.9	91.5

Season Closures

Commercial landings by month from the ALS were averaged for the years 2003 through 2005 in Table 2.2.11 (SERO 2007b). Landings from the commercial fishery are highest during March through June. Using a seasonal closure to reduce commercial landings by 49 percent would require the fishery to be closed for a minimum of nearly six months.

Table 2.2.11. Percent commercial gray triggerfish landings by month (2003 - 2005)

Month	Percent
Jan	6.3%
Feb	7.4%
Mar	8.9%
Apr	9.1%
May	11.5%
Jun	11.8%
Jul	6.0%
Aug	8.8%
Sep	5.2%
Oct	8.4%
Nov	9.0%
Dec	7.5%

Alternatives

As with the recreational management measures in Action 9, the alternatives in this action are based on a range of commercial landings reductions that could reduce the commercial and recreational sectors by the same proportion or could shift the available resource by as much as five percent toward the recreational fishery. The Council decided that the commercial management measures proposed for gray triggerfish should be as simple as possible and as a result eliminated seasonal closures as too restrictive in light of other northern Gulf fishery resource closures. Based on the reductions expected from the proposed alternatives for the recreational fishery (See Action 9), the proposed commercial alternatives range from 49 percent to 61 percent to assure a fishery-wide landings reduction of at least 49 percent required by the rebuilding plans in Action 6. Currently, the preferred alternatives for the commercial and recreational fisheries accomplish equal proportional reductions of 60 and 61 percent respectively. Table 2.2.12 offers examples of ways to achieve acceptable recreational harvest reductions within the range of management measures being considered.

Table 2.2.12. Alternatives for reducing landings of gray triggerfish in the commercial fishery based on the F_{OY} rebuilding plan in Action 6. Proposed measures necessary to end overfishing based on the preferred alternatives selected in Actions 6 and 8 are shaded.

	49%	61%
Trip Limit	70 pounds 51% reduction	40 pounds 63% reduction
Size Limit	16 inches FL 63% reduction	16 inches FL 63% reduction
Size & Trip	14" FL & 200 pounds 49% reduction	15" FL & 210 pounds 62% reduction
Size & Trip	13" FL & 110 pounds 50% reduction	14" FL & 90 pounds 62% reduction
Quota	107,000 49% reduction	80,000 61% reduction

Alternative 1: No action. Maintain the 12-inch TL minimum size limit.

Alternative 2: Establish a commercial trip limit of 40 pounds; Reduces landings by 63 percent.

Alternative 3: Increase the commercial size limit to 16 inches FL; Reduces landings by 63 percent.

Alternative 4: Increase the commercial size limit to 15 inches FL and establish a commercial trip limit of 210 pounds; Reduces landings by 62 percent.

Alternative 5. Increase the commercial size limit to 14 inches FL and establish a commercial trip limit of 90 pounds; Reduces landings by 62 percent.

Preferred Alternative 6: Increase the commercial size limit to 14 inches FL and establish a commercial hard quota of 80,000 pounds in 2008, 93,000 pounds in 2009, 106,000 pounds in 2010, 117,000 pounds in 2011, 127,000 pounds in 2012, and 135,000 pounds in 2013; Reduces landings by 61 percent.

<u>Discussion</u>: A 49 percent or greater reduction in gray triggerfish commercial fishery landings relative to 2000-2004 average landings is needed to end overfishing and achieve the allocated

commercial yield associated with F_{OY}. . The following discussion summarizes the impacts to the physical, biological, social, economic, and administrative environments associated with each of the Action 10 alternatives. For a more detailed discussion of the environmental consequences associated with this action see Section 5.10.

Alternative 1 would maintain status quo commercial regulations, which include a 12-inch TL commercial minimum size limit. The current minimum size limit corresponds to the size-at-first maturity, which is approximately 12 to 14.5 inch TL (Ingram 2001; SEDAR 9 2006b). This size limit is currently not providing adequate protection to gray triggerfish and is allowing overfishing to occur. Maintaining status quo regulations would allow fishing mortality rates to remain well above $F_{30\%SPR}$ and SSB would be well below the SSB at either maximum sustainable yield or optimum yield. Allowing overfishing to continue would negatively affect the stock and lead to lower landings in the future, lower spawning stock biomass, and a truncated size and age distribution.

Alternative 2 would establish a 40-pound trip limit. This trip limit is estimated to reduce commercial landings by 63 percent (SERO 2007b). Implementing a trip limit is expected to reduce commercial landings because gray triggerfish are typically caught as a secondary species on most commercial fishing trips. Fishermen will not likely end their trip once this trip limit is reached because most commercial trips are targeting more economically valuable species, such as snappers and groupers and it is unlikely that fishermen will make more trips to compensate for the trip limit. However, the trip limit is expected to reduce fishing mortality by requiring commercial fishermen to release gray triggerfish once the limit is reached. Because survival after release is high (98.5 percent post-release survival), most fish released in excess of the trip limit would survive.

Alternative 3 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 16 inches FL. Increasing the commercial minimum size limit by 6.56 inches is estimated to reduce commercial landings by 63 percent. The benefits to the biological environment resulting from the 16-inch FL minimum size limit are similar to those described for **Alternative 2** in Action 9. Benefits would include delaying the age and size at harvest and increasing spawning potential (larger, older gray triggerfish produce more eggs). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release and therefore would not significantly diminish the overall effectiveness of this alternative. Increasing the minimum size limit to 16 inches FL would delay harvest of gray triggerfish by as much as three to five years, allowing gray triggerfish to spawn several more years before becoming susceptible to fishing mortality. Additionally, the number of eggs produced by a gray triggerfish increases exponentially by size and age (SEDAR 9 2006b), allowing for increased spawning potential. The average 16-inch FL gray triggerfish produces 4.6 times more eggs per spawning event than the average 12-inch TL gray triggerfish (SEDAR 9 2006b). Unlike **Alternatives 4** and **5**, **Alternative 3** would not establish a trip limit and therefore would allow commercial fishermen to harvest an unlimited amount of gray triggerfish per trip. As the size structure of the stock stabilizes in relation to the new minimum size limit and more legal fish become available, commercial landings are likely to increase.

Alternative 4 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 15 inches FL and establish a 210-pound trip limit. Increasing the commercial minimum size limit in conjunction with a trip limit is estimated to reduce commercial landings by 62 percent. The benefits to the biological environment resulting from the 15-inch FL minimum size limit would be slightly less than **Alternative 3**, because the minimum size limit would be one inch less. Benefits would include delaying the age and size at harvest and increasing spawning potential (larger, older gray triggerfish produce more eggs). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release and therefore would not significantly diminish the overall effectiveness of this alternative. The 210-pound trip limit would reduce fishing mortality and prevent large numbers of gray triggerfish from being landed when fishermen are targeting other species, such as snappers and groupers. The 210-pound trip limit would impact the least number of commercial fishing trips when compared to **Alternatives 2** and **5**.

Alternative 5 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 14 inches FL and establish a 90-pound trip limit. Increasing the commercial minimum size limit in conjunction with a trip limit is estimated to reduce commercial landings by 62 percent. The benefits to the biological environment resulting from the 14-inch FL minimum size limit would be slightly less than for **Alternatives 3** and **4** because commercial fishermen would be allowed to land smaller gray triggerfish on average. Benefits would include delaying the age and size at harvest and increasing spawning potential (larger, older gray triggerfish produce more eggs). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release and therefore would not significantly diminish the overall effectiveness of this alternative. The 90-pound trip limit would reduce fishing mortality and prevent large numbers of gray triggerfish from being landed when fishermen are targeting other species, such as snappers and groupers.

Preferred Alternative 6 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 14 inches FL (16.2 inches TL) and establish a commercial quota based on a 61 percent reduction in commercial harvest. The commercial quota would be 80,000 pounds in 2008, 93,000 pounds in 2009, 106,000 pounds in 2010, 117,000 pounds in 2011, 127,000 pounds in 2012, and 135,000 pounds in 2013. Any increases in the commercial quota after 2010 would be contingent on the results of the next gray triggerfish stock assessment. The hard quota is expected to reduce commercial landings by 61 percent as necessary to end overfishing and rebuild the stock. Increasing the commercial minimum size limit to 14 inches FL will slow the harvest of gray triggerfish and may shorten the length of the seasonal closure associated with meeting the hard quota. The benefits to the biological environment resulting from the 14-inch FL minimum size limit are similar but slightly less than those described for **Alternatives 3** and **4** because commercial fishermen would be allowed to land smaller gray triggerfish on average. Benefits would include delaying the age and size at harvest and increasing spawning potential (larger, older gray triggerfish produce more eggs). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release and therefore would not significantly diminish the overall effectiveness of this alternative.

Alternatives 2 through **6** are all expected to end overfishing. Ending overfishing would benefit the biological environment by increasing SSB and restoring the population to a more natural age and size distribution. If overfishing is ended and fishing mortality is maintained at the fishing mortality rate associated with OY, then SSB is estimated to increase by more than 50 percent by 2012.

All of the alternatives in Action 10 are expected to have minimal effects on the physical environment. Gray triggerfish are rarely the primary target species on a commercial fishing trip and therefore any change in regulations is expected to have a small effect on overall fishing effort and habitat-gear interactions.

Reductions in gray triggerfish commercial landings considered in this action would be expected to result in economic losses to the fleet. For the commercial sector, anticipated annual economic losses during the rebuilding schedule, relative to the status quo range from approximately $0.66 million under **Alternative 4,** which would increase the commercial gray triggerfish minimum size limit to 15 inches (fork length) and set a commercial trip limit of 210 pounds, to approximately $0.77 million under **Alternative 2,** which would establish a commercial gray triggerfish trip limit of 40 pounds. **Preferred Alternative 6** would increase the commercial gray triggerfish minimum size limit to 14 inches (TL) and establish 80,000 lbs hard quota. Losses in economic value incurred by the commercial fleet are expected to reach $0.72 million. **Preferred Alternative 6** appears to be better than the other alternatives considered under this action because it clearly sets a limit to commercial harvests and adjusts the minimum size limit. Given the hardiness and low discard mortality of gray triggerfish, alternatives focusing on size limit adjustments may be superior to those establishing trip limits.

All of the Action 10 alternatives except **Alternative 6** are expected to have small or no effects on the administrative environment. **Alternative 1** would result in no additional regulatory measures to implement or enforce and therefore would have no additional effect on the administrative environment. Implementing a commercial trip limit (**Alternatives 2, 4-5**) would represent a new regulation to enforce and therefore would increase the burden on the administrative environment to determine compliance with regulations; however, trip limits are part of current reef fish regulations and, as such, are routinely enforced. Higher trip limits would have less impact on the administrative environment because fewer trips would meet the higher trip limit, thereby reducing the burden on enforcement to determine compliance. Increasing the minimum size limit (**Alternatives 3-5**) would represent a minor change to existing regulations, and result in only small effects on the administrative environment associated with implementing and enforcing the new size limit. **Preferred Alternative 6** would require monitoring landings of gray triggerfish until the quota is met and noticing the closure which is likely to have the most overall impact on SEFSC, SERO and NMFS Enforcement. However, other quotas have been and are still being monitored in the reef fish complex (red snapper up to 2007 and grouper currently) so the burden is expected not to be significant.

The Council selected **Alternative 6** as preferred because a hard quota is the simplest way to assure the commercial fish does not exceed its share of the resource over the long term. Additionally, it will be less likely that AMs described in Action 7 will be exceeded requiring reductions the following year. The increased minimum size limit was intended to lengthen the fishing season somewhat and standardize size limits across the entire fishery.

3. DESCRIPTION OF THE FISHERY AND AFFECTED ENVIRONMENT

3.1 Description of the Affected Physical Environment

The physical environment for reef fish, including greater amberjack and gray triggerfish, 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 km^2), including state waters (Gore 1992). It is a semi-enclosed, oceanic basin connected to the Atlantic Ocean by the Straits of Florida and to the Caribbean Sea by the Yucatan Channel. Oceanic conditions are primarily affected by the Loop Current, 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. In the Gulf, adult greater amberjack are pelagic and epibenthic, occurring over reefs and wrecks as well as around buoys. Adult gray triggerfish are associated with natural and artificial reefs, although will move away from reef structures to feed (GMFMC, 2004a).

Environmental Sites of Special Interest Relevant to Greater Amberjack and Gray Triggerfish (Figure 3.3.1)

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

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.

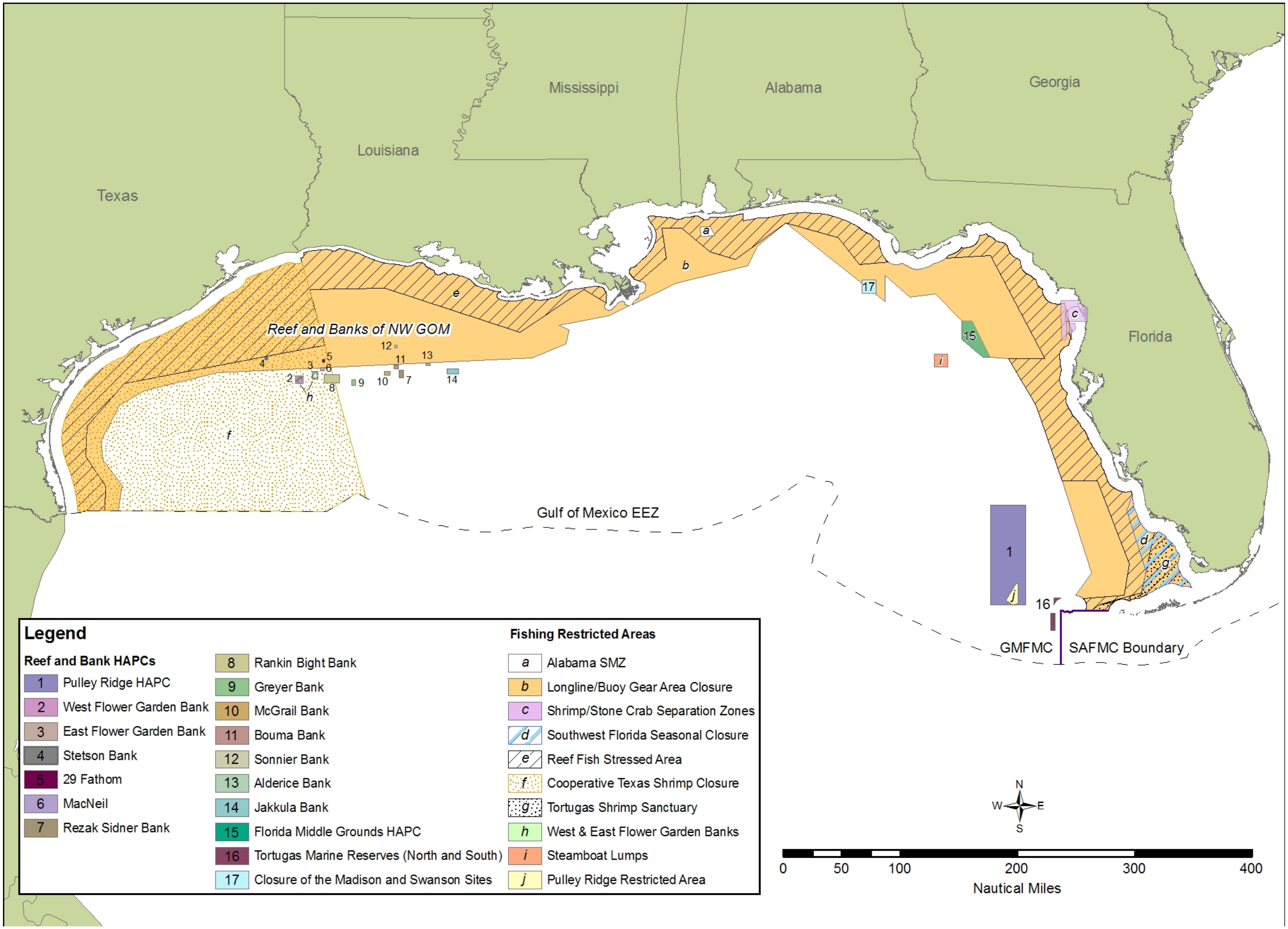

Figure 3.2.1 Map of most fishery management closed areas in the Gulf of Mexico

3.2 Description of the Affected Biological Environment

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

<u>Reef Fish Including Greater Amberjack and Gray Triggerfish</u>

Greater Amberjack Life History and Biology

Greater amberjack demonstrate the typical reef fish life history pattern (Table 3.2.2.1). Eggs and larvae are pelagic and smaller juveniles (<20 mm SL) are found associated with pelagic Sargassum mats (Bortone et al. 1977; Wells and Rooker 2004a). Juveniles then shift to demersal habitats (5-6 months), where they congregate around reefs, rock outcrops, and wrecks. Since greater amberjack are only seasonally abundant in certain parts of their range, they likely utilize a variety of habitats and/or areas each year. A more complete description of greater amberjack life history can be found in the Council's EFH EIS (GMFMC, 2004a). In the Gulf, spawning is protracted (January to May), with peak spawning occurring in the spring (Burch 1979; Beasley 1993; Wells and Rooker 2004; Harris et al. 2004). The age and size at sexual maturity for greater amberjack in the Gulf of Mexico is not known well. Harris et al. (2004) reported all female greater amberjack taken off the U. S. Atlantic coast were mature by 865 mm FL and age 4.2 years. For males, it was 795 mm FL and 3.5 years. Greater amberjack have been reported to live as long as 17 years (Manooch and Potts 1997a) and commonly reach sizes greater than 1000 mm FL. Females reach larger sizes at age than males (Harris et al. 2004).

Status of the Greater Amberjack Stock

See Section 1.2.

Gray Triggerfish Life History and Biology

Unlike most reef fish species, gray triggerfish incubate their eggs in demersal nests between within 12 to 58 hours, after which they enter the plankton (Thresher, 1984). Like greater amberjack, larvae and small juveniles are associated with seaweed and flotsam (mostly Sargassum). Ingram (2001) reports that gray triggerfish settle to benthic habitats between 40 and 160 mm FL based on settlement marks in the first dorsal spine of trawl-caught gray trigger. Adults inhabit reef areas (natural and artificial reefs, low or high-relief reefs) in waters deeper than 10 m (Smith, 1976; Johnson and Saloman, 1984, Ingram, 2001). Spawning primarily occurs during the summer and early fall (Dooley 1972; Wilson et al. 1995; Hood and Johnson 1997). Gray triggerfish live to at least 14 years old (Hood and Johnson 1997) with most harvested fish between 2- and 4-years old (Johnson and Saloman 1984; Wilson et al. 1995; Hood and Johnson 1997; Ingram 2001). Growth of gray triggerfish in the Gulf is rapid, attaining a mean length of at least 260 mm FL during their second year (Hood and Johnson 1997), and can attain a maximum sizes over 600 mm FL.

Status of the Gray Triggerfish 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 GOM (SEA 1998). NOS obtained fishery-independent data sets for the GOM, 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 GOM, occupying both pelagic and benthic habitats during their life cycle. Habitat types and life history stages are summarized in Table 3.2.2.1 and can be found in more detail in GMFMC (2004a). In general, both eggs and larval stages are planktonic. Larvae feed on zooplankton and phytoplankton. Exceptions to these generalizations include the gray triggerfish that lay their eggs in depressions in the sandy bottom, and gray snapper whose larvae are found around submerged aquatic vegetation (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 3.2.2.1. 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	Pelagic	Pelagic				Hard bottoms	
Mutton snapper	Reefs	Reefs	Reefs	Mangroves, Reefs, SAV, Emergent	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

Common name	Eggs	Larvae	Post-larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
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	
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				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

Common name	Eggs	Larvae	Post-larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
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
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

Common name	Eggs	Larvae	Post-larvae	Early Juveniles	Late juveniles	Adults	Spawning adults
Warsaw grouper	Pelagic	Pelagic			Reefs	Hard bottoms, Shelf edge/slope	
Snowy grouper	Pelagic	Pelagic		Reefs	Reefs	Hard bottoms, Reefs, Shelf edge/slope	
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 3.2.2.2). Stock assessments have been conducted on 11 species: red snapper (SEDAR 7, 2005), vermilion snapper (Porch and Cass-Calay, 2001; SEDAR 9, 2006c), 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, 2006a), hogfish (Ault et al., 2003; SEDAR 6, 2003a), 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 fourth 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 three as undergoing overfishing (red snapper, gag, 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. The Council is developing Amendment 30B to address overfishing for gag. This amendment addresses overfishing for gray triggerfish, and greater amberjack. Based on the preferred definition for MSST in this amendment, gray triggerfish is considered overfished. 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 3.2.2.2 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	Not overfished overfishing
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 overfishing
Gag	Mycteroperca microlepis	Unknown, overfishing
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) and the February 2005 ESA biological opinion on the reef fish fishery (NMFS 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 2008 Marine Mammal Protection Act List of Fisheries as Category III fisheries (73 FR 66048). 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 these fisheries. Bottlenose dolphins may predate and depredate on the bait, catch, and/or released discards of the reef fish fishery. They are also a common predator around reef fish vessels, feeding on the discards.

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

Smalltooth sawfish 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 2005). Fishermen in this fishery are required to follow smalltooth sawfish safe handling guidelines. The long, toothed rostrum of the smalltooth sawfish causes this species to be particularly vulnerable to entanglement in fishing gear.

3.3 Description of the Fishery and Economic Environment

3.3.1 Commercial Sector

Introduction

This economic description of the Gulf of Mexico finfish (GOMFF) fishery and the sectors that land greater amberjack (GAJ) and gray triggerfish (GTR) focuses on the commercial harvesting fleet. There is some overlap between the for-hire and the commercial harvesting fleets in the GOMFF fishery (especially for GTR) as some vessels engage in both for-hire recreational activities and the commercial harvest and sale of GOMFF species.

In this description of the fishery we take a broader view of U.S. Gulf of Mexico (Gulf) GAJ and GTR fishing effort and subsequent economic impact than the biological perspective employed by SEDAR 9. Assessment biologists are primarily interested in commercial fishing targeting Council managed species within Gulf waters (i.e., Fisheries Logbook System (FLS) statistical grids 1-22). The mortality rate (F) of the biological stock determines landings and catch per unit of effort (CPUE) within the Council's geographic and regulatory boundaries. For the years 1993-2005, SEDAR 9 assessed Gulf GAJ and GTR stocks in part by estimating the amount of commercial harvests attributed strictly to Gulf waters. These estimates were formed by applying gear- and area-specific landings proportions derived from historical CFLP trip-level data to aggregated landings data from the Accumulated Landings System (ALS) database. Estimated commercial landings provided a direct link from Gulf commercial fishing effort to Gulf biomass through geographically bounded F and CPUE.

Economists, on the other hand, are concerned not only about the socioeconomic impact of commercial fishermen operating in Gulf waters but also any activities that may influence the economic well-being of industry stakeholders and dependent communities within its terrestrial jurisdiction. Commercial fishing operators can affect Gulf economic activity in two main ways. First, due to commonality in species composition and commercial permitting between the Gulf reef fish and south Atlantic snapper grouper fisheries, operators can fish for reef fish in Gulf waters with a proper permit, but that does not preclude them from landing their catch in Atlantic states if they have the appropriate permits or purchasing inputs from Atlantic businesses. In this case, the Gulf biological resource is depleted and some percentage of the wealth generated by its extraction and sale is transferred outside the Council's land jurisdiction to Atlantic communities[1]. Since the catch has economic value, and overall Gulf rents are directly impacted by the wealth transfer, Gulf economic impact analyses should include all fishing activity within the Council's jurisdictional waters regardless where the catch was landed. Second, fishermen could fish in areas outside of the Gulf but land their fish and pay operating expenditures in Gulf communities. This is a common complexity when assessing fishing effort and economic impacts in Monroe County, FL[2]. In this case, Gulf economic impact analyses should include all landings activity taking place within the Council's land jurisdiction since the initial economic activity affects Gulf commercial stakeholders and eventually spreads throughout dependent Gulf communities. The implications of the differences in biological and economic perspectives will be highlighted as we describe the commercial fishery in more detail.

In this analysis we also include finfish other than reef fish in the economic description of the primary Gulf fishery even though the amendment under review applies to the Gulf of Mexico Reef Fish FMP. The reasoning for this is twofold. First, the Council is tasked to manage a variety of species under different fishery management plans including reef fish, sharks,

[1] From an economic perspective, negative impacts on biomass may result in additional economic loss known as opportunity costs; however, this concept is beyond the scope of this document.

[2] Although northern Monroe County is clearly a Gulf community, the Florida Keys could be characterized as either a Gulf or south Atlantic community or both. Since Monroe County is classified as a west Florida area by CFLP, we consider the Florida Keys, which is part of Monroe County, to be part of west Florida and thus a Gulf community.

dolphin/wahoo, mackerels, stone crab and spiny lobster. In general, socioeconomic impacts associated with amendments to the Gulf of Mexico Reef Fish FMP should be viewed broadly, including possible effects on substitutable Council managed finfish species other than reef fish which also contribute to overall Gulf commercial fishing rents. Second, a significant portion of Gulf commercial operations exhibit switching behavior across species, fishing areas, and gears employed. Again, Gulf of Mexico Reef Fish FMP socioeconomic impact analyses should take a broad perspective and anticipate that alternative targeting strategies could include any Council regulated finfish species. Historically, fishery management failures can be partly traced back to situations where managers failed to anticipate behavioral changes in heterogeneous commercial operations in response to narrowly focused regulations.

Gulf Fleet Description

The commercial GOMFF fleet is comprised of vessels that utilize a number of different gear types and target a variety of species. This introductory section describes the main trends at the trip- and vessel-levels for the overall fishery and the GAJ and GTR sectors. A GOMFF, GAJ and GTR trip is defined as a trip where at least one pound of a Gulf finfish, GAJ and GTR species, respectively, was landed by a vessel possessing a GOMRF, mackerel, shark, highly migratory species or dolphin/wahoo permit. Subsequent sections present more detailed discussions about landings and revenues, species allocations, the distribution of fishing activity by state/region, gear and season, and harvesting costs and profits.

During the period 1993 to 2005, number of trips, number of active vessels, and effort (measured by days fished), experienced both decreasing and increasing trends for GOMFF, GAJ and GTR (Figures 3.3.1-3). A significant decline in these parameters was observed from 2003 to 2005. Some of this decline may be attributed to impacts associated with the 2004 Gulf hurricane season especially for Louisiana operations.

Commercial trips throughout the Gulf have declined significantly from 2003 to 2005 (Figure 3.3.1). According to CFLP reports, GOMFF trips have declined by 22% over this time period while GAJ and GTR trips in 2005 constituted only 81% and 73% of their 2003 totals, respectively. All three sectors reported historical lows in 2005 for the number of trips reported to CFLP.

The number of GOMFF and GTR trips reached a maximum in 1999 while GAJ trips peaked in 1997. GAJ trips suffered a major decline (24%) in 1998 as an annual Gulf wide closure was implemented for the commercial GAJ fishery during the months of March, April and May. Since 1998 GAJ trips have been variable while imaging the Gulf wide declining trend from 2003 to 2005.

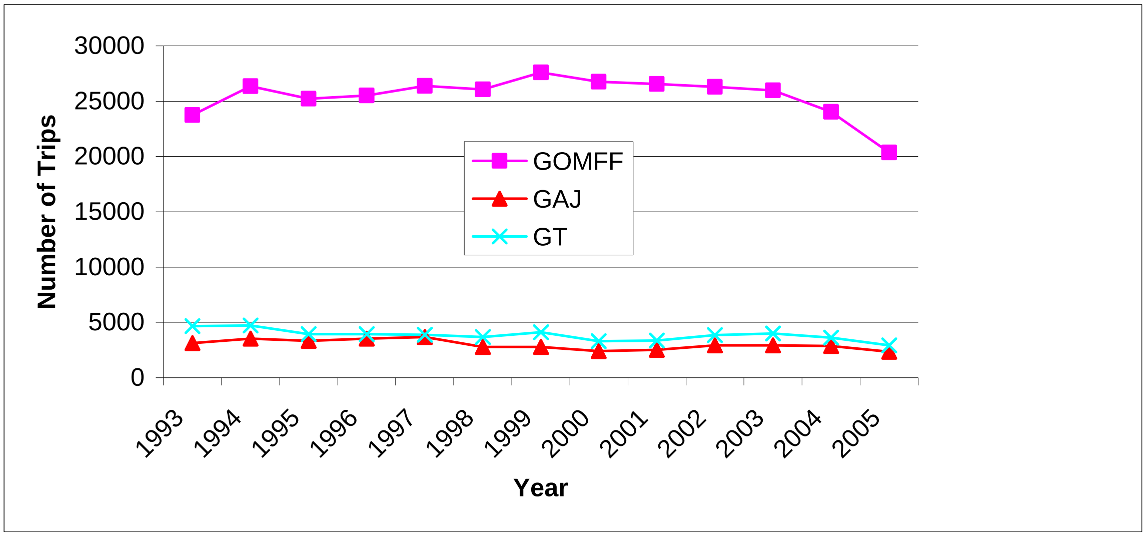

Figure 3.3.1 Number of trips that landed in Gulf states or caught in Gulf waters Council managed finfish species (GOMFF), greater amberjack (GAJ) and gray triggerfish (GTR) from 1993-2005. Data source: NMFS .

The number of vessels reporting landings of GOMFF, GAJ and GTR similarly fluctuated then declined during 2003 to 2005 for all three sectors (Figure 3.3.2). The number of vessels landing GOMFF, GAJ and GTR declined 10%, 10% and 7% from 2003 to 2005, respectively. The 2004 Gulf hurricane season may have caused a significant number of vessels to be inactive in 2005 due to physical damage.

Since GAJ and GTR are bycatch species on many trips, the distribution of active vessels based on relative harvests may identify primary targeting and bycatch components of the GAJ and GTR sectors. This allocation has important implications for proposed trip limits.

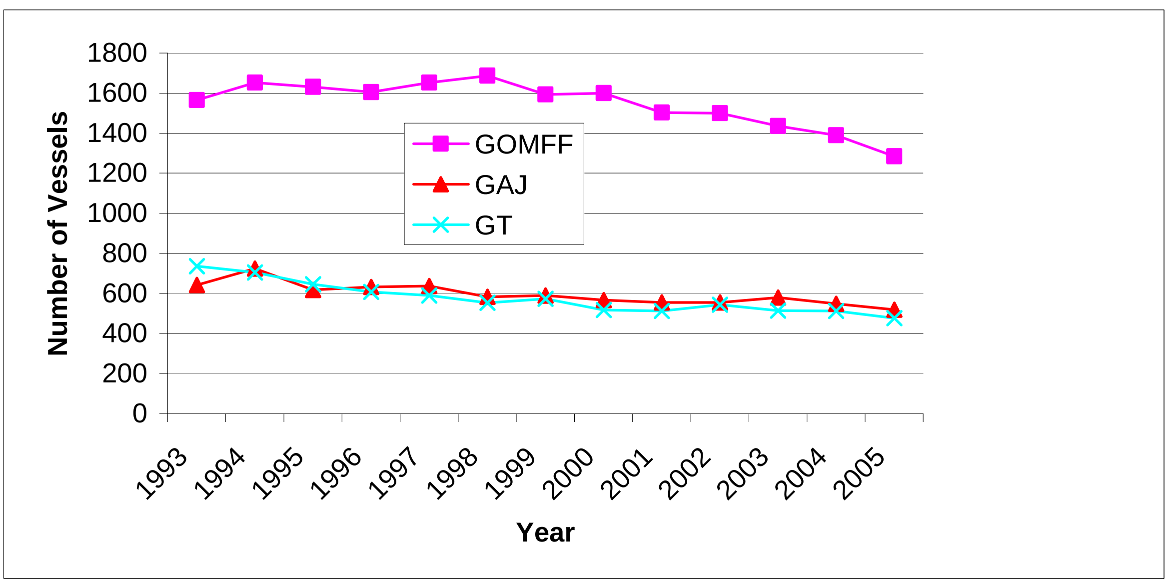

Figure 3.3.2. Number of vessels that landed in Gulf states or caught in Gulf waters Council managed finfish species (GOMFF), greater amberjack (GAJ), and gray triggerfish (GTR) from 1993-2005. Data source: NMFS CFLP.

Although in absolute terms active vessels are declining Gulf wide, the relative distribution of active vessels based on volume of catch has basically stayed constant (Table 3.3.1). In 2004 and 2005 more than 40% of permitted vessels actively participating in the GOMFF fishery reported annual landings over 10,000 pounds. In 2005 only 6% of vessels reporting GAJ landings caught over 10,000 pounds of GAJ, and only 9% of vessels landing GTR reported over 1,000 pounds of GTR landings. With more than a quarter of vessels landing GAJ and more than half of vessels landing GTR reporting less than 100 pounds of annual landings of those species, it would appear that a relatively large number of vessels either operate on a part time basis in the GAJ and GTR sectors, and/or these species are sources of secondary revenue for operators primarily targeting other reef fish.

Vessels landing more than 1,000 pounds of GAJ seem to have been significantly reduced from 2004 to 2005 relative to other classes of active GAJ vessels (28% reduced to 23%) (Table 3.3.1). It is unclear if these vessels exited the fishery or reduced their catch of GAJ. Regardless, in light of this relative decline, proposed GAJ trip limits in Amendment 30A, which range from 700 to 1,100 pounds, may impact a smaller portion of active GAJ vessels than in previous years due to exogenous factors associated with Gulf wide commercial attrition during 2004-2005.

Table 3.3.1 Distribution of vessels that landed in Gulf states or caught in Gulf waters Council managed finfish species (GOMFF), greater amberjack (GAJ) and gray triggerfish (GTR) from 1993-2005. Data source: NMFS CFLP.

	2000	2001	2002	2003	2004	2005
Number of vessels landing Gulf species :						
Gulf of Mexico Finfish	1,600	1,502	1,500	1,436	1,389	1,285
Greater Amberjack	566	555	555	579	548	519
Gray Triggerfish	517	513	544	514	513	477
Number of vessels with more than 100 lbs. of landings:						
Gulf of Mexico Finfish	1,530 95.6%	1,464 97.5%	1,459 97.3%	1,395 97.1%	1,338 96.3%	1,229 95.6%
Greater Amberjack	388 68.6%	373 67.2%	386 69.5%	406 70.1%	385 70.3%	371 71.5%
Gray Triggerfish	207 40.0%	228 44.4%	231 42.5%	238 46.3%	244 47.6%	205 43.0%
Number of vessels with more than 1,000 lbs. of landings:						
Gulf of Mexico Finfish	1,250 78.1%	1,241 82.6%	1,204 80.3%	1,162 80.9%	1,109 79.8%	1,046 81.4%
Greater Amberjack	144 25.4%	147 26.5%	150 27.0%	168 29.0%	155 28.3%	120 23.1%
Gray Triggerfish	34 6.6%	45 8.8%	66 12.1%	66 12.8%	66 12.9%	44 9.2%
Number of vessels with more than 10,000 lbs. of landings:						
Gulf of Mexico Finfish	585 36.6%	580 38.6%	589 39.3%	571 39.8%	562 40.5%	517 40.2%
Greater Amberjack	22 3.9%	21 3.8%	24 4.3%	36 6.2%	36 6.6%	31 6.0%
Gray Triggerfish	0 0.0%	0 0.0%	1 0.2%	1 0.2%	0 0.0%	0 0.0%
Number of vessels with more than 100,000 lbs. of landings:						
Gulf of Mexico Finfish	51 3.2%	62 4.1%	59 3.9%	68 4.7%	55 4.0%	51 4.0%
Greater Amberjack	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
Gray Triggerfish	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%

Likewise, GTR vessels experienced similar attrition from 2004 to 2005 as those landing over 100 pounds of GTR experienced a relative decline (48% to 43%) (Table 3.3.1). Trip limits proposed in Amendment 30A also may impact a smaller portion of active GTR vessels than in previous years. However, the majority of these operations land GTR as a bycatch species, so negative socioeconomic impacts may arise due to opportunity costs, such as bycatch mortality and producer avoidance/disposal of GTR, as well as from direct reduction in secondary income from GTR.

Commercial effort throughout the Gulf (measured by days fished) has also declined significantly from 2003 to 2005 (Figure 3.3.3). According to CFLP reports, GOMFF days fished have declined by 21% over this time period while days fished for trips landing GAJ and GTR in 2005 constituted only 73% and 77% of total days fished in 2003 for GAJ and GTR trips, respectively. All three sectors reported historical lows in effort in 2005 as reported to CFLP. The days fished on trips that landed GAJ declined at a faster rate during 2003-2005 than the number of trips declined (73% compared to 81%), suggesting that the average trip length in the GAJ sector has been reduced recently.

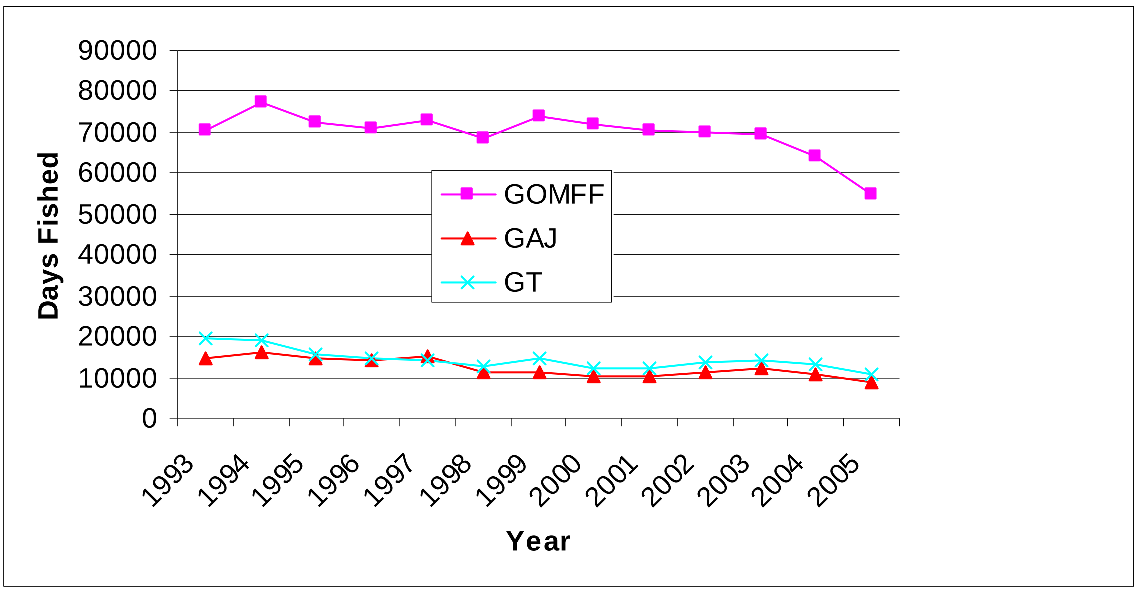

Figure 3.3.3. Effort (measured by days fished) by vessels that landed in Gulf states or caught in Gulf waters Council managed finfish species (GOMFF), greater amberjack (GAJ) and gray triggerfish (GTR) from 1993-2005. Data source: NMFS CFLP.

Gulf Landings and Revenues

The GOMFF complex is important to the commercial harvesting sector in the Gulf of Mexico. In 2005, Gulf-related commercial effort exerted by vessels possessing Gulf of Mexico reef fish, south Atlantic snapper-grouper, king and Spanish mackerel, shark, and/or Atlantic dolphin and wahoo permits and reporting to CFLP resulted in 26.3 million pounds of landings with an ex-vessel value of $50.9 million (NMFS CFLP). These figures include all Council managed finfish landed in Gulf states or caught in Gulf waters as documented by CFLP mandatory trip-level reporting and reflect our broad definition of Gulf economic activity. The GAJ and GTR sectors contributed 1.1 million pounds/$1.0 million and 154,000 pounds/$157,000 to these totals, respectively (NMFS CFLP).

Average unit prices adjusted for inflation have been relatively stable for all GOMFF species from 1993 to 2005 (Figure 3.3.4) ranging from $1.80 in 2003 to $1.97 in 1998. In recent years the average price for GAJ has decreased 25% from 2000 to 2005. In comparison, GOMFF and GTR average prices have declined 6% and 17%, respectively.

Gulf prices depend on the quantity of landings, product quality, and market conditions, such as the availability of imports, relative prices of substitute goods, and consumer income levels. Under normal conditions one would not expect market prices to decrease over time as prices should at least account for inflation. Imports have been a factor in price depression throughout the Gulf since 2000. This is likely illustrated in 2005 when average prices did not respond to a significant drop in harvests for all three sectors. As domestic demand for seafood products has increased in recent years, this suggests, all other things being equal, that Gulf finfish are becoming more price elastic due to increased competition from foreign harvested substitutes.

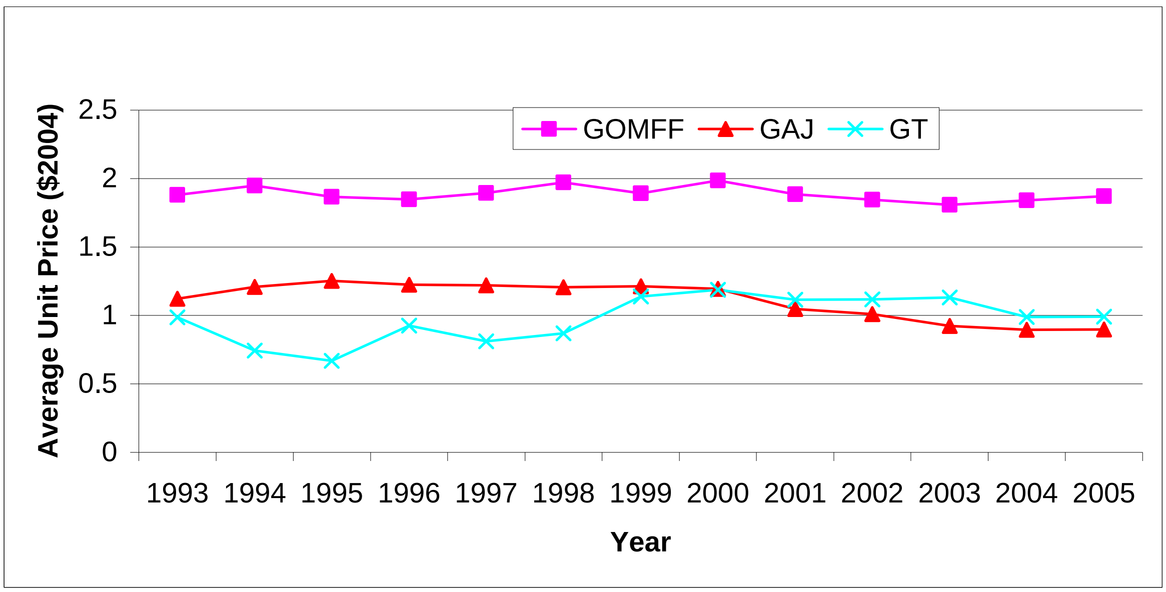

Figure 3.3.4. Trends in unit price (adjusted for inflation, base year 2004) for Council managed finfish species (GOMFF), greater amberjack (GAJ) and gray triggerfish (GTR) landed in Gulf states or caught in Gulf waters from 1993-2005. Data source: NMFS CFLP, Consumer Price Index for All Urban Consumers (CPI-U).

It is reasonable to expect that imports influence domestic prices. From the point of view of fishermen, imports contribute to depressed dockside prices. However, imports increase the aggregate U.S. supply of finfish, which leads to lower retail prices for consumers. Thus, consumers in this country benefit from imports although there are also balance of trade considerations with imports, which affect the buying power of U.S. consumers in the long run. Imports also benefit some wholesalers and retailers in the fishing industry especially at times when the domestic fishery is unable to supply current market needs.

Apart from the response to fishery management regulations, fluctuations in landings and revenues can also be partly attributed to changes in stock abundance and availability, market conditions and fleet dynamics. The following subsections investigate the landings and revenues associated with the GOMFF, GAJ and GTR fishery sectors. Landings data from CFLP, ALS and SEDAR 9 are presented to illustrate the difference between economic and biological perspectives of Gulf commercial activity.

Gulf of Mexico Finfish Fishery

According to CFLP reports, there was an increasing trend in overall Gulf finfish ex-vessel landings and value from 1993 to 1999 (Figure 3.3.5). On the other hand, ALS aggregate landings of the same finfish species exhibited a declining trend during the same time period. This difference may have been caused in part by reporting irregularities involving landings of mackerels. Fishermen were not required to report such landings to CFLP before 1998. During 1993-1999, CFLP finfish landings increased from 25 million pounds to 30 million pounds (20% increase), and real ex-vessel revenue increased from around $47 million to $57 million (21% increase)[3]. Given a relatively stable average price for GOMFF species, revenue increases for the entire fishery seemed to be directly attributable to increased harvest levels during 1993-1999.

After 1999, CFLP and ALS reported landings started to converge although ALS annual landings typically were about 5% higher than those reported to CFLP (Figure 3.3.5). CFLP landings were relatively constant averaging close to 30 million pounds from 2000-2004, while average real revenues for this time period were near $56 million. Prior to the peak year of 1999, on average GOMFF commercial fishermen landed 26 million pounds annually generating ex-vessel real revenues near $49 million. Thus, average annual landings in the fishery increased by 15%, and real revenues increased by 14% when 1993-1998 is compared to 2000-2004. In 2005 this upward trend was not upheld. GOMFF landings and real ex-vessel revenues were both down 12% in 2005 compared to average annual landings and revenues from 2000-2004. Average unit GOMFF prices adjusted for inflation increased $.03 or only about 2%.

[3] All landings are reported in whole weights, and revenues are calculated using landings from CFLP and average prices derived from ALS. When revenues are adjusted for inflation (i.e., real) they are reported in 2004 dollars and derived using the Consumer Price Index for All Urban Consumers (CPI-U).

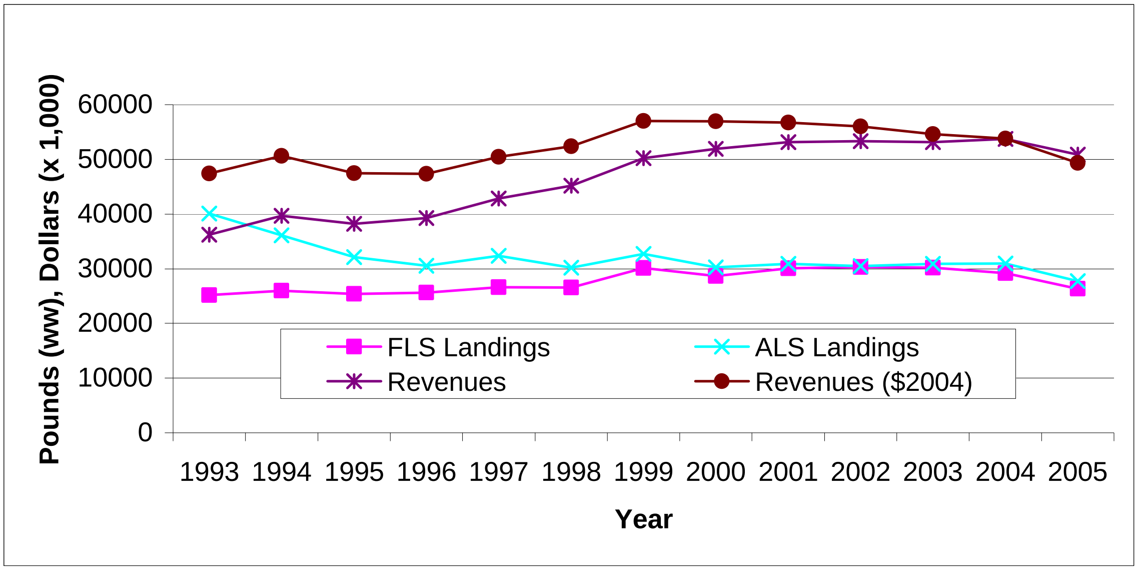

Fig. 3.3.5. Trends in dockside landings and nominal and real (base year 2004) ex-vessel revenue for GOMFF species landed in the Gulf of Mexico region or caught in Gulf waters during 1993-2005. Data sources: NMFS CFLP, Consumer Price Index for All Urban Consumers (CPI-U).

Gulf of Mexico Greater Amberjack Sector

According to CFLP reports, annual GAJ ex-vessel landings and value from 1993 to 1997 were at historically high levels (Figure 3.3.6). During this period GAJ landings averaged about 1.3 million pounds, and real ex-vessel revenue averaged around $1.6 million. Average real prices remained stable in the $1.20 range during this time period. In 1998 the Council implemented a seasonal closure for March, April and May causing CFLP reported landings and inflation-adjusted revenue to decrease 22% and 23%, respectively, in one year. Landings eventually recovered to pre-closure levels by 2004; however, average real prices started to drop significantly in 2001 causing real revenue increases to be proportionately smaller than the gains being reported in GAJ landings. Average real prices bottomed out at $0.89 in 2004. GAJ landings and real ex-vessel revenue were both down 18% in 2005 compared to 2004 figures while average unit prices adjusted for inflation increased only $.01 to $.90.

Commercial landings of GAJ as estimated by SEDAR 9 are also included in Figure 3.3.6. Except for 1993, Gulf GAJ landings reported to CFLP have been higher than those estimated by SEDAR 9 sometimes by as much as 400,000 pounds. This difference in landings illustrates the discrepancy between the biological and economic perspectives towards relevant Gulf commercial fishing activity. The economic perspective identifies Gulf activity as landings in Gulf waters as well as catches from Atlantic waters that were landed in Gulf states. The biological perspective only identifies Gulf activity with Gulf landings that took place in Gulf territorial waters. The majority of this difference can be attributed to GAJ caught in south Atlantic waters around the Florida Keys and landed in Monroe County, FL.

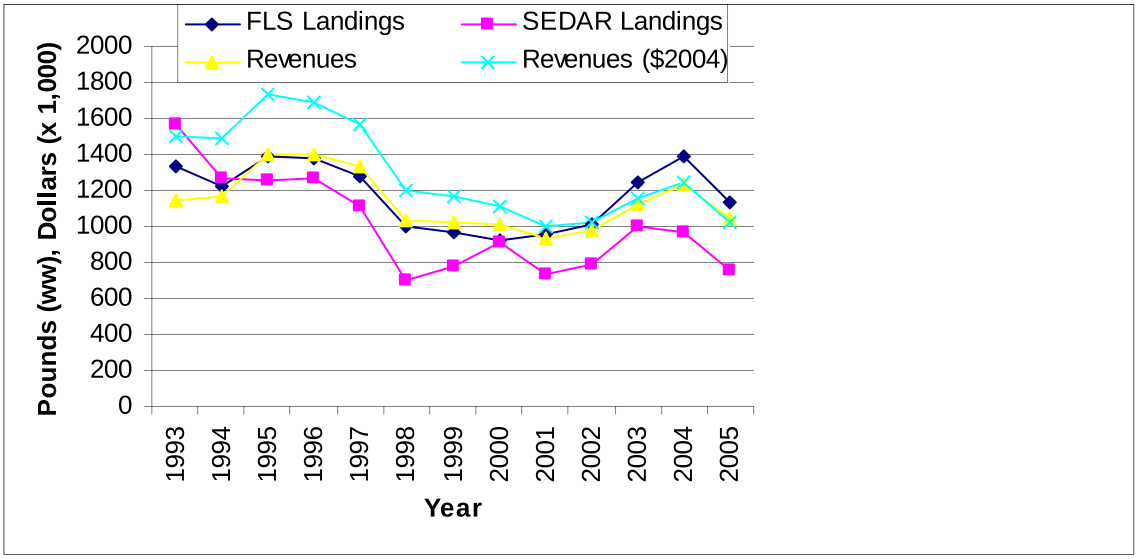

Fig. 3.3.6. Trends in dockside landings and nominal and real ex-vessel revenue for greater amberjack landed in the Gulf of Mexico region or caught in Gulf waters during 1993-2005. Data sources: NMFS CFLP, CPI

The revenue derived from sales of these landings is attributed to communities under the jurisdiction of the Gulf Council although the physical resource is under the jurisdiction of the South Atlantic Council[4]. This discrepancy is not trivial either, amounting to $268,000 on average annually during 2000-2005 (Figure 3.3.7). In fact, ex-vessel revenues in west Florida (wF) for 2005 are trending above the six year average suggesting more effort is currently focused on GAJ in the Florida Keys than in the past. This is worrisome as increased Gulf regulations could unintentionally shift even more GAJ effort into south Atlantic waters. If these extra fish are landed in Monroe County, an even greater wealth transfer will occur across political boundaries.

Interestingly, on average SEDAR 9 attributed more revenue to Louisiana (LA) than what was reported to CFLP during 2000-2005 (Figure 3.3.7). Louisiana GAJ revenues were down 48% from the annual CFLP average during 2000-2004 probably due to effects from the 2004 hurricane season.

[4] It can be argued that the Florida Keys are under joint jurisdiction of both the Gulf and South Atlantic Councils; however, the biological perspective employed by SEDAR makes a clear geographic distinction between the Gulf and south Atlantic biological stocks based on roadways in the Florida Keys. As discussed before we defer to the CFLP definition of Monroe County as a west Florida community which includes the Florida Keys.

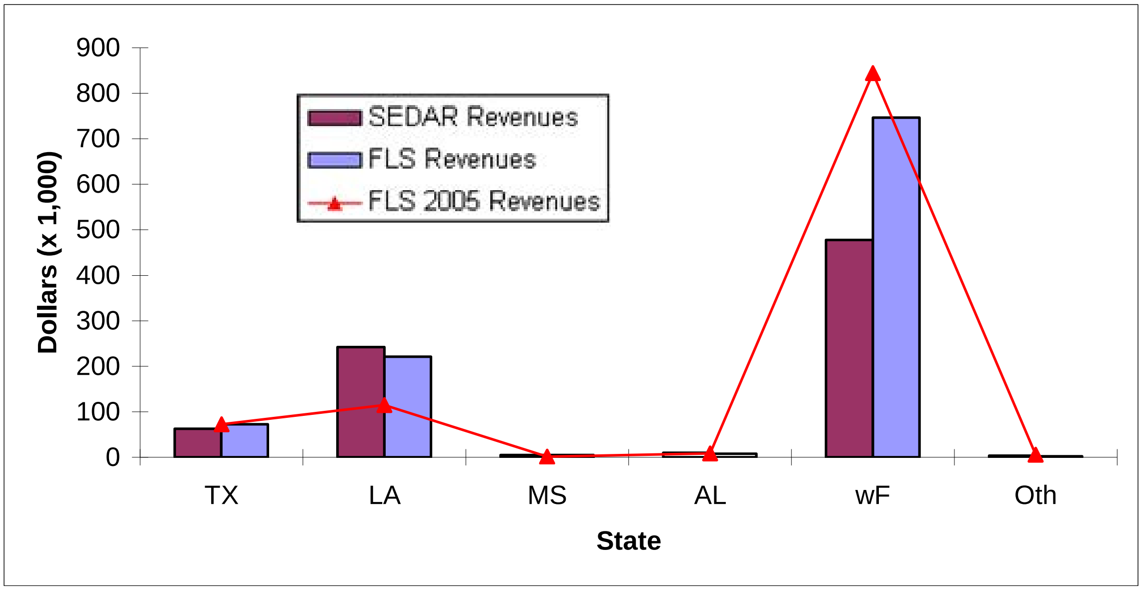

Figure 3.3.7. Average ex-vessel value of landings of greater amberjack by state from 2000-2005 with 2005 CFLP values superimposed. Data sources: NMFS CFLP, NMFS ALS, SEDAR 9.

There is a large amount of seasonal variability in GAJ landings and revenues (Figure 3.3.8). Total landings aggregated by month from 2000-2005 show a relatively high harvest during months immediately prior to and after the seasonal closure in March, April, and May with relatively low landings from September through December. Interestingly, Gulf landings are relatively high for March and May which is supposed to be closed to Gulf commercial GAJ activity. Again, this illustrates the shortcomings of jurisdictional division of the GAJ stock rather than joint management of GAJ around the Florida Keys. Gulf landings of GAJ reported to CFLP are virtually non-existent for the month of April because both the South Atlantic and Gulf Councils have imposed seasonal closures. If one assumes that the Florida Keys are a Gulf community, effort has been active in Atlantic waters during March and May and has been landing that catch in Gulf communities. This creates Gulf economic impacts derived from trips harvesting south Atlantic resources that may not necessarily be impacted by proposed actions in Amendment 30A.

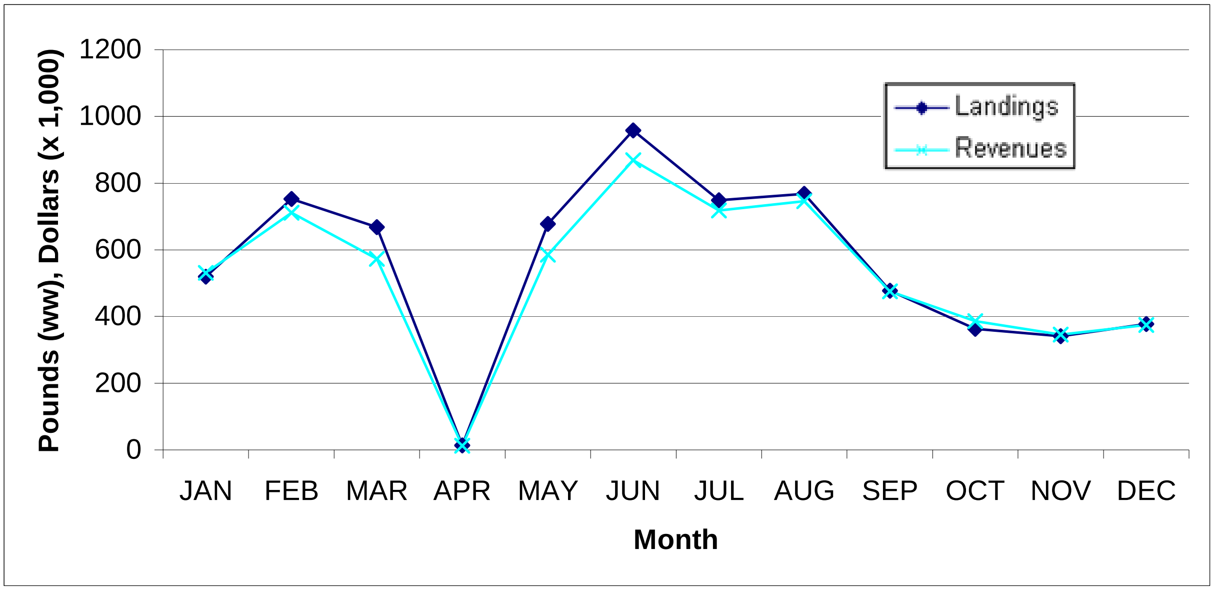

Figure 3.3.8. Seasonal trends in dockside landings and nominal ex-vessel revenue for greater amberjack landed in the Gulf of Mexico region or caught in Gulf waters averaged over 2000-2005. Data sources: NMFS CFLP, NMFS ALS.

Gulf of Mexico Gray Triggerfish Fishery

According to CFLP reports, annual GTR ex-vessel landings and value experienced a downward trend (except for 1999) from 1993 to 2000 (Figure 3.3.9). During this period GTR landings declined from 383,000 pounds in 1993 to 157,000 pounds in 2000 while real ex-vessel revenue declined from $377,000 to $186,000 during the same time period. Average real prices fluctuated widely ranging from $.67 in 1995 to a historical high of $1.19 in 2000. Landings and real revenues increased to 260,000 pounds and $294,000 in 2003 resulting in an average unit price of $1.13. GTR landings and real ex-vessel revenue decreased 41% and 48%, respectively, in 2005 compared to 2003 figures while average unit prices adjusted for inflation decreased 12% to $.99 during the same time period.

Commercial landings of GTR as estimated by SEDAR 9 are also included in Figure 3.3.9. Since 2000, GTR landings reported to CFLP are very similar to those estimated by SEDAR 9. Thus, there is not much difference between the biological and economic perspectives of Gulf fishing activity landing GTR. This is because most of the Florida GTR activity is located significantly north of the Florida Keys and does not cross jurisdictional boundaries. Virtually all of the Gulf economic impact from GTR landings is created by the extraction of the valuable biological resource that is within the geographical boundaries of the Gulf Council. Thus, the economic impacts resulting from GTR trip limits proposed in Action 10 of Amendment 30a are for the most part linked to catch strictly from Gulf waters.

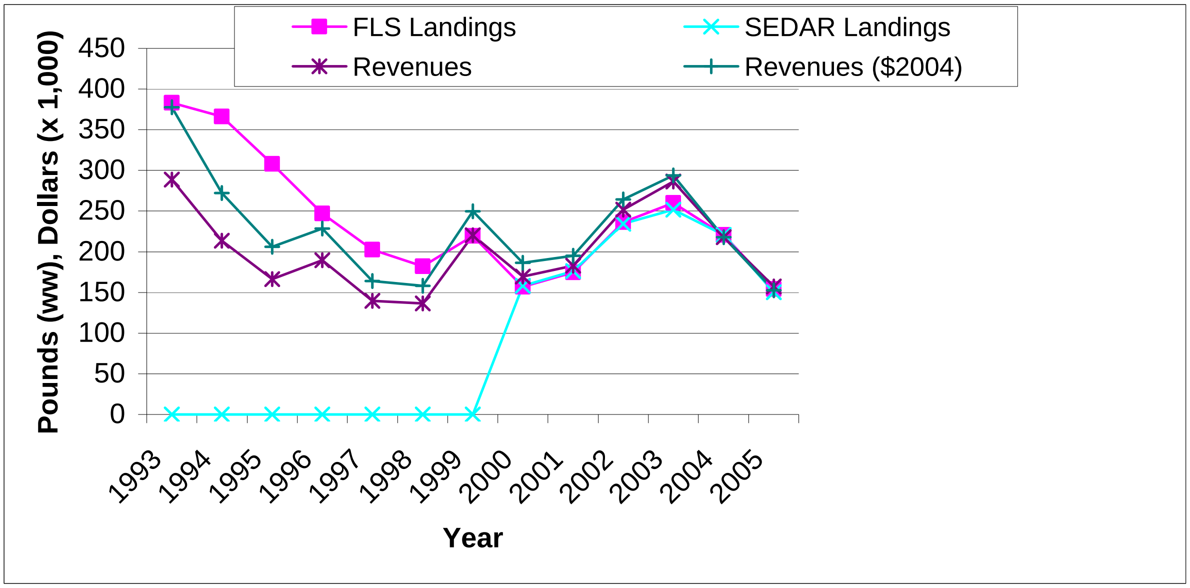

Figure 3.3.9. Trends in dockside landings and nominal and real ex-vessel revenue for gray triggerfish landed in the Gulf of Mexico region or caught in Gulf waters during 1993-2005. Updated SEDAR landings were not available from 1993-1999. Data sources: NMFS CFLP, NMFS ALS, SEDAR9.

There is a large amount of seasonal variability in GTR landings and revenues (Figure 3.3.10). Total landings aggregated by month from 2000-2005 show a relatively high harvest during the spring and relatively low landings in January, July, and September. Increases in March, April and May could reflect some effort shift from the GAJ sector during the Gulf seasonal closure.

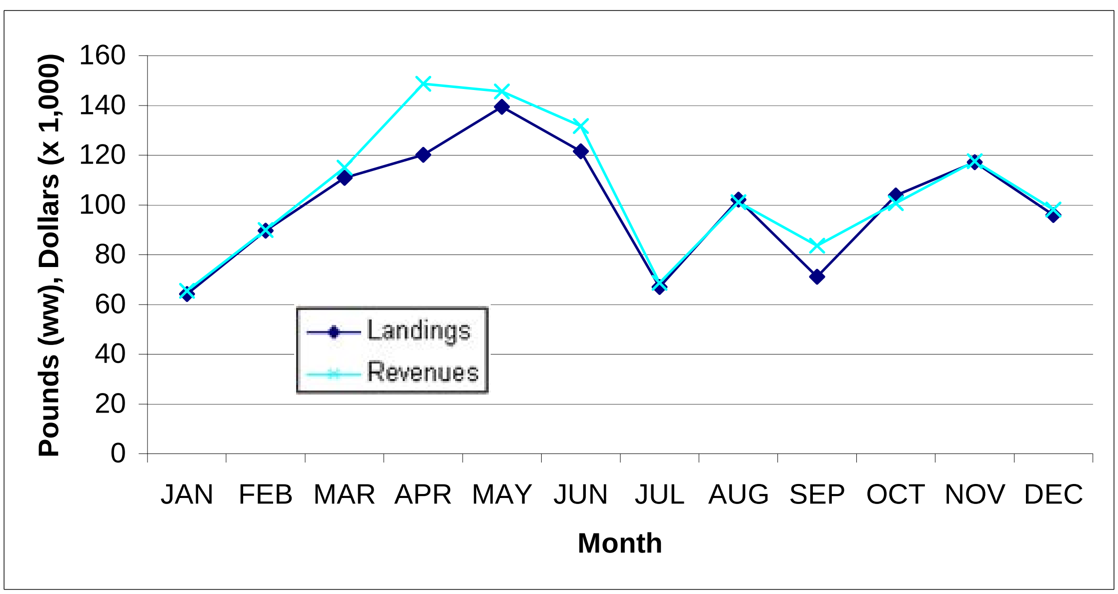

Figure 3.3.10. Seasonal trends in dockside landings and nominal ex-vessel revenue for gray triggerfish landed in the Gulf of Mexico region or caught in Gulf waters averaged over 2000-2005. Data sources: NMFS CFLP.

Species Composition Trends

There are numerous species that make up the U.S. Gulf of Mexico finfish complex and for an analysis of the fishery the entire complex has been divided into 9 groups. In terms of ex-vessel revenue the most important groups that make up the Gulf complex were the shallow water groupers and the mid depth snappers during 2000-2005 (Figure 3.3.11). Of secondary importance in terms of revenue earned by the fleet are shallow water snappers, deep water groupers and coastal migratory pelagics. Among other factors the species composition of the GOMFF catch depends on fishing location within the Gulf of Mexico, gear employed, time of year and allocation of production inputs such as fuel, bait, and ice.

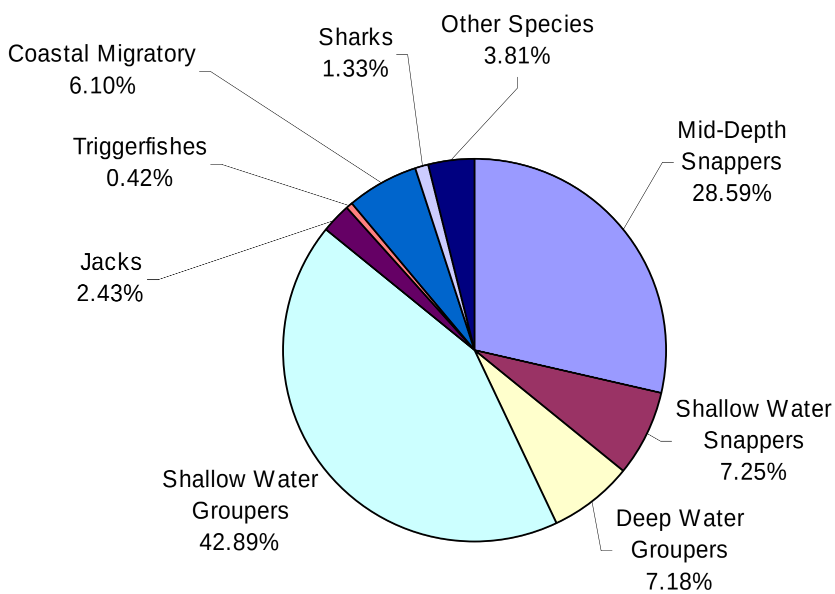

Figure 3.3.11. Proportion of ex-vessel revenue derived from the various groups in the GOMFF complex. Average ex-vessel revenue for the period 2000-2005 was used to calculate the percentage composition. Data sources: NMFS CFLP, NMFS ALS.

In terms of primary targeting fishermen mostly depend on shallow water groupers, shallow water snappers, and mid-depth snappers as primary revenue generators on GOMFF trips (Figure 3.3.12). A species is considered a primary target of a trip if that species contributed a plurality of the final ex-vessel revenues derived from that trip.

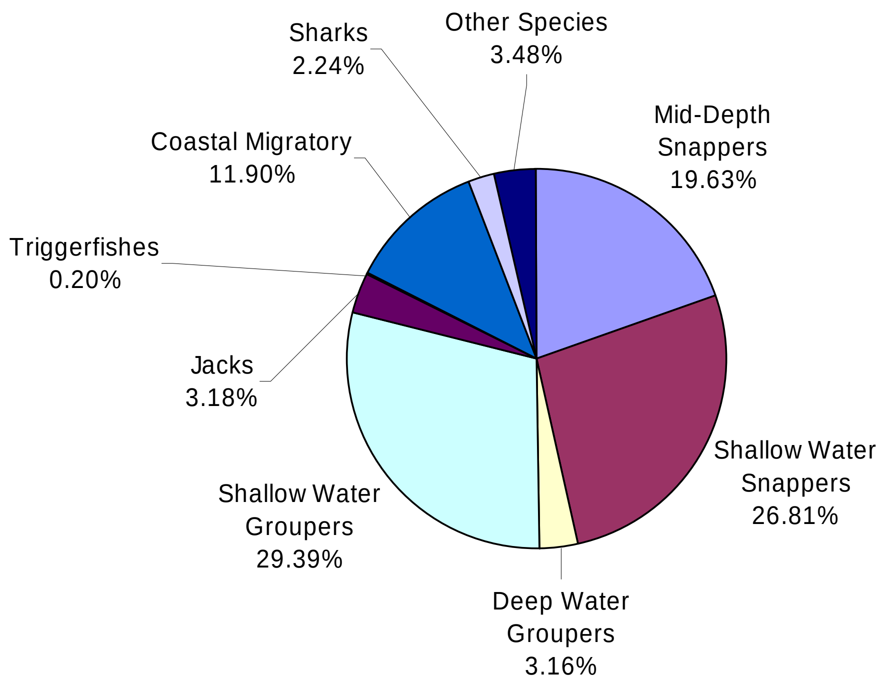

Figure 3.3.12. Proportion of GOMFF trips reported to the Logbook Program during 2000-2005 where the species group was the top revenue-producer. Data sources: NMFS CFLP, NMFS ALS.

There appears to be substantial differences in prices (based on whole weight pounds landed) among the various groups in the Gulf finfish complex. It was decided that these species groupings could be placed into three categories based on the observed average annual price per pound (Figure 3.3.13):

- Low price category - nominal price did not exceed $1.00 per pound during the entire time series. Species groups included the jacks, grunts and other porgies, sea basses, and sharks.

- Medium price category – generally prices ranged from $1.00 to $1.50 per pound. Species groups include tilefishes, coastal migratory pelagics and triggerfishes.

- High price category - the price per pound is usually close to or exceeds $2.00 per pound. The following groups fall in this category: tunas, deep water groupers, mid depth snappers, shallow water groupers, shallow water snappers, and an inclusive other species category.

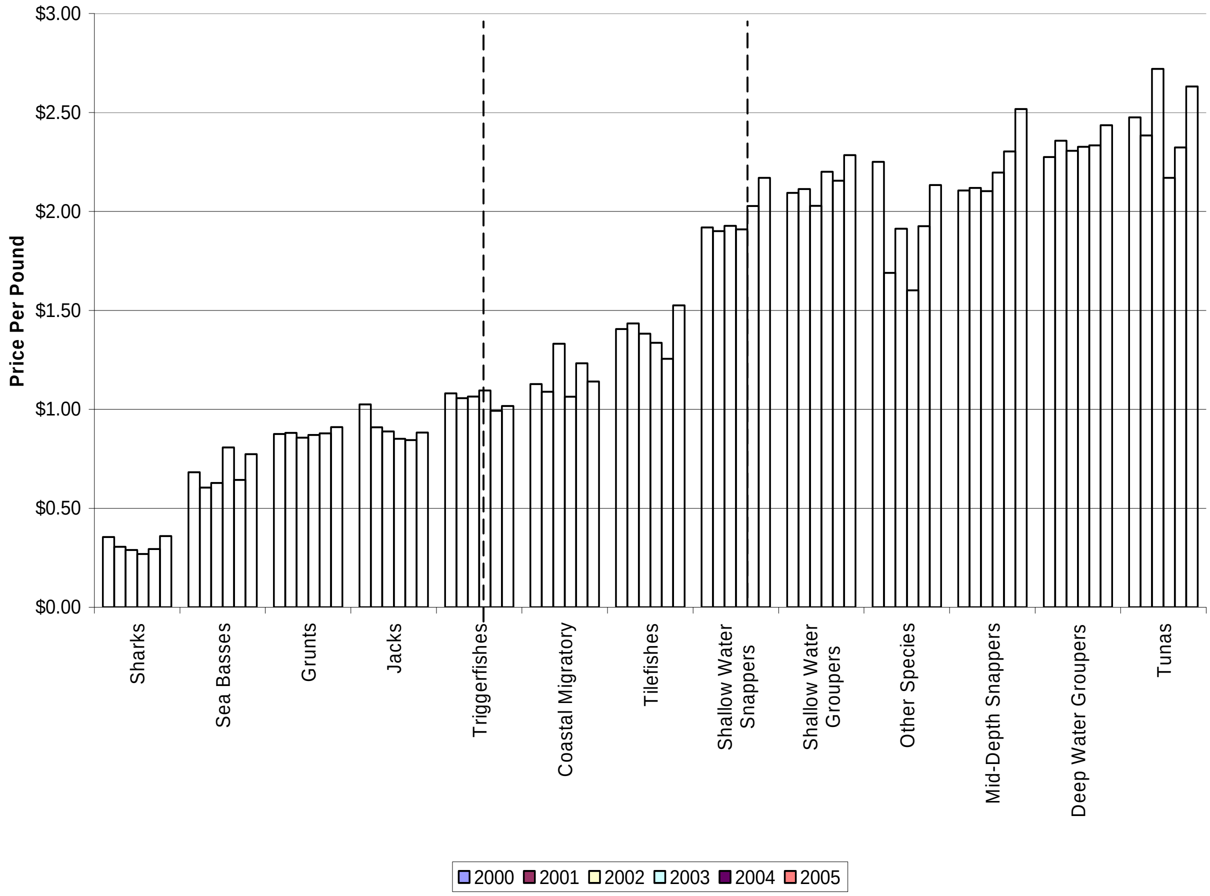

Figure 3.3.13. Average price per pound by species group during the period 2000-2005. Data sources: NMFS ALS.

On average 24,999 GOMFF trips were reported to CFLP annually from 2000-2005 (Table 3.3.2). On average 11% and 14% of GOMFF trips landed at least one pound of GAJ and GTR, respectively. These trips are defined as GAJ and GTR trips. On average for a year, 716 (3%) and 53 (0%) GOMFF trips reported GAJ and GTR as the top revenue producing GOMFF species landed, respectively. Consequently, on average 27% and 2% of GAJ and GTR trips had that respective species as the top revenue producing GOMFF species. Most GAJ trips and almost all GTR trips target another species for primary revenue generation.

On average 1,452 vessels reported GOMFF landings to CFLP annually from 2000-2005 (Table 3.3.3). On average 38% and 35% of these vessels landed at least one pound of GAJ and GTR, respectively. On average for a year, 9% and 2% of these vessels reported GAJ and GTR as the top revenue producing GOMFF species landed on at least one trip, respectively. Consequently, on average 25% and 6% of vessels reporting at least one pound of GAJ and GTR landed, respectively, had that respective species as the top revenue producing GOMFF species on at least one of their GAJ and GTR trips. Most vessels landing GAJ and almost all vessels landing GTR target another species for primary revenue generation.

Table 3.3.2. Average number of trips that landed in Gulf states or caught in Gulf waters Council managed finfish species (GOMFF), greater amberjack (GAJ), and gray triggerfish (GTR) from 1993-2005. Data source: NMFS CFLP.

Species	Trips with at least 1 pound of species (Y)	Percent of all trips that landed at least 1 pound of species	Trips with species as top source of revenue (X)	Percent of trips with unit as top source of revenue	(X/Y)*
GOMRF Finfish	24,999	100%	24,999	100%	100%
Greater Amberjack	2,664	11%	716	3%	27%
Gray Triggerfish	3,509	14%	53	0%	2%

Table 3.3.3. Average number of vessels that landed in Gulf states or caught in Gulf waters Council managed finfish species (GOMFF), greater amberjack (GAJ), and gray triggerfish (GTR) from 1993-2005. Data source: NMFS CFLP

Species	Total boats with at least 1 pound of species (Y)	Percent of all boats that landed at least 1 pound of species	Boats with top-revenue trips only (X)	Percent of boats with unit as top source of revenue	(X/Y)
GOMRF Finfish	1,452	100%	1,452	100%	100%
Greater Amberjack	554	38%	137	9%	25%
Gray Triggerfish	513	35%	30	2%	6%

There is significant variability among the states with respect to the species groups that generate revenue on GOMFF, GAJ and GTR trips (Table 3.3.4). In terms of ex-vessel revenue from 2000-2005 on average the top state for all three sectors is west Florida which also includes landings in the Florida Keys followed by Louisiana and Texas. Revenue from GAJ and GTR landings is concentrated in south Florida and north Florida, respectively, and to a lesser extent Louisiana and Texas.

On average from 2000-2005, a majority (59%) of trips that catch GOMFF species primarily employ hook and line type gear although a significant number (32%) primarily utilize longline gear (Table 3.3.5). On average, 89% of trips that land at least one pound of GAJ or GTR, primarily employed hook and line gear with 7% and 4% of GAJ and GTR trips employing longline gear, respectively. Although 6% of GTR trips primarily utilized traps, fish traps in the Gulf are being phased out after 2007.

Table 3.3.4. Average ex-vessel value of Council managed finfish species (GOMFF), greater amberjack (GAJ), and gray triggerfish (GTR) landed in Gulf states or caught in Gulf waters by state for the period 2000-2005. Data source: NMFS CFLP, NMFS ALS.

Species	Texas	Louisiana	Mississippi	Alabama	West Florida	Other
Gulf of Mexico Finfish	$5,788,777	$8,938,152	$231,073	$882,737	$36,650,060	$201,105
Greater Amberjack	$72,491	$220,691	$4,737	$7,819	$746,482	$2,388
Gray Triggerfish	$19,013	$60,873	$1,157	$7,409	$122,037	$531

Table 3.3.5. The relative importance of different gear types. Percentage of species caught by gear during 2000-2005. Data source: NMFS CFLP.

SPECIES	HOOKS & LINES	LONG LINES	TRAPS	TROLL LINES	DIVING	OTHER
Gulf of Mexico Finfish	58.7%	31.9%	4.3%	2.9%	0.8%	1.3%
Greater Amberjack	88.8%	7.2%	0.2%	1.2%	2.4%	0.2%
Gray Triggerfish	88.9%	3.8%	6.0%	0.5%	0.6%	0.1%

3.3.2 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) and the 2005 recreational fishery grouper regulatory amendment (GMFMC 2005d) 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.

In terms of number of trips, recreational fishing effort, as evaluated from the Marine Recreational Fisheries Statistics Survey, are provided in Tables 3.3.1-6 (Holiman, pers. comm. 2007). Total recreational effort for all species from Florida through Louisiana has averaged at 18.7 million trips annually. This effort declined slightly in the late 1980s, recovered in 1990 but then remained flat at around that level for the rest of the decade. It registered a relatively fast growth in the 2000s.

Recreational fishing effort can be represented by target and catch trips. Summary characteristics for greater amberjack target effort are presented in Tables 3.3.1-4. Greater amberjack target effort has averaged at 60,436 trips annually. This effort declined in the late 1980s, with a sharp drop in 1989, followed by a relatively steep increase in 1990, but steadily declined through most of the 1990s. It did recover fast in the 2000s, although a perceptible decline occurred in 2004. Relative to total recreational effort, target effort for greater amberjack ranged from less than 0.1 percent (1997) to slightly above 0.6 percent (1987), or averaged at 0.3 percent for the entire period. Florida has accounted for most of greater amberjack target trips, followed by Alabama, then by Louisiana, and lastly by Mississippi. Target trips in Florida were very high in the late 1980s, but declined substantially through the years while those for Alabama steadily rose through the years. Private and charter fishing modes have accounted for most of target trips, although the private mode appears to be the dominant source of target trips. A perceptible gap existed between private mode target trips and charter target trips in the late 1980s, narrowed in subsequent years, and then widened in the early 2000s. Target effort has generally remained low in the first two months of the year, would start to pick in the next two months, and has been generally highest in May through August.

Summary characteristics for greater amberjack catch effort are presented in Tables 3.3.5-8. Catch effort has been more than twice target effort and has averaged at 137,660 trips annually. Catch effort has generally followed the same pattern as target effort; i.e., it declined in the late 1980s, recovered in 1989 but subsequently thereafter, and rose in early 2000s. As a percent to total trips, catch effort was relatively high in the late 1980s, but subsequently declined although it picked up somewhat in the early 2000s although not at previous high levels. This effort has averaged at 0.7 percent and ranged from 0.29 to 1.49 percent. Florida has been clearly the dominant state in term of catch effort. While Alabama ranks second, the state's catch effort performance has not been as close to Florida as with target effort. In terms of fishing mode, the charter fishery has been the dominant source of catch trips; however, the private mode has approximated the performance of charter mode in the early 2000s. Similar to target effort, catch effort has been generally low in the first two and last 4 months of the year. May through August have registered the highest number of catch trips.

Summary characteristics for gray triggerfish target effort are presented in Tables 3.3.9-12. Gray triggerfish effort has been substantially lower than that of greater amberjack. Target effort for gray triggerfish has averaged at 16,762 trips annually. This effort increased in the second half of the 1980s through the early 1990s, and remained relatively flat in the second half of the 1990s. It climbed high in early 2000s but suffered a substantial drop in 2005. Relative to total recreational effort, target effort for gray triggerfish has averaged at 0.09 percent, with a range of close to zero to 0.22 percent. Florida and Alabama have been the major sources of target effort, although overall Florida still has registered the highest number of trips. Both Florida and Alabama showed relatively higher effort levels in the late 1980s through the early 1990s and in the first half of the 2000s. Target trips have been quite low in Louisiana and Mississippi. The private fishing mode has dominated the target effort category, especially in the 2000s. Charter target effort was relatively high in the early years but then later declined to low levels and stayed at those low levels through the first half of 2000s. In terms of seasonality, target effort has stayed low in the first two and last two months of the year. The other months have been associated with higher effort levels.

Summary characteristics for gray triggerfish catch effort are presented in Tables 3.3.13-16. Catch effort has exceeded target effort by almost a factor of 10. This effort has averaged at 238,939 trips annually. Compared to the target average of 16,762 trips annually, significantly more non-target trips caught gray triggerfish. Catch effort has followed a slightly different track than target effort. Catch effort rose in the late 1980s but gradually declined over the following years until around 2002. It subsequently rose in 2003 and thereafter to levels higher than in any of the previous years. As a percent to total trips, catch effort has followed the same pattern as the number of trips, i.e., rose in the late 1980s, gradually declined over the years and increased in the 2000s but did not match new high levels reached by the number of trips. This effort has averaged at around 1.0 percent and ranged from 0.63 percent to 2.01 percent. Unlike target effort in which Alabama has competed well with Florida as the dominant source of target trips, catch effort has been greatly dominated by Florida. It appears then that increases in Florida catch effort in later years could have been a major factor in overall catch trips reaching new high levels. In terms of fishing mode, both the private and charter mode have been the dominant sector, although the charter fishery has a slight advantage over the private mode. Catch trips through the charter mode, but not through private mode, rose to new high levels in the 2000s. Similar to target effort, catch effort has been generally low in the first two months of the year. May through August have registered the highest number of catch trips.

The Headboat data do not support the estimation of target effort. Nevertheless, Table 3.3.17 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 3.3.18 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 3.3.1. GULF OF MEXICO GREATER AMBERJACK TARGET EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1986	57,321	0.30	19,039,944
1987	98,617	0.61	16,089,446
1988	62,427	0.32	19,743,299
1989	84,971	0.54	15,622,510
1990	20,695	0.16	13,310,226
1991	98,239	0.54	18,173,598
1992	62,594	0.35	18,079,250
1993	76,866	0.44	17,431,009
1994	47,969	0.27	17,503,737
1995	54,018	0.31	17,390,316
1996	31,874	0.19	17,032,778
1997	25,766	0.14	18,593,084
1998	13,859	0.08	16,703,364
1999	24,369	0.15	15,893,729
2000	27,833	0.13	21,017,783
2001	75,900	0.33	22,889,697
2002	72,327	0.37	19,665,578
2003	120,995	0.53	22,956,673
2004	77,878	0.32	24,451,338
2005	74,198	0.33	22,541,279

Table 3.3.2. GULF OF MEXICO GREATER AMBERJACK TARGET EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE														
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI			TOTAL		
	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	1,898	0.22	866,722	48,218	0.34	14,367,176	4,364	0.14	3,029,420	2,841	0.37	776,626	57,321	0.30	19,039,944
1987	2,093	0.34	622,080	96,524	0.78	12,321,111	0	0.00	2,370,674	0	0.00	775,582	98,617	0.61	16,089,446
1988	2,169	0.18	1,182,515	60,258	0.41	14,730,478	0	0.00	2,922,611	0	0.00	907,695	62,427	0.32	19,743,299
1989	8,672	1.39	622,719	72,095	0.60	12,031,576	4,176	0.18	2,263,719	28	0.00	704,496	84,971	0.54	15,622,510
1990	12,626	1.75	722,805	2,794	0.03	9,922,602	5,275	0.27	1,978,380	0	0.00	686,439	20,695	0.16	13,310,226
1991	10,977	1.69	648,774	81,295	0.57	14,261,115	5,968	0.25	2,419,805	0	0.00	843,905	98,239	0.54	18,173,598
1992	29,388	3.85	763,018	31,815	0.23	13,763,989	993	0.04	2,550,806	398	0.04	1,001,436	62,594	0.35	18,079,250
1993	41,588	4.46	933,061	32,395	0.25	12,928,092	2,210	0.08	2,703,754	673	0.08	866,103	76,866	0.44	17,431,009
1994	20,283	2.29	886,949	21,648	0.16	13,166,982	3,420	0.14	2,485,308	2,618	0.27	964,498	47,969	0.27	17,503,737
1995	11,203	1.12	998,539	34,272	0.28	12,396,870	8,542	0.29	2,941,473	0	0.00	1,053,434	54,018	0.31	17,390,316
1996	17,403	1.87	931,884	2,425	0.02	12,331,873	12,046	0.43	2,823,868	0	0.00	945,154	31,874	0.19	17,032,778
1997	7,315	0.71	1,024,177	11,815	0.09	13,384,436	4,105	0.13	3,185,378	2,533	0.25	999,093	25,766	0.14	18,593,084
1998	2,835	0.29	968,485	9,704	0.08	12,234,580	1,320	0.05	2,672,764	0	0.00	827,536	13,859	0.08	16,703,364
1999	12,263	1.05	1,169,914	10,615	0.09	11,296,851	1,491	0.06	2,621,446	0	0.00	805,518	24,369	0.15	15,893,729
2000	9,507	0.87	1,086,818	14,050	0.09	15,086,213	4,275	0.11	3,751,609	0	0.00	1,093,144	27,833	0.13	21,017,783
2001	36,121	2.21	1,635,798	33,420	0.20	16,388,611	4,958	0.14	3,615,244	1,402	0.11	1,250,045	75,900	0.33	22,889,697
2002	18,661	1.57	1,190,004	47,486	0.33	14,418,275	6,180	0.20	3,018,946	0	0.00	1,038,353	72,327	0.37	19,665,578
2003	50,815	3.39	1,499,989	53,798	0.34	16,008,974	16,383	0.38	4,270,921	0	0.00	1,176,788	120,995	0.53	22,956,673
2004	21,418	1.04	2,061,578	45,212	0.27	16,476,655	11,248	0.23	4,801,185	0	0.00	1,111,919	77,878	0.32	24,451,338
2005	22,159	1.39	1,596,944	43,119	0.27	16,079,716	8,920	0.23	3,935,893	0	0.00	928,726	74,198	0.33	22,541,279

Table 3.3.3. GULF OF MEXICO GREATER AMBERJACK 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
YEAR												
1986	0	0.00	10,405,962	12,896	2.59	497,740	44,425	0.55	8,136,242	57,321	0.30	19,039,944
1987	0	0.00	6,923,388	37,187	5.74	648,271	61,430	0.72	8,517,788	98,617	0.61	16,089,446
1988	0	0.00	8,524,356	12,831	2.47	520,412	49,596	0.46	10,698,532	62,427	0.32	19,743,299
1989	4,952	0.08	6,419,667	17,962	3.66	490,536	62,057	0.71	8,712,307	84,971	0.54	15,622,510
1990	0	0.00	5,706,778	9,826	2.54	386,941	10,869	0.15	7,216,506	20,695	0.16	13,310,226
1991	9,275	0.11	8,642,251	53,645	12.07	444,609	35,319	0.39	9,086,738	98,239	0.54	18,173,598
1992	4,149	0.05	8,265,502	26,451	6.00	440,494	31,994	0.34	9,373,254	62,594	0.35	18,079,250
1993	1,893	0.02	7,642,451	27,704	3.71	747,252	47,270	0.52	9,041,306	76,866	0.44	17,431,009
1994	1,778	0.02	7,293,305	24,978	3.03	825,632	21,212	0.23	9,384,801	47,969	0.27	17,503,737
1995	1,587	0.02	6,925,453	30,235	3.38	893,967	22,195	0.23	9,570,896	54,018	0.31	17,390,316
1996	1,558	0.02	6,800,513	3,846	0.44	881,248	26,470	0.28	9,351,017	31,874	0.19	17,032,778
1997	0	0.00	7,423,022	11,295	1.16	974,979	14,471	0.14	10,195,083	25,766	0.14	18,593,084
1998	0	0.00	6,861,289	9,536	1.06	903,170	4,322	0.05	8,938,905	13,859	0.08	16,703,364
1999	0	0.00	5,918,885	7,752	0.88	877,041	16,616	0.18	9,097,803	24,369	0.15	15,893,729
2000	0	0.00	8,477,685	11,257	1.39	811,634	16,576	0.14	11,728,464	27,833	0.13	21,017,783
2001	0	0.00	9,776,174	10,102	1.36	742,386	65,798	0.53	12,371,138	75,900	0.33	22,889,697
2002	0	0.00	7,266,262	24,437	3.20	764,222	47,890	0.41	11,635,095	72,327	0.37	19,665,578
2003	0	0.00	8,155,304	20,825	3.01	691,362	100,170	0.71	14,110,007	120,995	0.53	22,956,673
2004	0	0.00	9,529,938	17,567	2.25	782,446	60,311	0.43	14,138,953	77,878	0.32	24,451,338
2005	0	0.00	8,584,294	23,992	1.85	1,299,722	50,206	0.40	12,657,263	74,198	0.33	22,541,279

Table 3.3.4. GULF OF MEXICO GREATER AMBERJACK TARGET EFFORT TRIPS, BY WAVE, MRFSS DATA.

	WAVE																		TOTAL		
	1			2			3			4			5			6					
	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	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS
YEAR	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1986	10,646	0.66	1,620,773	6,593	0.23	2,829,692	19,109	0.54	3,559,452	11,649	0.41	2,837,382	8,676	0.17	5,069,845	649	0.02	3,122,800	57,321	0.30	19,039,944
1987	0	0.00	3,550,826	26,793	1.27	2,109,947	10,928	0.43	2,567,991	26,909	0.95	2,836,924	24,656	0.82	2,999,005	9,331	0.46	2,024,753	98,617	0.61	16,089,446
1988	3,694	0.17	2,126,306	17,251	0.70	2,451,599	14,332	0.41	3,500,670	12,006	0.25	4,788,257	7,897	0.21	3,742,401	7,246	0.23	3,134,067	62,427	0.32	19,743,299
1989	22,167	0.67	3,297,541	21,109	0.72	2,948,334	16,626	0.60	2,783,023	12,143	0.53	2,289,342	9,773	0.39	2,493,520	3,153	0.17	1,810,750	84,971	0.54	15,622,510
1990	0	0.00	1,961,223	3,562	0.17	2,121,274	6,606	0.25	2,678,432	2,256	0.08	2,897,255	8,225	0.51	1,615,949	46	0.00	2,036,093	20,695	0.16	13,310,226
1991	618	0.03	2,191,203	6,151	0.24	2,575,654	10,156	0.30	3,373,494	29,448	0.63	4,676,472	31,078	0.97	3,219,015	20,788	0.97	2,137,761	98,239	0.54	18,173,598
1992	2,056	0.09	2,267,563	10,909	0.40	2,705,954	22,301	0.66	3,367,020	16,357	0.40	4,062,677	8,463	0.29	2,935,480	2,507	0.09	2,740,557	62,594	0.35	18,079,250
1993	1,419	0.06	2,296,437	10,028	0.39	2,574,229	19,782	0.62	3,176,285	18,693	0.51	3,666,123	18,155	0.52	3,465,600	8,790	0.39	2,252,336	76,866	0.44	17,431,009
1994	1,534	0.09	1,801,590	2,832	0.10	2,896,589	11,747	0.35	3,380,365	21,574	0.62	3,481,661	2,542	0.07	3,560,280	7,739	0.32	2,383,252	47,969	0.27	17,503,737
1995	6,336	0.25	2,538,852	13,083	0.45	2,887,691	17,169	0.43	3,982,577	7,172	0.25	2,926,907	2,129	0.07	2,985,397	8,129	0.39	2,068,892	54,018	0.31	17,390,316
1996	547	0.03	1,768,572	5,299	0.21	2,559,046	18,946	0.52	3,644,037	5,505	0.14	3,960,516	1,577	0.05	2,930,386	0	0.00	2,170,221	31,874	0.19	17,032,778
1997	0	0.00	2,291,201	626	0.02	2,728,092	7,911	0.20	3,942,833	11,476	0.29	4,004,469	4,024	0.13	3,099,943	1,729	0.07	2,526,547	25,766	0.14	18,593,084
1998	2,077	0.11	1,969,685	0	0.00	3,121,777	6,016	0.17	3,573,416	1,856	0.05	3,689,985	1,270	0.05	2,349,003	2,639	0.13	1,999,497	13,859	0.08	16,703,364
1999	1,717	0.08	2,261,718	1,514	0.05	2,864,161	8,174	0.23	3,573,442	6,272	0.20	3,080,604	3,996	0.18	2,245,156	2,696	0.14	1,868,648	24,369	0.15	15,893,729
2000	859	0.03	2,531,586	6,985	0.20	3,564,241	7,218	0.15	4,665,590	9,330	0.21	4,489,176	1,310	0.04	3,249,659	2,131	0.08	2,517,531	27,833	0.13	21,017,783
2001	7,698	0.29	2,634,785	15,638	0.41	3,856,325	11,312	0.21	5,454,665	27,801	0.62	4,515,558	4,003	0.11	3,536,545	9,448	0.33	2,891,819	75,900	0.33	22,889,697
2002	6,126	0.27	2,306,137	14,791	0.51	2,888,512	22,901	0.47	4,840,342	12,248	0.33	3,678,214	5,891	0.17	3,382,934	10,370	0.40	2,569,440	72,327	0.37	19,665,578
2003	15,213	0.61	2,511,809	14,309	0.38	3,723,180	32,331	0.76	4,256,988	36,618	0.73	4,984,014	15,332	0.37	4,173,484	7,193	0.22	3,307,199	120,995	0.53	22,956,673
2004	2,246	0.08	2,766,465	17,357	0.40	4,341,216	34,825	0.58	6,018,283	20,445	0.44	4,656,797	695	0.02	3,286,373	2,310	0.07	3,382,204	77,878	0.32	24,451,338
2005	13,868	0.46	3,038,490	14,923	0.34	4,350,570	16,188	0.32	5,095,207	27,433	0.60	4,578,185	76	0.00	2,900,026	1,710	0.07	2,578,801	74,198	0.33	22,541,279

Table 3.3.5. GULF OF MEXICO GREATER AMBERJACK CATCH EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	CATCH EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1986	156,921	0.82	19,039,944
1987	209,977	1.31	16,089,446
1988	139,168	0.70	19,743,299
1989	233,167	1.49	15,622,510
1990	47,271	0.36	13,310,226
1991	139,875	0.77	18,173,598
1992	172,611	0.95	18,079,250
1993	168,026	0.96	17,431,009
1994	117,712	0.67	17,503,737
1995	62,242	0.36	17,390,316
1996	92,073	0.54	17,032,778
1997	64,730	0.35	18,593,084
1998	47,798	0.29	16,703,364
1999	92,193	0.58	15,893,729
2000	102,977	0.49	21,017,783
2001	164,971	0.72	22,889,697
2002	205,049	1.04	19,665,578
2003	208,268	0.91	22,956,673
2004	160,072	0.65	24,451,338
2005	168,105	0.75	22,541,279

Table 3.3.6. GULF OF MEXICO GREATER AMBERJACK CATCH EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE														
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI			TOTAL		
	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
1986	5,482	0.63	866,722	147,961	1.03	14,367,176	3,478	0.11	3,029,420	0	0.00	776,626	156,921	0.82	19,039,944
1987	8,959	1.44	622,080	195,577	1.59	12,321,111	5,442	0.23	2,370,674	0	0.00	775,582	209,977	1.31	16,089,446
1988	10,919	0.92	1,182,515	125,175	0.85	14,730,478	3,075	0.11	2,922,611	0	0.00	907,695	139,168	0.70	19,743,299
1989	26,458	4.25	622,719	200,387	1.67	12,031,576	6,322	0.28	2,263,719	0	0.00	704,496	233,167	1.49	15,622,510
1990	11,682	1.62	722,805	32,621	0.33	9,922,602	2,967	0.15	1,978,380	0	0.00	686,439	47,271	0.36	13,310,226
1991	11,530	1.78	648,774	118,418	0.83	14,261,115	9,748	0.40	2,419,805	179	0.02	843,905	139,875	0.77	18,173,598
1992	31,473	4.12	763,018	130,412	0.95	13,763,989	9,526	0.37	2,550,806	1,201	0.12	1,001,436	172,611	0.95	18,079,250
1993	45,038	4.83	933,061	119,304	0.92	12,928,092	3,684	0.14	2,703,754	0	0.00	866,103	168,026	0.96	17,431,009
1994	22,952	2.59	886,949	88,657	0.67	13,166,982	6,054	0.24	2,485,308	49	0.01	964,498	117,712	0.67	17,503,737
1995	15,706	1.57	998,539	34,592	0.28	12,396,870	11,117	0.38	2,941,473	828	0.08	1,053,434	62,242	0.36	17,390,316
1996	30,502	3.27	931,884	48,762	0.40	12,331,873	12,809	0.45	2,823,868	0	0.00	945,154	92,073	0.54	17,032,778
1997	9,842	0.96	1,024,177	49,251	0.37	13,384,436	5,047	0.16	3,185,378	590	0.06	999,093	64,730	0.35	18,593,084
1998	4,842	0.50	968,485	40,286	0.33	12,234,580	2,656	0.10	2,672,764	14	0.00	827,536	47,798	0.29	16,703,364
1999	16,419	1.40	1,169,914	74,089	0.66	11,296,851	1,685	0.06	2,621,446	0	0.00	805,518	92,193	0.58	15,893,729
2000	14,107	1.30	1,086,818	73,162	0.48	15,086,213	15,209	0.41	3,751,609	500	0.05	1,093,144	102,977	0.49	21,017,783
2001	46,379	2.84	1,635,798	100,484	0.61	16,388,611	17,641	0.49	3,615,244	467	0.04	1,250,045	164,971	0.72	22,889,697
2002	38,894	3.27	1,190,004	148,282	1.03	14,418,275	17,873	0.59	3,018,946	0	0.00	1,038,353	205,049	1.04	19,665,578
2003	58,824	3.92	1,499,989	131,947	0.82	16,008,974	17,497	0.41	4,270,921	0	0.00	1,176,788	208,268	0.91	22,956,673
2004	30,457	1.48	2,061,578	108,244	0.66	16,476,655	21,371	0.45	4,801,185	0	0.00	1,111,919	160,072	0.65	24,451,338
2005	31,507	1.97	1,596,944	121,467	0.76	16,079,716	15,131	0.38	3,935,893	0	0.00	928,726	168,105	0.75	22,541,279

Table 3.3.7. GULF OF MEXICO GREATER AMBERJACK 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
1986	0	0.00	10,405,962	83,789	16.83	497,740	73,132	0.90	8,136,242	156,921	0.82	19,039,944
1987	9,201	0.13	6,923,388	113,021	17.43	648,271	87,756	1.03	8,517,788	209,977	1.31	16,089,446
1988	14,602	0.17	8,524,356	68,423	13.15	520,412	56,142	0.52	10,698,532	139,168	0.70	19,743,299
1989	36,930	0.58	6,419,667	112,404	22.91	490,536	83,834	0.96	8,712,307	233,167	1.49	15,622,510
1990	3,841	0.07	5,706,778	26,820	6.93	386,941	16,609	0.23	7,216,506	47,271	0.36	13,310,226
1991	12,284	0.14	8,642,251	97,268	21.88	444,609	30,323	0.33	9,086,738	139,875	0.77	18,173,598
1992	22,957	0.28	8,265,502	90,966	20.65	440,494	58,688	0.63	9,373,254	172,611	0.95	18,079,250
1993	12,235	0.16	7,642,451	104,532	13.99	747,252	51,258	0.57	9,041,306	168,026	0.96	17,431,009
1994	2,668	0.04	7,293,305	92,927	11.26	825,632	22,118	0.24	9,384,801	117,712	0.67	17,503,737
1995	2,314	0.03	6,925,453	31,621	3.54	893,967	28,306	0.30	9,570,896	62,242	0.36	17,390,316
1996	7,788	0.11	6,800,513	47,159	5.35	881,248	37,126	0.40	9,351,017	92,073	0.54	17,032,778
1997	1,534	0.02	7,423,022	42,658	4.38	974,979	20,539	0.20	10,195,083	64,730	0.35	18,593,084
1998	4,007	0.06	6,861,289	30,680	3.40	903,170	13,111	0.15	8,938,905	47,798	0.29	16,703,364
1999	454	0.01	5,918,885	59,405	6.77	877,041	32,333	0.36	9,097,803	92,193	0.58	15,893,729
2000	6,499	0.08	8,477,685	63,452	7.82	811,634	33,026	0.28	11,728,464	102,977	0.49	21,017,783
2001	1,205	0.01	9,776,174	48,735	6.56	742,386	115,031	0.93	12,371,138	164,971	0.72	22,889,697
2002	973	0.01	7,266,262	113,640	14.87	764,222	90,435	0.78	11,635,095	205,049	1.04	19,665,578
2003	0	0.00	8,155,304	91,021	13.17	691,362	117,246	0.83	14,110,007	208,268	0.91	22,956,673
2004	2,604	0.03	9,529,938	76,243	9.74	782,446	81,224	0.57	14,138,953	160,072	0.65	24,451,338
2005	0	0.00	8,584,294	87,716	6.75	1,299,722	80,389	0.64	12,657,263	168,105	0.75	22,541,279

Table 3.3.8. GULF OF MEXICO GREATER AMBERJACK CATCH EFFORT TRIPS, BY WAVE, MRFSS DATA.

	WAVE																				
	1			2			3			4			5			6			TOTAL		
	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	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS
YEAR	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1986	19,634	1.21	1,620,773	14,170	0.50	2,829,692	33,589	0.94	3,559,452	11,660	0.41	2,837,382	54,870	1.08	5,069,845	22,999	0.74	3,122,800	156,921	0.82	19,039,944
1987	9,660	0.27	3,550,826	22,825	1.08	2,109,947	51,105	1.99	2,567,991	55,310	1.95	2,836,924	65,158	2.17	2,999,005	5,919	0.29	2,024,753	209,977	1.31	16,089,446
1988	3,694	0.17	2,126,306	6,463	0.26	2,451,599	46,877	1.34	3,500,670	31,474	0.66	4,788,257	25,912	0.69	3,742,401	24,749	0.79	3,134,067	139,168	0.70	19,743,299
1989	14,137	0.43	3,297,541	18,253	0.62	2,948,334	24,547	0.88	2,783,023	61,395	2.68	2,289,342	99,240	3.98	2,493,520	15,595	0.86	1,810,750	233,167	1.49	15,622,510
1990	2,485	0.13	1,961,223	6,560	0.31	2,121,274	11,389	0.43	2,678,432	971	0.03	2,897,255	16,389	1.01	1,615,949	9,476	0.47	2,036,093	47,271	0.36	13,310,226
1991	8,636	0.39	2,191,203	12,319	0.48	2,575,654	21,707	0.64	3,373,494	39,187	0.84	4,676,472	23,713	0.74	3,219,015	34,313	1.61	2,137,761	139,875	0.77	18,173,598
1992	20,655	0.91	2,267,563	19,335	0.71	2,705,954	55,615	1.65	3,367,020	44,376	1.09	4,062,677	22,784	0.78	2,935,480	9,847	0.36	2,740,557	172,611	0.95	18,079,250
1993	9,339	0.41	2,296,437	22,761	0.88	2,574,229	41,443	1.30	3,176,285	49,006	1.34	3,666,123	35,580	1.03	3,465,600	9,897	0.44	2,252,336	168,026	0.96	17,431,009
1994	6,480	0.36	1,801,590	18,907	0.65	2,896,589	50,872	1.50	3,380,365	23,074	0.66	3,481,661	4,822	0.14	3,560,280	13,557	0.57	2,383,252	117,712	0.67	17,503,737
1995	11,111	0.44	2,538,852	17,253	0.60	2,887,691	21,297	0.53	3,982,577	1,509	0.05	2,926,907	1,708	0.06	2,985,397	9,364	0.45	2,068,892	62,242	0.36	17,390,316
1996	11,734	0.66	1,768,572	21,788	0.85	2,559,046	37,900	1.04	3,644,037	16,154	0.41	3,960,516	2,510	0.09	2,930,386	1,988	0.09	2,170,221	92,073	0.54	17,032,778
1997	2,370	0.10	2,291,201	5,428	0.20	2,728,092	17,712	0.45	3,942,833	23,961	0.60	4,004,469	8,839	0.29	3,099,943	6,420	0.25	2,526,547	64,730	0.35	18,593,084
1998	5,217	0.26	1,969,685	0	0.00	3,121,777	21,567	0.60	3,573,416	10,296	0.28	3,689,985	5,448	0.23	2,349,003	5,271	0.26	1,999,497	47,798	0.29	16,703,364
1999	5,123	0.23	2,261,718	11,865	0.41	2,864,161	23,336	0.65	3,573,442	15,690	0.51	3,080,604	23,160	1.03	2,245,156	13,019	0.70	1,868,648	92,193	0.58	15,893,729
2000	8,356	0.33	2,531,586	17,355	0.49	3,564,241	36,266	0.78	4,665,590	27,619	0.62	4,489,176	9,901	0.30	3,249,659	3,479	0.14	2,517,531	102,977	0.49	21,017,783
2001	11,005	0.42	2,634,785	35,075	0.91	3,856,325	53,085	0.97	5,454,665	44,209	0.98	4,515,558	8,557	0.24	3,536,545	13,040	0.45	2,891,819	164,971	0.72	22,889,697
2002	14,676	0.64	2,306,137	31,821	1.10	2,888,512	95,805	1.98	4,840,342	30,373	0.83	3,678,214	17,756	0.52	3,382,934	14,617	0.57	2,569,440	205,049	1.04	19,665,578
2003	21,543	0.86	2,511,809	40,424	1.09	3,723,180	66,271	1.56	4,256,988	38,115	0.76	4,984,014	34,440	0.83	4,173,484	7,475	0.23	3,307,199	208,268	0.91	22,956,673
2004	8,533	0.31	2,766,465	28,334	0.65	4,341,216	71,115	1.18	6,018,283	35,391	0.76	4,656,797	10,190	0.31	3,286,373	6,508	0.19	3,382,204	160,072	0.65	24,451,338
2005	26,942	0.89	3,038,490	34,494	0.79	4,350,570	56,353	1.11	5,095,207	36,296	0.79	4,578,185	9,210	0.32	2,900,026	4,811	0.19	2,578,801	168,105	0.75	22,541,279

Table 3.3.9. GULF OF MEXICO GRAY TRIGGERFISH TARGET EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1986	345	0.00	19,039,944
1987	6,372	0.04	16,089,446
1988	14,449	0.07	19,743,299
1989	6,078	0.04	15,622,510
1990	22,665	0.17	13,310,226
1991	21,268	0.12	18,173,598
1992	21,591	0.12	18,079,250
1993	39,215	0.22	17,431,009
1994	17,287	0.10	17,503,737
1995	25,413	0.15	17,390,316
1996	5,744	0.03	17,032,778
1997	12,285	0.07	18,593,084
1998	6,216	0.04	16,703,364
1999	11,217	0.07	15,893,729
2000	10,023	0.05	21,017,783
2001	11,171	0.05	22,889,697
2002	25,526	0.13	19,665,578
2003	21,777	0.09	22,956,673
2004	42,096	0.17	24,451,338
2005	14,495	0.06	22,541,279

Table 3.3.10. GULF OF MEXICO GRAY TRIGGERFISH TARGET EFFORT TRIPS, BY STATE, MRFSS DATA.

	STATE														
	ALABAMA			FLORIDA			LOUISIANA			MISSISSIPPI			TOTAL		
	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	0	0.00	866,722	345	0.00	14,367,176	0	0.00	3,029,420	0	0.00	776,626	345	0.00	19,039,944
1987	33	0.01	622,080	6,339	0.05	12,321,111	0	0.00	2,370,674	0	0.00	775,582	6,372	0.04	16,089,446
1988	0	0.00	1,182,515	14,449	0.10	14,730,478	0	0.00	2,922,611	0	0.00	907,695	14,449	0.07	19,743,299
1989	2,182	0.35	622,719	3,896	0.03	12,031,576	0	0.00	2,263,719	0	0.00	704,496	6,078	0.04	15,622,510
1990	20,248	2.80	722,805	2,417	0.02	9,922,602	0	0.00	1,978,380	0	0.00	686,439	22,665	0.17	13,310,226
1991	14,451	2.23	648,774	4,608	0.03	14,261,115	2,209	0.09	2,419,805	0	0.00	843,905	21,268	0.12	18,173,598
1992	9,552	1.25	763,018	11,304	0.08	13,763,989	735	0.03	2,550,806	0	0.00	1,001,436	21,591	0.12	18,079,250
1993	22,107	2.37	933,061	16,965	0.13	12,928,092	142	0.01	2,703,754	0	0.00	866,103	39,215	0.22	17,431,009
1994	3,375	0.38	886,949	13,800	0.10	13,166,982	112	0.00	2,485,308	0	0.00	964,498	17,287	0.10	17,503,737
1995	2,457	0.25	998,539	22,956	0.19	12,396,870	0	0.00	2,941,473	0	0.00	1,053,434	25,413	0.15	17,390,316
1996	3,442	0.37	931,884	2,302	0.02	12,331,873	0	0.00	2,823,868	0	0.00	945,154	5,744	0.03	17,032,778
1997	3,285	0.32	1,024,177	9,000	0.07	13,384,436	0	0.00	3,185,378	0	0.00	999,093	12,285	0.07	18,593,084
1998	4,378	0.45	968,485	1,837	0.02	12,234,580	0	0.00	2,672,764	0	0.00	827,536	6,216	0.04	16,703,364
1999	3,756	0.32	1,169,914	7,359	0.07	11,296,851	0	0.00	2,621,446	101	0.01	805,518	11,217	0.07	15,893,729
2000	7,882	0.73	1,086,818	2,140	0.01	15,086,213	0	0.00	3,751,609	0	0.00	1,093,144	10,023	0.05	21,017,783
2001	5,106	0.31	1,635,798	6,066	0.04	16,388,611	0	0.00	3,615,244	0	0.00	1,250,045	11,171	0.05	22,889,697
2002	9,824	0.83	1,190,004	15,702	0.11	14,418,275	0	0.00	3,018,946	0	0.00	1,038,353	25,526	0.13	19,665,578
2003	8,041	0.54	1,499,989	13,736	0.09	16,008,974	0	0.00	4,270,921	0	0.00	1,176,788	21,777	0.09	22,956,673
2004	14,768	0.72	2,061,578	27,328	0.17	16,476,655	0	0.00	4,801,185	0	0.00	1,111,919	42,096	0.17	24,451,338
2005	6,292	0.39	1,596,944	8,203	0.05	16,079,716	0	0.00	3,935,893	0	0.00	928,726	14,495	0.06	22,541,279

Table 3.3.11. GULF OF MEXICO GRAY TRIGGERFISH 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
YEAR												
1986	0	0.00	10,405,962	345	0.07	497,740	0	0.00	8,136,242	345	0.00	19,039,944
1987	0	0.00	6,923,388	3,961	0.61	648,271	2,412	0.03	8,517,788	6,372	0.04	16,089,446
1988	0	0.00	8,524,356	755	0.14	520,412	13,694	0.13	10,698,532	14,449	0.07	19,743,299
1989	0	0.00	6,419,667	1,069	0.22	490,536	5,009	0.06	8,712,307	6,078	0.04	15,622,510
1990	0	0.00	5,706,778	11,953	3.09	386,941	10,712	0.15	7,216,506	22,665	0.17	13,310,226
1991	497	0.01	8,642,251	8,727	1.96	444,609	12,044	0.13	9,086,738	21,268	0.12	18,173,598
1992	0	0.00	8,265,502	6,079	1.38	440,494	15,512	0.17	9,373,254	21,591	0.12	18,079,250
1993	0	0.00	7,642,451	13,835	1.85	747,252	25,380	0.28	9,041,306	39,215	0.22	17,431,009
1994	844	0.01	7,293,305	13,484	1.63	825,632	2,959	0.03	9,384,801	17,287	0.10	17,503,737
1995	0	0.00	6,925,453	24,479	2.74	893,967	935	0.01	9,570,896	25,413	0.15	17,390,316
1996	0	0.00	6,800,513	1,893	0.21	881,248	3,851	0.04	9,351,017	5,744	0.03	17,032,778
1997	0	0.00	7,423,022	10,956	1.12	974,979	1,329	0.01	10,195,083	12,285	0.07	18,593,084
1998	0	0.00	6,861,289	3,164	0.35	903,170	3,051	0.03	8,938,905	6,216	0.04	16,703,364
1999	0	0.00	5,918,885	5,360	0.61	877,041	5,857	0.06	9,097,803	11,217	0.07	15,893,729
2000	0	0.00	8,477,685	2,594	0.32	811,634	7,429	0.06	11,728,464	10,023	0.05	21,017,783
2001	0	0.00	9,776,174	2,732	0.37	742,386	8,439	0.07	12,371,138	11,171	0.05	22,889,697
2002	0	0.00	7,266,262	4,896	0.64	764,222	20,630	0.18	11,635,095	25,526	0.13	19,665,578
2003	0	0.00	8,155,304	6,066	0.88	691,362	15,711	0.11	14,110,007	21,777	0.09	22,956,673
2004	0	0.00	9,529,938	8,295	1.06	782,446	33,800	0.24	14,138,953	42,096	0.17	24,451,338
2005	0	0.00	8,584,294	5,693	0.44	1,299,722	8,801	0.07	12,657,263	14,495	0.06	22,541,279

Table 3.3.12. GULF OF MEXICO GRAY TRIGGERFISH TARGET EFFORT TRIPS, BY WAVE, MRFSS DATA.

	WAVE																				
	1			2			3			4			5			6			TOTAL		
	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	TARGET EFFORT TRIPS		TOTAL TRIPS	TARGET EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
YEAR																					
1986	0	0.00	1,620,773	0	0.00	2,829,692	0	0.00	3,559,452	0	0.00	2,837,382	345	0.01	5,069,845	0	0.00	3,122,800	345	0.00	19,039,944
1987	0	0.00	3,550,826	0	0.00	2,109,947	714	0.03	2,567,991	1,297	0.05	2,836,924	4,361	0.15	2,999,005	0	0.00	2,024,753	6,372	0.04	16,089,446
1988	0	0.00	2,126,306	369	0.02	2,451,599	1,516	0.04	3,500,670	0	0.00	4,788,257	4,932	0.13	3,742,401	7,631	0.24	3,134,067	14,449	0.07	19,743,299
1989	0	0.00	3,297,541	956	0.03	2,948,334	2,932	0.11	2,783,023	0	0.00	2,289,342	0	0.00	2,493,520	2,191	0.12	1,810,750	6,078	0.04	15,622,510
1990	0	0.00	1,961,223	5,617	0.26	2,121,274	4,804	0.18	2,678,432	1,868	0.06	2,897,255	2,747	0.17	1,615,949	7,628	0.37	2,036,093	22,665	0.17	13,310,226
1991	6,478	0.30	2,191,203	3,409	0.13	2,575,654	2,413	0.07	3,373,494	273	0.01	4,676,472	7,733	0.24	3,219,015	962	0.05	2,137,761	21,268	0.12	18,173,598
1992	0	0.00	2,267,563	3,503	0.13	2,705,954	5,844	0.17	3,367,020	1,488	0.04	4,062,677	9,783	0.33	2,935,480	975	0.04	2,740,557	21,591	0.12	18,079,250
1993	0	0.00	2,296,437	4,590	0.18	2,574,229	142	0.00	3,176,285	5,127	0.14	3,666,123	24,385	0.70	3,465,600	4,971	0.22	2,252,336	39,215	0.22	17,431,009
1994	0	0.00	1,801,590	1,998	0.07	2,896,589	1,389	0.04	3,380,365	11,798	0.34	3,481,661	100	0.00	3,560,280	2,001	0.08	2,383,252	17,287	0.10	17,503,737
1995	0	0.00	2,538,852	0	0.00	2,887,691	8,638	0.22	3,982,577	8,254	0.28	2,926,907	8,207	0.27	2,985,397	314	0.02	2,068,892	25,413	0.15	17,390,316
1996	0	0.00	1,768,572	1,201	0.05	2,559,046	2,883	0.08	3,644,037	1,172	0.03	3,960,516	488	0.02	2,930,386	0	0.00	2,170,221	5,744	0.03	17,032,778
1997	116	0.01	2,291,201	417	0.02	2,728,092	6,910	0.18	3,942,833	986	0.02	4,004,469	2,292	0.07	3,099,943	1,565	0.06	2,526,547	12,285	0.07	18,593,084
1998	898	0.05	1,969,685	0	0.00	3,121,777	1,320	0.04	3,573,416	888	0.02	3,689,985	635	0.03	2,349,003	2,475	0.12	1,999,497	6,216	0.04	16,703,364
1999	928	0.04	2,261,718	2,411	0.08	2,864,161	1,667	0.05	3,573,442	2,974	0.10	3,080,604	657	0.03	2,245,156	2,580	0.14	1,868,648	11,217	0.07	15,893,729
2000	305	0.01	2,531,586	2,543	0.07	3,564,241	1,219	0.03	4,665,590	488	0.01	4,489,176	3,317	0.10	3,249,659	2,151	0.09	2,517,531	10,023	0.05	21,017,783
2001	819	0.03	2,634,785	2,852	0.07	3,856,325	4,907	0.09	5,454,665	65	0.00	4,515,558	171	0.00	3,536,545	2,356	0.08	2,891,819	11,171	0.05	22,889,697
2002	8,499	0.37	2,306,137	3,186	0.11	2,888,512	1,215	0.03	4,840,342	2,549	0.07	3,678,214	1,284	0.04	3,382,934	8,792	0.34	2,569,440	25,526	0.13	19,665,578
2003	2,986	0.12	2,511,809	1,850	0.05	3,723,180	2,688	0.06	4,256,988	2,862	0.06	4,984,014	7,169	0.17	4,173,484	4,222	0.13	3,307,199	21,777	0.09	22,956,673
2004	377	0.01	2,766,465	4,890	0.11	4,341,216	10,528	0.17	6,018,283	18,105	0.39	4,656,797	7,524	0.23	3,286,373	672	0.02	3,382,204	42,096	0.17	24,451,338
2005	575	0.02	3,038,490	1,200	0.03	4,350,570	5,673	0.11	5,095,207	3,197	0.07	4,578,185	988	0.03	2,900,026	2,861	0.11	2,578,801	14,495	0.06	22,541,279

Table 3.3.13. GULF OF MEXICO GRAY TRIGGERFISH CATCH EFFORT TRIPS, MRFSS DATA.

	TOTAL		
	CATCH EFFORT TRIPS		TOTAL TRIPS
	TOTAL	%	TOTAL
YEAR			
1986	119,330	0.63	19,039,944
1987	218,059	1.36	16,089,446
1988	242,210	1.23	19,743,299
1989	313,337	2.01	15,622,510
1990	215,283	1.62	13,310,226
1991	262,875	1.45	18,173,598
1992	280,223	1.55	18,079,250
1993	250,920	1.44	17,431,009
1994	274,702	1.57	17,503,737
1995	229,693	1.32	17,390,316
1996	171,645	1.01	17,032,778
1997	216,041	1.16	18,593,084
1998	175,630	1.05	16,703,364
1999	237,372	1.49	15,893,729
2000	144,659	0.69	21,017,783
2001	211,037	0.92	22,889,697
2002	242,134	1.23	19,665,578
2003	204,023	0.89	22,956,673
2004	295,564	1.21	24,451,338
2005	333,552	1.48	22,541,279

Table 3.3.14. GULF OF MEXICO GRAY TRIGGERFISH 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
1986	8,868	1.02	866,722	104,878	0.73	14,367,176	5,583	0.18	3,029,420	0	0.00	776,626	119,330	0.63	19,039,944
1987	8,672	1.39	622,080	204,638	1.66	12,321,111	3,784	0.16	2,370,674	965	0.12	775,582	218,059	1.36	16,089,446
1988	25,896	2.19	1,182,515	201,820	1.37	14,730,478	14,172	0.48	2,922,611	322	0.04	907,695	242,210	1.23	19,743,299
1989	46,814	7.52	622,719	246,630	2.05	12,031,576	18,757	0.83	2,263,719	1,137	0.16	704,496	313,337	2.01	15,622,510
1990	65,437	9.05	722,805	121,959	1.23	9,922,602	25,861	1.31	1,978,380	2,025	0.30	686,439	215,283	1.62	13,310,226
1991	37,502	5.78	648,774	198,174	1.39	14,261,115	25,703	1.06	2,419,805	1,496	0.18	843,905	262,875	1.45	18,173,598
1992	56,334	7.38	763,018	194,996	1.42	13,763,989	23,622	0.93	2,550,806	5,272	0.53	1,001,436	280,223	1.55	18,079,250
1993	61,679	6.61	933,061	167,968	1.30	12,928,092	16,265	0.60	2,703,754	5,007	0.58	866,103	250,920	1.44	17,431,009
1994	53,281	6.01	886,949	189,967	1.44	13,166,982	26,320	1.06	2,485,308	5,134	0.53	964,498	274,702	1.57	17,503,737
1995	64,873	6.50	998,539	126,779	1.02	12,396,870	29,671	1.01	2,941,473	8,368	0.79	1,053,434	229,693	1.32	17,390,316
1996	51,717	5.55	931,884	107,410	0.87	12,331,873	6,944	0.25	2,823,868	5,574	0.59	945,154	171,645	1.01	17,032,778
1997	56,973	5.56	1,024,177	144,338	1.08	13,384,436	11,410	0.36	3,185,378	3,319	0.33	999,093	216,041	1.16	18,593,084
1998	27,952	2.89	968,485	137,985	1.13	12,234,580	7,804	0.29	2,672,764	1,890	0.23	827,536	175,630	1.05	16,703,364
1999	54,045	4.62	1,169,914	158,791	1.41	11,296,851	22,984	0.88	2,621,446	1,552	0.19	805,518	237,372	1.49	15,893,729
2000	31,073	2.86	1,086,818	97,714	0.65	15,086,213	15,390	0.41	3,751,609	482	0.04	1,093,144	144,659	0.69	21,017,783
2001	52,885	3.23	1,635,798	146,328	0.89	16,388,611	11,562	0.32	3,615,244	261	0.02	1,250,045	211,037	0.92	22,889,697
2002	49,875	4.19	1,190,004	181,706	1.26	14,418,275	8,815	0.29	3,018,946	1,738	0.17	1,038,353	242,134	1.23	19,665,578
2003	49,793	3.32	1,499,989	141,021	0.88	16,008,974	10,667	0.25	4,270,921	2,542	0.22	1,176,788	204,023	0.89	22,956,673
2004	67,156	3.26	2,061,578	199,844	1.21	16,476,655	22,442	0.47	4,801,185	6,122	0.55	1,111,919	295,564	1.21	24,451,338
2005	72,584	4.55	1,596,944	249,336	1.55	16,079,716	11,632	0.30	3,935,893	0	0.00	928,726	333,552	1.48	22,541,279

Table 3.3.15. GULF OF MEXICO GRAY TRIGGERFISH 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												
1986	0	0.00	10,405,962	91,051	18.29	497,740	28,278	0.35	8,136,242	119,330	0.63	19,039,944
1987	10,374	0.15	6,923,388	141,589	21.84	648,271	66,095	0.78	8,517,788	218,059	1.36	16,089,446
1988	0	0.00	8,524,356	124,628	23.95	520,412	117,582	1.10	10,698,532	242,210	1.23	19,743,299
1989	1,789	0.03	6,419,667	112,661	22.97	490,536	198,887	2.28	8,712,307	313,337	2.01	15,622,510
1990	12,468	0.22	5,706,778	111,896	28.92	386,941	90,919	1.26	7,216,506	215,283	1.62	13,310,226
1991	50,279	0.58	8,642,251	143,661	32.31	444,609	68,935	0.76	9,086,738	262,875	1.45	18,173,598
1992	13,356	0.16	8,265,502	90,219	20.48	440,494	176,649	1.88	9,373,254	280,223	1.55	18,079,250
1993	4,185	0.05	7,642,451	147,991	19.80	747,252	98,744	1.09	9,041,306	250,920	1.44	17,431,009
1994	8,251	0.11	7,293,305	169,690	20.55	825,632	96,761	1.03	9,384,801	274,702	1.57	17,503,737
1995	4,907	0.07	6,925,453	157,535	17.62	893,967	67,251	0.70	9,570,896	229,693	1.32	17,390,316
1996	4,442	0.07	6,800,513	96,879	10.99	881,248	70,324	0.75	9,351,017	171,645	1.01	17,032,778
1997	2,695	0.04	7,423,022	124,054	12.72	974,979	89,292	0.88	10,195,083	216,041	1.16	18,593,084
1998	0	0.00	6,861,289	87,753	9.72	903,170	87,877	0.98	8,938,905	175,630	1.05	16,703,364
1999	2,357	0.04	5,918,885	128,565	14.66	877,041	106,449	1.17	9,097,803	237,372	1.49	15,893,729
2000	1,383	0.02	8,477,685	81,047	9.99	811,634	62,229	0.53	11,728,464	144,659	0.69	21,017,783
2001	6,274	0.06	9,776,174	97,776	13.17	742,386	106,987	0.86	12,371,138	211,037	0.92	22,889,697
2002	2,495	0.03	7,266,262	110,660	14.48	764,222	128,979	1.11	11,635,095	242,134	1.23	19,665,578
2003	0	0.00	8,155,304	96,920	14.02	691,362	107,103	0.76	14,110,007	204,023	0.89	22,956,673
2004	3,671	0.04	9,529,938	139,193	17.79	782,446	152,699	1.08	14,138,953	295,564	1.21	24,451,338
2005	3,793	0.04	8,584,294	210,833	16.22	1,299,722	118,925	0.94	12,657,263	333,552	1.48	22,541,279

Table 3.3.16. GULF OF MEXICO GRAY TRIGGERFISH CATCH EFFORT TRIPS, BY WAVE, MRFSS DATA.

	WAVE																		TOTAL		
	1			2			3			4			5			6					
	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	CATCH EFFORT TRIPS		TOTAL TRIPS	CATCH EFFORT TRIPS		TOTAL TRIPS
YEAR	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL	TOTAL	%	TOTAL
1986	3,343	0.21	1,620,773	6,434	0.23	2,829,692	24,562	0.69	3,559,452	22,620	0.80	2,837,382	51,269	1.01	5,069,845	11,101	0.36	3,122,800	119,330	0.63	19,039,944
1987	15,050	0.42	3,550,826	9,660	0.46	2,109,947	28,946	1.13	2,567,991	30,710	1.08	2,836,924	105,382	3.51	2,999,005	28,311	1.40	2,024,753	218,059	1.36	16,089,446
1988	5,325	0.25	2,126,306	15,876	0.65	2,451,599	43,742	1.25	3,500,670	65,096	1.36	4,788,257	70,715	1.89	3,742,401	41,456	1.32	3,134,067	242,210	1.23	19,743,299
1989	39,359	1.19	3,297,541	47,319	1.60	2,948,334	45,426	1.63	2,783,023	45,441	1.98	2,289,342	108,743	4.36	2,493,520	27,049	1.49	1,810,750	313,337	2.01	15,622,510
1990	18,058	0.92	1,961,223	23,169	1.09	2,121,274	67,117	2.51	2,678,432	27,274	0.94	2,897,255	55,327	3.42	1,615,949	24,338	1.20	2,036,093	215,283	1.62	13,310,226
1991	17,131	0.78	2,191,203	25,936	1.01	2,575,654	64,902	1.92	3,373,494	30,481	0.65	4,676,472	60,366	1.88	3,219,015	64,059	3.00	2,137,761	262,875	1.45	18,173,598
1992	9,813	0.43	2,267,563	39,654	1.47	2,705,954	70,152	2.08	3,367,020	36,427	0.90	4,062,677	96,761	3.30	2,935,480	27,418	1.00	2,740,557	280,223	1.55	18,079,250
1993	11,437	0.50	2,296,437	16,164	0.63	2,574,229	45,682	1.44	3,176,285	63,462	1.73	3,666,123	78,611	2.27	3,465,600	35,565	1.58	2,252,336	250,920	1.44	17,431,009
1994	8,487	0.47	1,801,590	34,015	1.17	2,896,589	60,272	1.78	3,380,365	76,555	2.20	3,481,661	50,071	1.41	3,560,280	45,303	1.90	2,383,252	274,702	1.57	17,503,737
1995	12,791	0.50	2,538,852	15,445	0.53	2,887,691	75,672	1.90	3,982,577	36,141	1.23	2,926,907	50,391	1.69	2,985,397	39,252	1.90	2,068,892	229,693	1.32	17,390,316
1996	8,835	0.50	1,768,572	12,976	0.51	2,559,046	43,662	1.20	3,644,037	42,008	1.06	3,960,516	33,802	1.15	2,930,386	30,362	1.40	2,170,221	171,645	1.01	17,032,778
1997	18,005	0.79	2,291,201	36,484	1.34	2,728,092	38,478	0.98	3,942,833	39,882	1.00	4,004,469	43,283	1.40	3,099,943	39,910	1.58	2,526,547	216,041	1.16	18,593,084
1998	4,730	0.24	1,969,685	0	0.00	3,121,777	29,138	0.82	3,573,416	54,600	1.48	3,689,985	53,973	2.30	2,349,003	33,189	1.66	1,999,497	175,630	1.05	16,703,364
1999	42,888	1.90	2,261,718	46,223	1.61	2,864,161	57,553	1.61	3,573,442	36,724	1.19	3,080,604	38,098	1.70	2,245,156	15,886	0.85	1,868,648	237,372	1.49	15,893,729
2000	6,780	0.27	2,531,586	25,949	0.73	3,564,241	41,980	0.90	4,665,590	33,719	0.75	4,489,176	26,482	0.81	3,249,659	9,751	0.39	2,517,531	144,659	0.69	21,017,783
2001	7,493	0.28	2,634,785	28,087	0.73	3,856,325	42,854	0.79	5,454,665	50,769	1.12	4,515,558	43,019	1.22	3,536,545	38,816	1.34	2,891,819	211,037	0.92	22,889,697
2002	22,474	0.97	2,306,137	34,807	1.20	2,888,512	61,553	1.27	4,840,342	54,397	1.48	3,678,214	39,449	1.17	3,382,934	29,454	1.15	2,569,440	242,134	1.23	19,665,578
2003	5,975	0.24	2,511,809	28,434	0.76	3,723,180	49,965	1.17	4,256,988	48,795	0.98	4,984,014	48,302	1.16	4,173,484	22,552	0.68	3,307,199	204,023	0.89	22,956,673
2004	9,602	0.35	2,766,465	37,208	0.86	4,341,216	104,820	1.74	6,018,283	88,723	1.91	4,656,797	37,233	1.13	3,286,373	17,978	0.53	3,382,204	295,564	1.21	24,451,338
2005	16,374	0.54	3,038,490	77,056	1.77	4,350,570	99,889	1.96	5,095,207	71,711	1.57	4,578,185	52,413	1.81	2,900,026	16,108	0.62	2,578,801	333,552	1.48	22,541,279

Table 3.3.17. Headboat angler days, NMFS Headboat Survey.

	STATE			
	LOUISIANA	TEXAS	WFLORIDA/-ALABAMA	TOTAL
	Sum	Sum	Sum	Sum
	TOTAL #	TOTAL #	TOTAL #	TOTAL #
YEAR				
1986	.	.	.	.
1987	6,362	63,363	217,049	286,774
1988	7,691	70,396	195,948	274,035
1989	2,867	63,389	208,325	274,581
1990	6,898	58,144	213,906	278,948
1991	6,373	59,969	174,312	240,654
1992	9,911	76,218	184,742	270,871
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 3.3.18. 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 3.3.19 and 3.3.20. 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 3.3.19. 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

Characteristic	Charterboats	Headboats
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 3.3.20 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 3.3.20. 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		

Characteristic	Charterboats		Headboats	
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).

3.4 Description of the Fishery and Social Environment

As described in the social impact statement, there is little data to adequately describe the affected environment for communities dependent on the greater amberjack and gray triggerfish 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 Census was used for the descriptions of Madeira Beach, St. Petersburg, and Panama City, Florida, and Golden Meadow, Louisiana so that it is possible to see changes in the communities in those ten years. The demographics are from a report prepared by Impact Assessment, Inc. (2005a, 2005b)

The demographics for Destin, Florida, were not included in those reports so only the demographics for 2000, which were gathered from the U.S. Census web site (www.Census.gov 2007) were included. There is also less community information for these two communities than the other four communities listed.

Fishing communities were ranked according to the dealer reported number of pounds, using 2004 greater amberjack and gray triggerfish data, to get an idea of which communities are dependent on the commercial greater amberjack and gray triggerfish fisheries. Permits data was also taken into consideration. Specific communities that are dependent on the recreational greater amberjack and gray triggerfish fisheries were not described because the recreational landings data describes landings at the regional level, not at the community level. These analyses do not fully take into account how communities have been impacted by the hurricanes season of 2005.

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. A boat that is homeported in one location may not necessarily unload its catch at that location.

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. 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. As the price of water front property continues to rise, it is becoming more common in many communities for fishermen and others working in fishing dependent businesses to live inland, away from the water. This compounds the problem of trying to identify fishing communities as a certain location where people dependent on marine resources live and work. 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.

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, the complete census is only conducted every ten years. In the span of ten years much can change in a coastal community due to the increasing pressure to develop waterfront property for uses other than 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 may report their occupation under another category.

Greater amberjack and gray triggerfish are both often caught as bycatch by the commercial fishermen when they are fishing for other reef fish species with a higher market value such as snappers and groupers. Even though they may not be the targeted fish, they add to the total catch and the total revenues for commercial fishing trips. 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 can 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 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. Greater amberjack is a targeted species for private and for-hire recreational fishermen, whereas gray triggerfish is more often caught when fishermen are targeting other species. 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 with in a given year. A reduction in trips will have an impact on businesses and communities that support the recreational sector. 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 greater amberjack or gray triggerfish fisheries.

As illustrated above, much 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 in the future 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 Northern Gulf of Mexico in recent years. Profiling these communities based on older data would not help to understand potential impacts from new regulations for the shrimp and red snapper fisheries. Therefore, the communities chosen are communities that may be affected by new regulations but would not necessarily be ranked the same year to year.

Communities Substantially Involved in the Gray Triggerfish Fishery
Most of the commercial fishermen who fish for gray triggerfish are actually targeting other reef fish of higher market value such as groupers and snappers. Some fishermen fish throughout the Gulf and unload in various locations, making it difficult to identify communities that would be most affected by new regulations on the gray triggerfish fishery. Fish processors who buy gray triggerfish take in multiple reef fish species so they are not totally dependent on the gray triggerfish fishery. Depending on what percentage the gray triggerfish fishery constitutes of their total landings, the processors may or may not be heavily impacted by any reduction in landings of gray triggerfish. For the recreational fishery, there are many communities spread throughout the Gulf, from Florida to Texas that serve as a launching point for recreational and charter fishermen who target gray triggerfish, but the majority of the landings are in Alabama and West Florida.

For the purpose of this amendment, three communities that are dependent on the commercial gray triggerfish fishery were chosen as representative communities that could be impacted by new regulations. After analyzing secondary data relating to the commercial gray triggerfish fishery in the Gulf of Mexico, three communities were chosen for discussion. These include Destin and Panama City, Florida and Golden Meadow, Louisiana.

Destin, Florida (incorporated population 11,119).
Native Americans inhabited Destin as early as the 7th century A.D. Destin's more recent history includes the establishment of Destin by a fishing captain, Leonard Destin, who settled in Destin in 1845. He is credited for establishing the commercial fishing industry in the area. Over the years Destin grew from a small fishing community to a major tourist resort area. The City of Destin was chartered as a municipality in 1984, although the community of Destin had been in existence for over 100 years. Destin is a popular destination for recreational fishermen.

In 2004, there were 109,308 pounds of gray triggerfish landed in Destin, Florida with a value of $111,572. In the 2000 census, two percent of the population listed their occupation under the category for farming, fishing, and forestry and 10.7 percent listed their occupation under the agriculture, forestry, fishing, and hunting category.

Destin Demographics, 2000

Factor	2000
Total population	11,119
Population 16 years and over	9,397
In civilian labor force	5,327
Household income (Median $)	$53,042
Poverty (Percent of population with income below poverty line)	5.5
Percent 16 and over in the civilian labor force	56.7
Percent of civilian labor force unemployed	2.2
High School graduate or higher for 25 years and older (percent)	91.9
Management, professional, and related occupations	36.3
Service occupations	14.6
Sales and office occupations	28.4
Farming, fishing, and forestry occupations	2.0
Construction, extraction, and maintenance occupations	10.7

Production, transportation, and material moving occupations	8.1
Agriculture, forestry, fishing and hunting	1.2
Manufacturing	4.2
Percent government workers	9.1
Percent in carpools	9.8
Percent using public transportation	0.3
Mean travel time to work (minutes)	19.8

U.S. Census Bureau, 2000.

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 2004, there were 32,523 pounds of gray triggerfish landed in Panama City, Florida with a value of $34,264. 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.

Golden Meadow, Louisiana (incorporated, pop. 2,193)

Location and Overview. Golden Meadow is the largest incorporated community along Bayou Lafourche, and the most southerly along the linear area of settlement (with the exception of distant Port Fourchon). The importance of the shrimping industry to the region is commemorated here in display of *Le Petit Caporal* in the center of the town. Built in 1854 for sailing and converted to gasoline power in the early 20th century, this vessel is the only surviving example of a Louisiana "lugger." The importance of recreational fishing to the area is also evinced in the number of RV camps, cabin rentals, and motels that serve visiting anglers. Indicating the centrality of Golden Meadow to all types of fishing in the region, the annual Blessing of the Fleet takes place here each August.

Current Conditions and Trends. Golden Meadow had a year 2000 population of 2,193 persons; an increase of 144 persons since 1990. The number of persons claiming fishing as their primary occupation has also increased from 1990. Golden Meadow has fully developed commercial and recreational fisheries infrastructure. There are numerous seafood docks and dealers, and a number of boat construction and repair yards. There are at least two marine railways with lifts capable of out-hauling large offshore commercial fishing vessels and oil field supply vessels. Numerous large and small recreational and commercial vessels dock along the banks of Bayou Lafourche.

While Golden Meadow's commercial fishing industry has thrived for many decades, some local fishermen report having recently experienced an economic downturn. One who has been in this industry since 1966 blames the influx of imported shrimp for the decline. Shrimp, crab, and oysters are important products here, and there are many resident state license holders. There are also active federal permits and harvest of various pelagic and reef fish species. A seafood processor was active here at the time of this study. At least six charter vessel operators were residing in or maintaining post office box addresses in the area during 2000. Vast areas of estuarine shrimping grounds lay adjacent to the community, and (distant) ocean access is enabled via Bayou Lafourche. As of 2003, six shrimp permit holders reported Golden Meadow addresses (Impact Assessment, Inc. 2005b).

In 2004, there were 15,453 pounds of gray triggerfish landed in Golden Meadow, Louisiana with a value of $16,046. In the 2000 census, 7.5 percent of the population listed their occupation under the category for farming, fishing, and forestry, an increase from the 3.2 percent who were in this category in 1990. In 2000, 6.0 percent listed their occupation under the agriculture, forestry, fishing, and hunting category also an increase from the 4.1percent listed in 1990.

Following the demographic table are four tables that help to describe the presence of fishing in Golden Meadow 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).

Golden Meadow Demographics for 1990 and 2000

Factor	1990	2000
Total population	2,049	2,193
Gender Ratio M/F (Number)	970/1,079	1,069/1,124
Age (Percent of total population)		
Under 18 years of age	26.3	27.9
18 to 64 years of age	58.5	56.6
65 years and over	15.2	15.5
Ethnicity or Race (Number)		
White	1,939	2,029
Black or African American	0	11
American Indian and Alaskan Native	92	106
Asian	9	9
Native Hawaiian and other Pacific Islander	N/A	0
Some other race	9	17
Two or more races	N/A	21
Hispanic or Latino (any race)	87	32
Educational Attainment (Population 25 and over)		
Percent with less than 9th grade	41.8	27.0
Percent high school graduate or higher	44.2	54.3
Percent with a Bachelor's degree or higher	6.2	8.1
Language Spoken at Home (Population 5 years and over)		
Percent who speak a language other than English at home	54.5	40.0
And Percent who speak English less than very well	17.2	10.3
Household income (Median $)	16,373	28,690
Poverty Status (Percent of population with income below poverty line)	22.7	18.8
Percent female headed household	11.9	9.9
Home Ownership (Number)		
Owner occupied	573	637
Renter occupied	204	184
Value Owner-occupied Housing (Median $)	37,400	57,600
Monthly Contract Rent (Median $)	173	243
Employment Status (Population 16 yrs and over)		
Percent in the labor force	46.6	50.1
Percent of civilian labor force unemployed	3.1	4.4
Occupation (Percent in workforce)**		
Management, professional, and related occupations	N/A	20.2
Service occupations	N/A	13.0
Sales and office occupations	N/A	18.2
Farming, fishing, and forestry occupations	3.2	7.5
Construction, extraction, and maintenance occupations	N/A	11.6
Production, transportation, and material moving occupations	N/A	29.5
Industry (Percent in workforce)**		
Agriculture, forestry, fishing and hunting (and mining)	4.1	6.0
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.

Fishing Infrastructure and Services Observed in Golden Meadow 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.

Factor	**Quantity**
Boats with Commercial Gear	-
Trawls	75-100
Skimmers	100-150
Butterfly	20-30
Crabbers	50-100
Oyster	5-10
Other Commercial	Numerous (oil field)
Recreational Boats	-
Freshwater	Over 100
Saltwater	40-50
Fishing Infrastructure and Services	-
Marinas	None
Seafood Docks/Dealers	11
Commercial Ship/Boat Repair	6
Commercial Ship/Boat Builders	6
Net Makers/Dealers	1
Commercial Marine Supply	1
Seafood Transport	Numerous
Air Fill Stations (diving)	0
Fishing Pier	0

Primary Fishing-related Businesses Listed in Golden Meadow 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	6
Boat Rentals & Pier	8
Boat Rentals & Pier; Diving & Fishing Equipment	1
Marina	4
Processor	2
Processor; Seafood Dealer (Wholesaler)/ Retailer	1
Processor; Seafood Dealer (Wholesaler)	1
Seafood Retailer	8
Seafood Dealer (Wholesaler)/ Retailer	1
Seafood Dealer (Wholesaler)	6
Total	38

Golden Meadow Commercial Landings Summary: 2000 (based on all address fields)

Species	Pounds Reported	**Ex-Vessel Value ($)**
Total Combined	5,878,722	7,686,284

Golden Meadow 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 (all types)	Total Sold in Community
107	13	612	4,075
Total = 120		Average Number of Licenses per Household: 612/821 = .7	--
% Households Holding Commercial Permit or License: 120/821 = 14.6			

Please reference Table 3.12-2 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.

Communities Substantially Involved in the Greater Amberjack Fishery

As with the commercial gray triggerfish fishery, commercial fishermen who fish for greater amberjack may actually be targeting other reef fish of higher market value such as groupers and snappers. Some fishermen fish throughout the Gulf and unload in various locations, making it difficult to identify communities that would be most affected by new regulations on the greater amberjack fishery. Fish processors who buy greater amberjack take in multiple reef fish species so they are not totally dependent on the greater amberjack fishery. Depending on what percentage the greater amberjack fishery constitutes of their total landings, the processors may or may not be heavily impacted by any reduction in landings of greater amberjack. For the recreational fishery, there are many communities spread throughout the Gulf, from Florida to Texas that serve as a launching point for recreational and charter fishermen who target greater amberjack, but the majority of the landings are in Alabama and West Florida.

For the purpose of this amendment, three communities that are dependent on the commercial greater amberjack fishery were chosen as representative communities that could be impacted by new regulations. After analyzing secondary data relating to the commercial greater amberjack fishery in the Gulf of Mexico, two communities, Madeira Beach and St. Petersburg, Florida, were chosen for discussion.

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 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 rise 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 the Seafood Festival in October.

In 2004, there were 170,266 pounds of greater amberjack landed in Madeira Beach, Florida with a value of $166,016. 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 2000, 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

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

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.

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 2004, there were 117,574 pounds of greater amberjack landed in St. Petersburg, Florida with a value of $120,169. 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 Description of the 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 GOM. 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 GOM 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 "GOM 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 states primary regulatory agency for marine resources is provided in Amendment 22 (GMFMC 2004b).

4. BYCATCH PRACTICABILITY ANALYSIS

Background/Overview

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

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 greater amberjack and gray triggerfish fisheries are currently regulated with size limits, bag limits, and seasonal closures. These measures are generally effective in limiting fishing mortality, the size of fish targeted, the number of targeted fishing trips, and/or 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 and Amendment 27/14 to the Reef Fish and Shrimp FMPs (Amendment 27/14) the practicability of taking additional action to further minimize directed fishery reef fish bycatch.

Greater amberjack and gray triggerfish are also caught as bycatch in shrimp trawls. The abundance of greater amberjack in shrimp trawls is so low that reliable estimates were not generated for the latest stock assessment (SEDAR 9 2006a). In contrast, gray triggerfish are more frequently encountered in shrimp trawls. During 1981-2004, estimated shrimp trawl dead discards ranged from 0.17 to 5.1 million age-1 equivalent fish, with an annual mean of 1.25 (± 0.5 95 percent confidence interval) million age-1 equivalent fish (SEDAR 9 2006b). With the exception of two years (1992, 2002), gray triggerfish bycatch in shrimp trawls has been less than 2 million age-1 equivalent fish. Gray triggerfish projections provided by the SEFSC assume fishing mortality across all sectors is reduced proportionally, including shrimp trawl bycatch (Sladek Nowlis 2007a). Actions proposed in Amendment 27/14 are intended to reduce shrimp trawl fishing mortality on red snapper by 74 percent during 2008-2010 relative to the baseline fishing mortality rate during 2001-03. If the target annual red snapper fishing mortality reduction is not achieved, the Council is proposing implementation of a seasonal closure in the subsequent year to control shrimp trawl bycatch mortality levels. These proposed actions, in conjunction with large declines in shrimp effort since 2003, are believed to be sufficient to reduce gray triggerfish shrimp trawl bycatch to the necessary levels specified in the projections.

Greater Amberjack and Gray Triggerfish Release Mortality Rates

Release mortality rate for greater amberjack in the Gulf of Mexico is unreported (SEDAR 9 2006a). Headboat and commercial handline observer studies off North Carolina estimated release mortality rate ranges from eight to nine percent for greater amberjack (Robert Dixon, pers. comm. in SEDAR 9 2006a); however, sample sizes were small for these studies. Release mortality rates were based on observer observations of greater amberjack floating at the surface after release. The SEDAR 9 data workshop panel suggested a minimum release mortality rate for greater amberjack of 10 percent, with actual release mortality potentially higher owing to fish dying after release that did not float at the surface. The SEDAR 9 data workshop panel recommended using a range of release mortality rates to evaluate the sensitivity of the SEDAR 9 stock assessment to this parameter. Release mortality rates of 0, 20, and 40 percent were used for the assessment, with 20 percent selected as the preferred release mortality rate. Evaluation of preliminary model results during the SEDAR 9 assessment workshop indicated that fishing mortality was higher and stock biomass was lower as release mortality decreased (SEDAR 9 2006a).

Headboat observer data collected by the Florida Fish and Wildlife Conservation Commission indicates release mortality for greater amberjack may be lower than estimated by the SEDAR 9 stock assessment. During 2005 and 2006, the conditions of 501 greater amberjack caught on headboats were observed. Ninety-four percent (n = 471) were released in good condition, two percent (n = 11) were released in fair condition, 1 percent (n = 5) were released in poor condition, one percent (n = 6) were released dead, and two percent (n = 6) were eaten. Overall post-release mortality for fish in fair or poor condition, or that were eaten, was 3.8 percent.

Gray triggerfish have an extremely low release mortality rate. Ingram (2001) visually assessed the condition of tagged gray triggerfish upon release and estimated an acute mortality rate of 1.5 percent. Only 19 gray triggerfish out of 1,271 fish released did not immediately orient to the bottom and swim down vigorously. Out of the 19 gray triggerfish that did not swim down immediately, two were later recaptured and released again indicating some fish assumed to die actually survived. Ingram (2001) did indicate that release mortality increased slightly with size, but that depth of capture did not significantly affect release condition.

Magnitude of Greater Amberjack and Gray Triggerfish Bycatch

Estimates of commercial greater amberjack and gray triggerfish discards from August 2001 through December 2004 were estimated by McCarthy (2005) using a 20 percent sample of Gulf of Mexico reef fish, king mackerel, Spanish mackerel, and shark permit holders selected to report discards in logbooks. A total of 853 out of 5,383 trips reported discarding greater amberjack during this time, while only 70 trips reported discarding gray triggerfish (McCarthy 2005). Discards were estimated for years prior to implementation of the discard logbook program by using average discard rates during 2001-2004. Between 1993 and 2004, commercial greater amberjack discards for handlines were estimated to range between 139 and 283 thousand fish weighing 2.1 to 4.3 million pounds (McCarthy 2005). Commercial handline discards for gray triggerfish were estimated to range from 1,202 to 1,305 gray triggerfish annually between 2000 and 2004. Discards were not estimated prior to 2000 for gray triggerfish because there was no minimum size limit before November 1999. Additionally, logbook discard sample sizes were inadequate to estimate discards from other gear types for both greater amberjack and gray triggerfish.

Recreational greater amberjack discard estimates were summarized in SEDAR 9 (2006a). Discards have generally increased over time with two large peaks in discards occurring during the early 1990s and around 2001. These peaks in discards correspond to implementation of the 28-inch recreational minimum size limit in 1990 and reduction in the bag limit to one fish in the late 1990s. Between 2001 and 2004, discards showed a declining trend. Since 2000, annual discards have averaged 250 thousand fish, with approximately 50,000 fish killed due to release mortality (Figure 4.1).

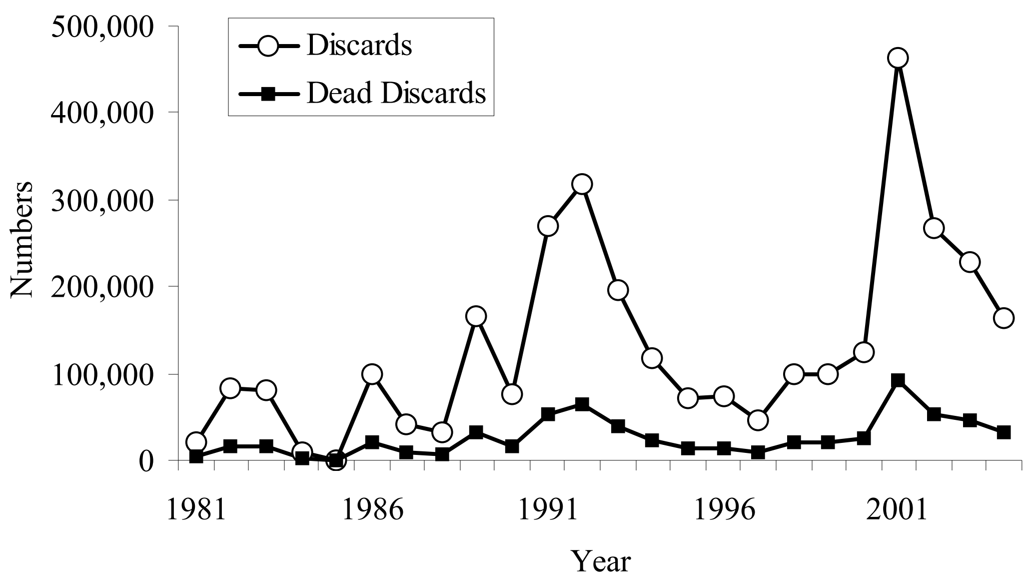

Figure 4.1 Greater amberjack recreational discards and dead discards, 1981-2004. Source: SEDAR 9 2006a.

No estimates of directed fishery bycatch were incorporated in the most recent gray triggerfish stock assessment (SEDAR 9 2006b) because release mortality rate is low (1.5 percent) and not expected to significantly affect the outcome of the assessment. Available discard estimates from the MRFSS indicate discards have been fairly stable since the mid 1980s (Figure 4.2). During 2002-2006, recreational discards (in numbers) ranged from 71 to 162 thousand per year, and averaged 115 thousand per year. These estimates do not include discards off Texas or discards associated with headboat trips. Applying a 1.5 percent release mortality rate to these discards results in 1,070 to 2,441 gray triggerfish being killed annually due to release mortality.

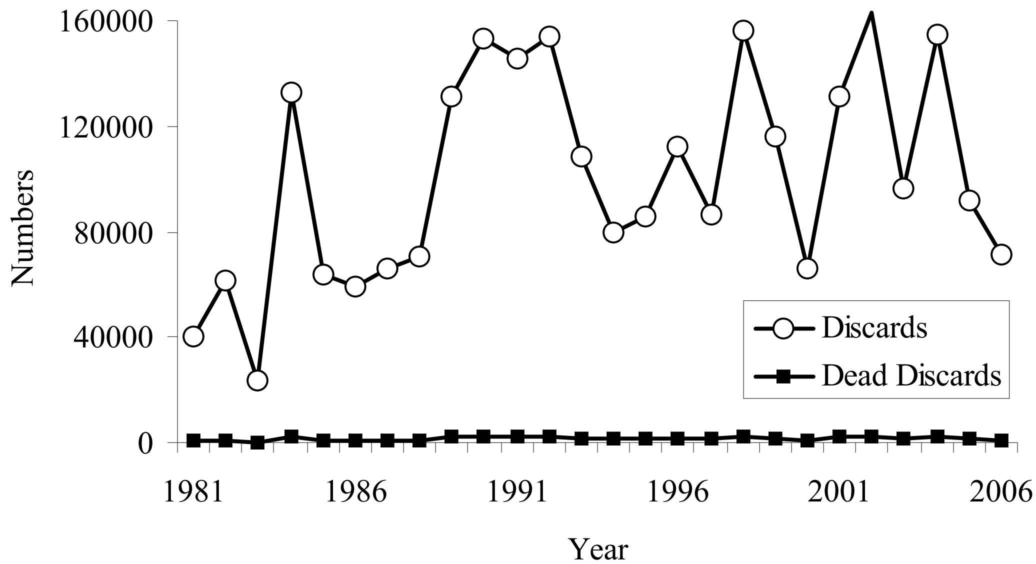

Figure 4.2 Gray triggerfish recreational discards and dead discards, 1981-2004. Source: MRFSS. Dead discards assume a 1.5 percent release mortality rate. Headboat and Texas private/charter discards are not included.

<u>Other Bycatch</u>

Species incidentally encountered by the directed greater amberjack and gray triggerfish fisheries include sea turtles and sea birds. The Gulf commercial reef fish fishery is listed as a Category III fishery under the Marine Mammal Protection Act, as there have been no documented interactions between this fishery and marine mammals (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 fishery, which uses similar gear, is also expected estimated to be low, although interactions with dolphins and sea turtles are known to occur.

A recently completed biological opinion (NMFS 2005) 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 2005). 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 2005). During this same time period, it was estimated there were 113 longline hardshell sea turtle takes, 87 vertical line hardshell sea turtle takes, and 9 leatherback sea turtle takes (NMFS 2005). The biological opinion also estimated eight smalltooth sawfish were caught and released by the commercial and recreational reef fish fishery during 2001-2003 (NMFS 2005). Two reasonable and prudent measures to minimize stress and increase survival of sea turtles and smalltooth sawfish were identified:

1. NMFS 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. NMFS 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 are represented in the Gulf, 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) and several species, 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) are listed by the U.S. Fish and Wildlife Service as either endangered or threatened. 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 greater amberjack and gray triggerfish fisheries adversely affect seabirds.

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

The commercial greater amberjack fishery is managed with a 36-inch minimum size limit, March through May seasonal closure, and gear restrictions. A 28-inch minimum size limit and one-fish bag limit are used to manage the recreational greater amberjack fishery. The commercial and recreational gray triggerfish fisheries are managed with a 12-inch TL minimum size limit and 20-reef fish aggregate recreational bag limit. The following discusses current and proposed management measures with respect to their relative impacts on bycatch.

Size limits

Minimum size limits are the greatest source of regulatory discards for most reef fish species. In 1990, a 36-inch FL commercial minimum size limit and a 28-inch FL recreational minimum size limit were implemented for greater amberjack. The 12-inch TL gray triggerfish minimum size limit was implemented in late 1999.

Size limits are typically established to reduce fishing mortality, increase yield-per-recruit, and prevent growth overfishing. A negative consequence of increasing the minimum size limit is potential increases in discards. There is no information on the size distribution of commercially or recreationally discarded greater amberjack from the Gulf of Mexico. A 1996-1999 tagging study of commercially caught greater amberjack in the South Atlantic indicated 41 percent of all greater amberjack caught were discarded (McGovern, pers. comm.). Reducing the commercial minimum size limit would reduce discards significantly (SERO 2007), but would increase harvest rates and fishing mortality, unless further restrictions are imposed, such as a quota. Increasing the recreational minimum size limit is estimated to increase the proportion of dead discards to landings, but the overall magnitude of dead discards is estimated to be less for higher size limits relative to the status quo because of the large reductions in harvest being considered in this amendment. Historical trends indicate dead discards increased after implementation of higher size limits, but quickly declined as the size distribution of greater amberjack adjusted to the new minimum size limit.

A yield-per-recruit analysis has not been conducted in recent years to determine if the legal minimum size limit for greater amberjack is adequately protecting against growth overfishing (SEDAR 9 2006a). Additionally, size- and age-at-maturity for greater amberjack are not well known. Thompson et al (1991) and Thompson (unpublished data) indicated zero percent of greater amberjack were mature at age 2, 50 percent were mature by age 3 and 100 percent were mature by age 4. More recent work by Harris et al. (2004) indicates 50 percent of male greater amberjack are mature by 25 inches TL and 50 percent of female greater amberjack are mature by 29 inches TL. The 36-inch FL commercial minimum size limit therefore corresponds to a size when greater than 50 percent of all greater amberjack are mature. In contrast, the 28-inch recreational minimum size limit corresponds to a size when no or less than 50 percent are mature. Increasing the recreational minimum size limit could potentially benefit spawning and yield-per-recruit if the increase does not result in a significant amount of forgone yield due to losses associated with natural and release mortality.

The size limit for gray triggerfish is the primary source of discards because there is no closed season and the recreational bag limit is not limiting. The 12-inch TL minimum size limit corresponds to the size at first maturity, which is approximately 12 to 14.5 inches TL (Ingram 2001). Unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish are hearty fish that have a very low release mortality rate. Only a small percentage (1.5 percent) of gray triggerfish die after release. Increasing the minimum size limit would not significantly increase discards or overall fishing mortality because release mortality is low. An increase in the minimum size limit could also potentially benefit the stock by increasing spawning potential (larger fish are more fecund) and yield-per-recruit.

Closed Seasons

The March through May commercial greater amberjack season closure was implemented in January 1998. No seasonal closure is currently in effect for the recreational greater amberjack fishery. The commercial season closure corresponds to the peak period of spawning (Burch 1979; Thompson et al. 1991; Beasley 1993; Harris et al. 2004). Discards are thought to be low during the closed season because commercial fishermen can avoid targeting schools of greater amberjack. This amendment includes alternatives that would add a recreational closed season from January through February. This small closed season would not correspond to the spawning season and would minimally increase discards since little fishing occurs during this time.

There are currently no closed seasons in effect for gray triggerfish. This amendment includes alternatives to establish both recreational and commercial closed seasons for gray triggerfish. Implementing a seasonal closure would increase bycatch, but only by a very small extent because release mortality is low (1.5 percent) and gray triggerfish are not the primary target species on most fishing trips. Implementing a seasonal closure during the spawning season would protect gray triggerfish from being harvested during a portion of their spawning season.

Bag Limits

A one-fish greater amberjack bag limit has been in effect since 1997. A low bag limit can encourage discards from high-grading once the bag limit is met. However, the minimum size limit likely plays a more significant role in determining the overall number of recreational discards. During 2003-2005, approximately 31 percent of MRFSS trips landing greater amberjack reported landing one or more greater amberjack per angler (Strelcheck, pers. comm.). This high percentage of trips indicates the potential for discards after the bag limit is met. However, no changes to the bag limit are currently proposed in this amendment for the recreational greater amberjack fishery.

Gray triggerfish are included in the 20-fish aggregate bag limit for reef fish without a species-specific bag limit. This aggregate bag limit was established in 1997. As discussed in Section 5.9.2, the aggregate bag limit does not limit the harvest of gray triggerfish. Nearly all recreational fishing trips reported landing less than 20 gray triggerfish per angler during 2003-2005. Because the bag limit is not restrictive and is rarely exceeded, discards do not occur. Lowering the bag limit could result in discards of gray triggerfish once the bag limit is reached. However, the minimum size limit is more likely to result in regulatory discards than a lower bag limit. Regardless, any increases in dead discards would be small since 98.5 percent of gray triggerfish survive after release.

Allowable Gear

Vertical hook-and-line gear (bandit rigs, manual handlines) is the primary gear used in both the greater amberjack and gray triggerfish commercial fisheries. During 2002-2004, vertical-line gear accounted for 90 percent of both the greater amberjack and gray triggerfish landings, longlines accounted for 10 percent of the greater amberjack landings and 4 percent of the gray triggerfish landings, and traps accounted for 6 percent of the gray triggerfish landings (SEDAR 9 2006b). No landings of greater amberjack were reported from traps.

On average, longlines harvest larger greater amberjack than vertical-line gear. TIP data from 2003-05 indicates the average size of greater amberjack caught on longlines was four inches greater than the average size caught on vertical-line gear (43.6 vs. 39.6 inches FL). The difference in size at harvest is evident in size limit analyses for greater amberjack, which indicate greater reductions in harvest occur for vertical-line gear than longlines when comparing similar minimum size limits (SERO 2007a). Because the size of landed fish is greater, the number of discards is less on longlines than vertical-line gear, because the gear selects for larger fish. McCarthy (2005) estimated vertical-line gear discards of greater amberjack by the commercial fishery during 1993 to 2004, but could not estimate longline discards because of the small number of trips reporting discards. Additionally, little is known on the release mortality rates associated with each of these gears. The 2006 assessment assumed a constant 20 percent release mortality rate for all gears and fisheries. More scientific information is needed to determine the magnitude and release mortality rates for various gears used in the greater amberjack commercial fishery. For instance, in the commercial red grouper fishery, longlines are assumed to have a 45 percent release mortality rate while vertical-line gear has a 10 percent release mortality rate. This difference in release mortality rate between gears can be important if one gear discards substantially more fish than the other, but kills a smaller percentage of the fish released.

Similar to greater amberjack, longlines harvest larger gray triggerfish than vertical-line gear. Size limit analyses conducted for gray triggerfish indicate longlines did not harvest any gray triggerfish less than 15 inches TL during 2003-05. In comparison, 24 percent of gray triggerfish landed by vertical-line gear fishermen were between 12 and 15 inches TL (SERO 2007b). Additionally, McCarthy (2005) estimated only 1,200 to 1,300 gray triggerfish were discarded annually by commercial fishermen during 2000 through 2004. These discards were all attributed to the vertical-line gear fishery because sample sizes were too small to estimate discards for other gear types.

Rod-and-reel is the primary gear used in the recreational fishery. Circle hooks are used by some anglers when targeting greater amberjack, but are less likely to be used for gray triggerfish because of their small mouth gape. Some triggerfish and greater amberjack are also caught using spears, which do not affect discards or release mortality since all fish caught are killed. Only undersized fish mistakenly killed while spearfishing would contribute to discard mortality.

Recreational discards are primarily due to the recreational size limits in each of these fisheries and the one fish greater amberjack bag limit; however, allowable gears can affect release mortality rates. Amendment 27/14 to the Reef Fish and Shrimp FMPs summarizes various research studies examining the effects of circle hooks, hook sizes, venting tools, and dehooking devices on survival of reef fishes after release.

Alternatives being considered to minimize bycatch

Reductions in dead discards can be accomplished either by reducing the number of greater amberjack and gray triggerfish discarded or reducing the release mortality rate of discards. To reduce the number of discards, management measures must limit fishing effort or change the selectivity of fishing gears in such a way that reduces the harvest of sub-legal fish. To reduce the discard mortality rate of greater amberjack and gray triggerfish, sources of release mortality must first be identified (e.g., depth, length, hooking location, surface interval, temperature) and management measures must be imposed to reduce discard mortality rates.

This amendment and Amendment 27/14 to the Reef Fish and Shrimp FMPs consider several management measures to reduce greater amberjack discards and discard mortality. Management measures are not proposed to reduce discards and discard mortality of gray triggerfish because discard mortality is already low (1.5 percent) and insignificant; however, the measures proposed in this amendment and other amendments may indirectly benefit bycatch of gray triggerfish. Alternatives directly or indirectly affecting bycatch include reducing the commercial greater amberjack minimum size limit (Alternative 3, Action 4) and requiring the use of circle hooks, dehooking devices, and venting tools in the reef fish fishery (Amendment 27/14).

<u>Practicability Analysis</u>

Criterion 1: Population effects for the bycatch species

Directed fishery bycatch represents a small component of the overall mortality of gray triggerfish. In fact, directed bycatch mortality is so small that it was not incorporated into the most recent stock assessment (SEDAR 9 2006b). No measures are proposed in this amendment to reduce gray triggerfish bycatch. Measures proposed in Amendment 27/14 are expected to indirectly reduce bycatch and bycatch mortality. These measures include: requiring circle hooks, venting tools, and dehooking devices. Because gray triggerfish have a small mouth gape, circle hooks may not only reduce bycatch, but may also reduce total landings because of changes in susceptibility to the gear.

Gray triggerfish are caught incidentally in shrimp trawls. To end overfishing of gray triggerfish, the bycatch mortality rate of gray triggerfish caught in shrimp trawls must be reduced. Actions proposed in Amendment 27/14 to the Shrimp and Reef Fish FMPs are intended to reduce shrimp trawl fishing mortality on red snapper by reducing overall shrimp effort. These proposed actions, in conjunction with large declines in shrimp effort since 2003, are believed to be sufficient to reduce gray triggerfish shrimp trawl bycatch to the necessary levels specified in the SEFSC projections (Sladek Nowlis 2007a). No further bycatch minimization measures are proposed in this amendment to address shrimp trawl bycatch of gray triggerfish.

Harvest reduction and bycatch minimization measures considered in this amendment for greater amberjack are expected to benefit the status of the stock. Lowering the commercial minimum size limit to 33 inches would reduce the number of greater amberjack killed by as much as 24 percent (SERO 2007a). The impact on yield per recruit is unknown but this measure would keep the minimum size limit above the size at 50 percent female maturity (29 inches TL). However, lowering the minimum size limit would increase catch rates and the number of fish available for harvest. Therefore, if the Council selects a lower minimum size limit as their preferred alternative then harvest would need to be constrained by a commercial quota or some other management measure that would limit the annual rate of harvest and fishing mortality. Seasonal closures, quota closures, and trip limits would not significantly increase greater amberjack bycatch since most commercial fishermen and anglers can selectively avoid targeting greater amberjack. Gear requirements (as proposed in Amendment 27/14), such as venting tools, dehooking devices, and circle hooks are all intended to reduce the rate of release mortality. The extent these measures reduce release mortality rates is contingent on how extensive these gears are already used. At this time, it is unknown how extensively these gears are used in the directed fisheries for greater amberjack. Increasing the recreational minimum size limit may increase bycatch in the directed recreational fishery; however, bycatch was accounted for when analyzing the impacts of recreational and commercial greater amberjack management measures (see Actions 3 and 4). Increasing the recreational minimum size limit by 2 to 4 inches is estimated to increase the proportion of dead discards to recreational landings from 12 percent to 18-24 percent. Although the percentage of dead discards to landings is estimated to increase, the magnitude of dead discards is actually estimated to decrease by 11-21 percent because of the large reduction in recreational landings considered in this amendment. Additionally, greater amberjack grow and have a relatively low release mortality rate (~20 percent, although anecdotal information suggests it may be less), so any changes in the proportion or magnitude of dead discards may be short-lived. Strict accountability measures proposed in Action 2 will also assist managers in controlling harvest and fishing mortality. Therefore, the benefits of reducing greater amberjack harvest, ending overfishing, and rebuilding the stock are estimated to outweigh the negative effects of increasing the proportion of bycatch to landings.

Directed-fishery bycatch of greater amberjack results in forgone yield. However, increases to the minimum size limit may offset losses in yield due to bycatch, thereby increasing overall YPR. Any reductions in directed fishery bycatch must be accounted for when setting TAC; the less bycatch is reduced, the more directed TAC must be reduced. Greater amberjack constant F_{OY} rebuilding projections account for dead discards when estimating future TAC levels. Figure 4.3 shows annual greater amberjack yields as reduced by dead discards. On average, directed fishery dead discards reduce yield by approximately 16.6 percent annually.

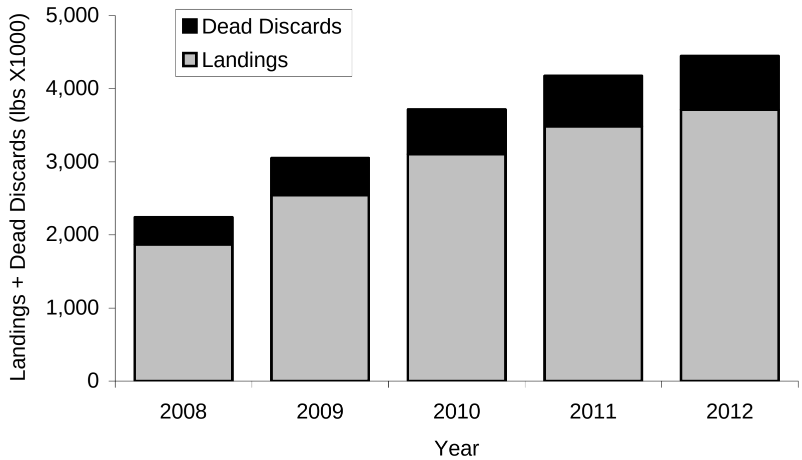

Figure 4.3 Greater amberjack landings and dead discards, 2008-2012.

Criterion 2: Ecological effects due to changes in the bycatch of greater amberjack and gray triggerfish (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. If successfully rebuilt, greater amberjack spawning stock biomass is estimated to double by 2012 (SEDAR 9 2006a). Spawning stock biomass of gray triggerfish is estimated to increase by 30 to 50 percent over the next five to ten years. Under any rebuilding scenario considered, the stocks will be significantly larger than they are currently. Greater amberjack are opportunistic predators that feed on benthic and pelagic fishes, squid and crustaceans. Gray triggerfish are diurnal predators, feeding on benthic invertebrates such as shrimp, crabs, sea urchins, sand dollars, sea stars, sea cucumbers, and bivalve mollusks. Reductions in bycatch and fishing mortality will allow each of these stocks 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 greater amberjack and gray triggerfish abundance.

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. Gray triggerfish are infrequently targeted and fishermen can specifically target greater amberjack while they are schooling. Snappers, groupers, and other reef fishes are commonly caught in association with greater amberjack and gray triggerfish. Those most commonly caught include: red snapper, vermilion snapper, gag, and red grouper. Red snapper are undergoing overfishing and overfished (SEDAR 7 2005; GMFMC 2007), red grouper are not overfished and are not undergoing overfishing (SEDAR 12 2007), gag are undergoing overfishing, but their overfished status is undefined

(SEDAR 10 2007), and vermilion snapper are not undergoing overfishing and not overfished. Regulatory discards significantly contribute to fishing mortality in all of these reef fish fisheries, especially red snapper and groupers.

Bycatch minimization measures proposed in Amendment 27/14 are expected to benefit each of these reef fish stocks. Measures proposed 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 grouper and snapper by selectively reducing the capture of undersized fish or reducing the release mortality of fish after capture (i.e., improve handling and release practices). Because of the very different jaw morphology and feeding behavior of grouper, circle hooks may not significantly reduce grouper discards. However, circle hooks may increase survival of discarded grouper by reducing gut hooking and hook-related mortality. 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.

Lowering the greater amberjack commercial minimum size limit is estimated to reduce the number of greater amberjack discarded by 24 percent. Decreasing the size limit will increase catch rates and fishing mortality. These increases must therefore be offset by other measures, such as a commercial quota, to constrain harvest to necessary rebuilding levels. However, these other management measures have the unintended consequences of shifting fishing effort to other species, especially if the greater amberjack fishery is closed prior to the end of the year. This shift in effort could negatively impact reef fish stocks not currently constrained by annual quotas. The magnitude of this impact would depend on the length of the closure and the amount of effort shifting that occurs.

Increasing the greater amberjack recreational minimum size limit will increase the proportion of dead discards to landings, but may result in an overall decrease in the magnitude of discards because of the large reduction in landings considered in this amendment. Increasing the minimum size limit for both gray triggerfish and greater amberjack may be more beneficial to other species, because fishing effort is less likely to be directed away from these species to other species. Assuming anglers continue to target greater amberjack and gray triggerfish if the minimum size limits are increased, less effort will be directed at other species thereby providing a small net benefit to those species because of lower fishing mortality and less bycatch.

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 greater amberjack for food.

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

Lower size limits and gear requirements will all affect costs associated with fishing operations. Reducing the commercial greater amberjack minimum size limit will increase efficiency and reduce time spent releasing fish. However, if a lower minimum size limit is selected as the preferred then catch rates are estimated to increase, requiring additional management measures to constrain harvest within necessary TAC levels. Establishing commercial and recreational seasonal closures for gray triggerfish 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. Recreational anglers would incur greater losses in consumer surplus resulting from a seasonal closure when compared to a higher minimum size limit. Circle hooks (which will be required through implementation of Amendment 27/14) are comparable in price to J-hooks, but would represent an initial increase in costs for those anglers and commercial fishermen currently not using circle hooks. Similarly, venting tools and dehooking devices would increase angler costs. However, all of these gear requirements represent small increases relative to total trip costs. To the extent that circle hooks reduce gray triggerfish harvest, reductions in commercial revenue and recreational consumer surplus would occur.

Criterion 6: Changes in fishing practices and behavior of fishermen

All bycatch minimization measures proposed are expected to change angler behavior and fishing practices. Reductions to the minimum size limit will increase catch rates, reduce bycatch, and affect decisions about where to fish. Increases to the minimum size limit will decrease catch rates and increase the proportion and/or magnitude of bycatch. The technique for setting a circle hook is different than the technique used to set standard J-hooks. Circle hooks will require anglers to steadily and slowly reel in the slack in the line until the hook sets itself, rather than jerking on the line to set the hook. Because circle hooks result in more fish hooked in the jaw, removing hooks and releasing greater amberjack and gray triggerfish should be easier. Dehooking devices will allow fishermen to remove hooks easier and more quickly from undersized fish and non-targeted species without having to handle the fish as much. Venting tools will allow anglers to carefully deflate the fish's gas bladder before returning the fish to the water. Seasonal closures and lower bag limits will alter angler effort, at least initially, and may affect decisions about when and where to fish.

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, trip limits, and closed seasons are currently used to regulate the commercial and recreational 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. Gear requirements (as specified in Amendment 27/14), such as circle hooks, minimum hook sizes, venting tools, and dehooking devices would result in additional regulations, which may be difficult to enforce. 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

If the minimum size limit in the commercial greater amberjack fishery is reduced it is expected to positively impact the stock by reducing regulatory discards, and thus foster a faster recovery rate. In addition to these long-term economic benefits that would be enjoyed by all participants in the greater amberjack fishery, harvest costs for commercial fishermen would be reduced (i.e., less time to cull undersized fish, less bait, potentially greater catches per trip).

Increasing recreational minimum size limits is expected to result in the greatest benefits to the social and economic environments. Recreational economic losses relative to status quo are less for size limit increases than seasonal closures or bag limit decreases. During development of this amendment the Council decided to move fractional greater amberjack bag limits to the considered but rejected section because of public opposition and potential confusion that they may cause anglers. Increasing the greater amberjack minimum size limit in combination with eliminating the captain and crew bag limit was more preferred by the general public, and therefore would provide greater social benefits to the recreational fishing community. Similarly, the Council moved closed season alternatives for gray triggerfish to the considered but rejected section because gray triggerfish have a low release mortality rate and size limit increases were estimated to provide greater social benefits and lower economic losses.

The implementation of circle hooks, dehooking devices, venting tools, and hook sizes through Amendment 27/14 to the Reef Fish and Shrimp FMPs is expected to result in long-term social and economic benefits resulting from reductions in reef fish discards and discard mortality. These devices will reduce bycatch and improve handling practices, thereby providing a net benefit to the recovery of the greater amberjack and gray triggerfish stocks. Recovery of these stocks will positively affect the social and economic value of fishing activities. However, requiring these devices will result in initial economic costs for persons not already possessing these gears. In addition, users will need to be trained in the proper techniques in order for these gears to be effective.

Criterion 9: Changes in the distribution of benefits and costs

Bycatch minimization measures that provide an overall net benefit to the stock and increase the rate of recovery will benefit both sectors. Tools to address bycatch, such as circle hooks, venting tools, and dehooking devices, would be required by all commercial and recreational fishermen and therefore each sector would share in the benefits and costs of reducing bycatch. However, recreational anglers may perceive reductions in the commercial greater amberjack minimum size limit as inequitable, since corresponding increases in the recreational greater amberjack minimum size limit are proposed within this amendment. Additionally, proposed commercial trip limits would allow commercial fishermen to harvest much larger amounts of greater amberjack per trip while recreational anglers would be allowed one fish per angler (see Action 3). Reducing the commercial minimum size limit would increase flexibility and efficiency, whereas recreational management measures would further constrain harvest and increase the proportion of bycatch to landings. The differing management regimes, objectives, and effects of the two fisheries make it unreasonable to attempt to apply the same regulations to both. However, despite these differences, bycatch minimization measures are intended to provide an overall net benefit to the stock, by reducing mortality associated with bycatch and increasing the rate of stock recovery.

Criterion 10: Social effects

Bycatch is considered wasteful because it reduces overall yield obtained from the fishery. Minimizing bycatch to the extent practicable will increase efficiency, reduce waste, and benefit stock recovery, thereby resulting in net social benefits. Gear restrictions, such as circle hooks, dehooking devices, venting tools, and hook sizes should all have positive social benefits, since these gears are known to reduce bycatch or bycatch mortality. Unlike red snapper, differences in commercial minimum size limits for either the greater amberjack or gray triggerfish fisheries appear to be less of an issue. Since 1990, the commercial minimum size limit for greater amberjack has been eight inches greater than the recreational minimum size limit. Preferred Alternative 4 in Action 3 would narrow the difference in the commercial and recreational greater amberjack minimum size limits to 5 inches (31 inches FL vs. 36 inches FL). This may be a social benefit as the size limits would be perceived as more fair and equitable to all user groups. This same effect may apply to gray triggerfish Actions 9 and 10 where the preferred alternatives could result in commercial and recreational 14-inch minimum size limits.

<u>CONCLUSIONS</u>

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 greater amberjack fishery. However, benefits of reducing bycatch in the directed gray triggerfish fishery are small and largely insignificant because gray triggerfish have a high rate of survival after release. The main benefits of reducing greater amberjack bycatch are: 1) less waste and 2) increased yield in the directed fishery. Approximately one-sixth of all directed yield is forgone due to recreational and commercial discards. Reducing discards and discard mortality rates would allow greater TACs to be achieved in the directed fishery. Reducing the commercial greater amberjack minimum size limit 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. In some cases, however, greater amberjack management measures (e.g., season closures, higher size limits) may need to be imposed to end overfishing that increase bycatch. When determining reductions associated with various management measures, release mortality was factored into the analysis, 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, with the greatest increase in discards associated with changes to the minimum size limit. The benefits of reducing harvest, ending overfishing, and rebuilding the stock are estimated to outweigh the benefits of further reducing discard mortality.

5. ENVIRONMENTAL CONSEQUENCES

5.1 Action 1. Modifications to the Greater Amberjack Rebuilding Plan

The alternatives in this section would modify the current rebuilding plan for greater amberjack. Secretarial Amendment 2 to the Reef Fish FMP, implemented in 2003, established a ten year rebuilding plan that increased TAC in three-year intervals. This plan was based on the results of the 2000 greater amberjack stock assessment. The rebuilding plan limited the harvest to 2.9 mp for 2003-2005, 5.2 mp for 2006-2008, 7.0 mp for 2009-2011, and to 7.9 mp for 2012. This plan was projected to rebuild the stock in 7 years; however, the regulations were written with a ten-year rebuilding plan making 2012 the year in which the stock must be rebuilt to B_{MSY}. Based on the current assessment (SEDAR 9 2006a), the stock remains overfished and has been undergoing overfishing since 2004. See Section 1.2 for a detailed discussion of the current status of the greater amberjack stock.

This Action initially had two additional alternatives based on assessment projections for 60% F_{2004}. Both would have rebuilt the stock by 2012 as mandated by Secretarial Amendment 2 but would have allowed landings to be approximately 0.8 to 1 mp higher during the first four years of the rebuilding plan than comparable 50% F_{2004} rebuilding plans. The Council moved these alternatives to Considered but Rejected (Section 13) because they provided no better than a 50 percent chance of rebuilding the stock by 2012 were deemed insufficient to end overfishing and rebuild the stock within the short timeframe (five years) remaining. Therefore, this Action examines the remaining three alternatives (Preferred Alternative 1 which is status quo, Alternative 2, and Alternative 3) which have a better than 50 percent chance of rebuilding the stock by 2012.

Preferred Alternative 1 maintains the same stepped F_{OY} rebuilding plan approved in Secretarial Amendment 2, but updates the plan with data from the 2006 stock assessment. Directed TAC would be reduced by 32 percent to 1.9 mp for 2008 through 2010 and increased to 3.5 mp from 2011 through 2012. **Alternative 2** is based on the same F_{OY} yield projections as for **Alternative 1** but uses the constant F trajectory instead of a three-year stepped rebuilding strategy. Directed TAC would be 1.9 mp for 2008, 2.5 mp for 2009, 3.1 mp for 2010, 3.5 mp for 2011, and 3.7 mp for 2012. **Alternative 3** uses a linearly increasing approach based on maintaining the same four and five year total landings as for the stepped approach and is considered a conservation equivalent to **Preferred Alternative 1**.

5.1.1 Direct and Indirect Effects on Physical Environment

The alternatives in this Action establish overall TAC reductions and will not directly affect the physical environment. The recreational fishery and 97 percent of the commercial fishery use hook and line gear to catch greater amberjack. Greater amberjack are pelagic and are primarily caught in the water column above structure. Hook-and-line gear is unlikely to contact bottom habitat or cause any damage (see Section 5.1.1). Anchoring over wrecks or other structure to fish for greater amberjack may have a negative effect on those structures and surrounding benthic habitat. Qualitatively, hook and line gear and the methods for using this gear to catch greater amberjack are much less destructive to the benthic environment than other methods to catch reef fish such as traps and bottom longlines (Barnette, 2001). Commercial longline vessels capture approximately three percent of the total greater amberjack landings; however, bottom longlines are not used to target greater amberjack so effort should not be affected by a reduction in TAC.

Specifying reductions in 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. All alternatives would require a 32 percent reduction in TAC in the first year of the new rebuilding plan. **Preferred Alternative 1** uses a stepped approach and **Alternative 3** uses a linearly-increasing approach to managing TAC levels during the rebuilding period and overall catches are expected to be lower by approximately 1.9 mp than for the comparable constant F rebuilding trajectories used in **Alternative 2**. However, these potential differences are difficult to quantify and are likely to be unrecognizable amongst effects of other gears used in the Gulf, such as longlines used in other reef fish fisheries, traps in the stone crab and lobster fisheries and trawls used in the shrimp fishery.

5.1.2 Direct and Indirect Effects on Biological /Ecological Environment

Alternatives that specify TAC reductions will not directly affect the biological condition of the greater amberjack resource, but will indirectly affect stock condition by requiring the implementation of measures to reduce landings and discards. The greater the reduction in landings, the more rapidly the stock will recover from the overfished condition. Projections from the 2006 assessment indicate that if no fishery were allowed, the stock would recover to B_{MSY} in one year (Table 1.2.1). After that time, the stock could be fished at the target yield F_{OY} or approximately 4.2 mp. All alternatives in this Action eliminate overfishing immediately (2008) and rebuild the stock before or during 2011. **Preferred Alternative 1** and **Alternative 3** should provide the most short-term benefit by rebuilding the greater amberjack stock to B_{MSY} by 2011. These rebuilding plans would allow less than 9.1 mp total landings. **Alternative 2** also rebuilds the stock by 2011 but allows approximately 21 percent more landings (1.9 mp) than either **Preferred Alternative 1** or **Alternative 3**. All the alternatives have significantly better than a 50 percent chance of rebuilding the stock before 2012 because they are based on F_{OY}.

There are two approaches used by the alternatives in this Action to rebuild the stock: stepped F and an increasing yield stream which include constant F and other increasing yield stream approaches. Both are valid approaches but have different requirements when selecting management measures which can affect the success of the rebuilding plan. **Preferred Alternative 1** uses a stepped approach, which maintains landings at a specified level for three years and then increases landings up to another level thereafter. The TAC level for each step is developed from a projection of annual yields at constant F_{OY}. The stepped approach was chosen in Secretarial Amendment 2 for rebuilding greater amberjack using yield projections from the $F_{40\%}$ (F_{OY}) trajectory. Steps were based on the TAC associated with F_{OY} in the first-year of each three-year step. For **Preferred Alternative 1**, management measures to reduce catch to the specified TAC of 1.9 mp would be implemented in 2008 and are expected to constrain catch to the same level for the next two years. Most types of management measures (bag, size, or trip limits and season closures) allow catch to vary in proportion to the availability of the stock. Greater amberjack stock abundance appears to react positively and rapidly to a reduction in landings, so availability is expected to increase during each three-year step. For **Preferred Alternative 1**, it is important to select management measures that will reduce the likelihood that catch will increase with availability. Otherwise, overages are likely to occur. The only management measure capable of preventing significant overages as a stock increases in abundance is a quota. However, it too could have small overages if there is a rush-to-fish as the quota is approached. **Alternatives 2 and 3** use an increasing yield approach which changes the TAC level each year. This approach assumes that the stock will improve as predicted by the projections. 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 in proportion to expected increases in availability.

There are always positive and negative ecological effects of changing the abundance of one species over another in the same ecosystem. There are models being used to examine ecological impacts of changing the abundance of some species of reef fish in the Gulf of Mexico but greater amberjack is not identified separately. All the alternatives quickly improve the status of greater amberjack in the Gulf of Mexico which ought to improve the overall health of the ecosystem. However, greater amberjack are a top-order predator, so prey species such as snappers and baitfish may suffer as a result particularly if those species are below B_{MSY} level. Without ecosystem modeling to quantitatively examine effects, the overall impact remains unknown.

5.1.3 Direct and Indirect Effects on Economic/Social Environment

Defining a rebuilding schedule is an administrative action and, as such, does not directly affect the economic environment since it would not directly alter the current harvest or use of a resource. Direct effects only accrue to actions that alter harvest or other use of the resource. All entities could continue normal and customary behaviors until such time as harvest restrictions are imposed. Participation rates and harvest levels could continue unchanged. Since there would be no direct effect on resource harvest or use, there would be no direct effects on fishery participants, associated industries, or communities.

Defining a rebuilding schedule, however, may result in indirect effects by delimiting the types of management measures to be adopted. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally for a given rebuilding target, the shorter the recovery period and the more severe the necessary harvest restrictions are, the greater will be the short term adverse economic effects. In the present case, the rebuilding period is the same under all three alternatives so it is not a factor in any potential differential effects of the alternatives.

With respect to individual user groups, depending on the value of the resource and the yield stream of benefits realized upon recovery, particularly severe restrictions may result in losses to current users that cannot be recovered in the long term since, dollar for dollar, current benefits are more valuable than future benefits. The magnitude of actual effects, however, cannot be determined independent of the specific measures that would be implemented to achieve the required harvest reductions. These effects are influenced by the rebuilding strategy and by the specific management measures (e.g., seasons, trip and bag limits, size limits, etc.) the Council selects to limit harvests to the goals established by the strategy. The magnitude of these effects is partly conditioned by the level of user group participation in the fishery, noting that various user groups, e.g., commercial and recreational, assign generally different valuations to the same resource.

The three alternatives considered for rebuilding greater amberjack have many similar features: they are constant F strategies, retain the same target rebuilding date of 2012 as set forth in Secretarial Amendment 2, and have significantly better than 50 percent chance of rebuilding the stock by the target date. These features may be expected to result in similar indirect economic effects. The area where the alternatives differ is in the manner TACs are established. **Alternative 2** implies less restrictive management measures over a longer period than **Preferred Alternative 1** or **Alternative 3**, and thus would more likely indirectly result in larger short-run adverse economic impacts. These two latter alternatives are close to each other so that their potential impacts may be considered highly similar. If the associated measures under all alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{MSY}, the resulting post-rebuilding benefits under all three alternatives would be approximately the same. In this case, the less costly alternative (**Alternative 2**) may be adjudged more beneficial than either **Preferred Alternative 1** or **Alternative 3**. One key condition in this conclusion is the extent to which specific management measures under each alternative are effective in aligning actual harvest to the alternative's target harvest trajectory. Two scenarios examined below provide some insights on the nature of this condition.

The first scenario abstracts from any specific management measures by comparing changes in vessel net operating revenues due to the rebuilding alternatives. An economic model of the fishery is used for this purpose (Appendix A). **Alternative 2** for rebuilding, with its relatively higher TACs, would result in overall net present value gain of about $444,000 over **Preferred Alternative 1** or **Alternative 3** during the 2008-2012 rebuilding period. The basic assumption here is that benefits from an increasing TAC under each alternative are fully realized. This occurs under the condition that each alternative perfectly aligns actual harvests to target harvests such that no TAC underages or overages occur.

The second scenario compares the benefits/losses of the rebuilding alternatives given various specific management measures. The following estimates, derived using the methodology described in Appendix A, are shown mainly for comparison of rebuilding alternatives. It is clear from the numbers that rebuilding **Alternative 2** results in more economic losses than **Preferred Alternative 1** or **Alternative 3** regardless of the management measures considered in this amendment. It appears surprising at first that the rebuilding alternative which provides for higher TACs during the rebuilding period would result in larger losses under any management measure. The main reason for this is that the management measures are so constraining as to result in forgoing more benefits from higher TACs. In other words, the management measures, assumed to be the same under either rebuilding alternative, would result in underages. The harvests forgone under each management measure translate into forgone economic values. This scenario implies that the same management measures adopted for the more liberal and less liberal TACs would result in more losses for the more liberal alternative. Given this scenario, Alternative 2 may be ranked lowest among the rebuilding alternatives.

Table 5.1.1 Net Present Value Changes, (in thousand dollars)

Management Measures	Rebuilding Alternative	
	Preferred Alternative 1 and Alternative 3	Alternative 2
Trip Limits	-1,944	-2,423
Size and Trip Limits	-2,248	-2,790
Quotas	-1,109	-1,294
Closed Seasons	-1,415	-1,649

It should be pointed out that each rebuilding alternative necessitates harvest reductions relative to the 2000-2004 harvest average in the first few years of this amendment's implementation (e.g., 32% in 2008). This implies that specific management measures, if effective, would likely reduce benefits to the resource users in the short term. Implicitly assumed then in these rebuilding alternatives is the likelihood for long-term benefits to outweigh short-term losses. The sooner the stock is rebuilt, the greater will likely be the present value of future benefits.

Summary

This Action has no direct effect on the economic environment since it would not directly alter the current harvest or use of a resource. Its indirect effects come in the form of conditioning the types of management measures to be adopted. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures

Preferred Alternative 1 implies more restrictive management measures over a longer period than **Alternative 2** or **Alternative 3**, and thus would more likely indirectly result in larger short-run adverse economic impacts. It should be noted, though, that **Preferred Alternative 1** and **Alternative 3** only slightly differ in their economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{msy}, the resulting post-rebuilding benefits under both alternatives would be approximately the same. In this case, the less costly alternative (**Preferred Alternative 1**) may be adjudged more beneficial than **Alternative 3**. The key condition in this conclusion is the extent to which specific management measures under each alternative are effective in aligning actual harvest to the alternative's target harvest trajectory. It appears that **Preferred Alternative 1** would offer a higher chance of faster recovery than the other alternatives.

Preferred Alternative 1, status quo, and **Alternatives 2 and 3,** are administrative in nature and in the short term would not alter the harvest of the resource. Therefore, no direct effects on the fishermen, businesses, or fishing communities that depend on the greater amberjack fishery are expected to result from the implementation of management measures included in this action. When a rebuilding schedule is designed, in the short term, there would be indirect negative impacts on the fishermen, businesses, and communities that depend on the greater amberjack fishery, if the rebuilding plan requires a lower TAC than is currently in place. If the rebuilding plan is successful in rebuilding the stock in five years fishermen, businesses, and communities dependent on the greater amberjack fishery would then benefit from a higher TAC.

5.1.4 Direct and Indirect Effects on Administrative Environment

There are no direct effects on the administrative environment from this Action. There is no action required to establish a TAC beyond rule promulgation. However, the indirect implication is that management measures that reduce landings will have to be implemented; thus affecting enforcement and monitoring. The specific administrative effects would depend on methods used to reduce landings and will be described under Actions 3 and 4. Indirect effects may be associated with AMs (Action 2) associated with each rebuilding plan and constraining harvest within allowable catch levels.

5.2 Action 2. Accountability Measures for the Greater Amberjack Rebuilding Plan.

Alternatives in this Action establish procedures to ensure that the rebuilding plan as established by Action 1 will be adhered to such that the greater amberjack stock will rebuild by 2012. Only five years remain to rebuild the stock. If the new rebuilding plan is not strictly adhered to, the plan is likely to fail, particularly since stock abundance seems to be very sensitive to the level of harvest. A new assessment is scheduled for 2010, but won't be available until late 2010 leaving only one year to rebuild the stock if it is determined at that time that the stock is not rebuilding as planned. **Alternative 1** is status quo and does not establish any accountability measures to close the fishery if TACs are being exceeded. **Preferred Alternative 2** establishes a monitoring procedure to determine if a sector of the fishery is exceeding its share of the TAC and provides the Regional Administrator with the authority to either close that sector for the remainder of the year or subtract the overage from next year as necessary. **Alternative 3** provides the same procedures to close a fishery or subtract overages from the following year as **Preferred Alternative 2**, but allows landings to vary around the target TAC on the assumption that the projection models do not account for short-term recruitment or environmental changes, or fishing pattern changes. **Alternative 3** allows a 20 percent overage in 2008, a 10 percent overage for the combined landings in 2008 and 2009, but no overage for the combined landings in 2008-2010 or for 2011 or 2012.

5.2.1 Direct and Indirect Effects on Physical Environment

This Action has no direct or indirect affect on the physical environment. This Action does not shift the amount of effort from either the recreational or commercial fisheries or alter the reductions required under any of the other Actions for greater amberjack. To the extent that accountability measures shorten commercial and recreational fishing seasons, small benefits to the physical environment may result from reduced effort. However, greater amberjack are pelagic and caught primarily in the water column rather than over bottom habitat, resulting in fewer effects to the physical environment.

5.2.2 Direct and Indirect Effects on Biological /Ecological Environment

These alternatives have a direct effect on the biological environment by increasing the likelihood that the greater amberjack stock will be rebuilt as required by the MSRA. If TAC is not strictly adhered to, the plan is likely to fail. The greater amberjack stock would not recover to B_{MSY} in the short-term and management measures would have to be changed to eventually recover the stock over the long-term. Greater amberjack stock abundance seems to be very sensitive to the level of harvest; so, if overages occur, corrective measures must be taken quickly to prevent much slowdown in the rebuilding program. **Alternative 1** is status quo, no accountability measures, which would require that currently available procedures would have to be used to implement changes if overages occurred. The Council's regulatory process currently requires at least one year to complete. Final landings estimates are not available until after-the fact so it would be at least two years before the first corrections could be made. NMFS may develop emergency measures under MSRA section 305(c) which requires a minimum of three to six months to implement depending on the level of Council involvement. This procedure may also be too long to effectively control landings depending on when in the rebuilding period overages occur. **Preferred Alternative 2** and **Alternative 3** provide the Regional Administrator of NMFS SERO the authority to file a notification of closures to prevent recreational or commercial landings from exceeding that sector's share of the TAC for each year if sufficient time remains in the season to do so. In addition, the commercial quota and recreational season would be reduced in the following year if any TAC overages occur in the previous year. Catch may be shifted seasonally which could have some minimal biological effect on spawning but the average TACs for any two-to-three year period should not exceed target TAC for that period. The rebuilding plan will be adhered to and stock biomass will be given the best opportunity to recover. However, there will be natural variation in recruitment and regional availability outside the control of regulations that are not accounted for by the assessment projections, are not detrimental to the rebuilding plan, and change the catchability of the stock. For example, if a good year-class enters the fishery, landings may exceed annual TAC while fishing mortality does not exceed target levels. Revised MSRA regulations require that AMs for stocks undergoing overfishing be implemented by 2010 to address landings overages even when a new assessment has not been conducted and the current F value is unknown. **Preferred Alternative 2** requires AMs be imposed if TAC in any year is exceeded and therefore provides no buffer for natural variations in recruitment (see Table 2.1.3). **Alternative 3** allows some variation around TACs to compensate for this natural variation (see Table 2.1.4), but requires that cumulative

TAC over the first three years and TACs for 2011 and 2012 are not exceeded. **Alternative 3** is equivalent to **Preferred Alternative 2** for the last three years of the rebuilding plan; however, landings could increase for the first two years (20 percent the first year or 10 percent over the first two years). This could cause a slight reduction in the biomass trends over the rebuilding period if the increased landings were the result of changes in fishing practices rather than increases in availability even though total landings would not exceed the total TAC for the remaining five years in the rebuilding plan.

5.2.3 Direct and Indirect Effects on Economic/Social Environment

Of the three accountability alternatives considered, **Preferred Alternative 2** and **Alternative 3** have direct economic effects. 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.

In the event overages occur, both the **Preferred Alternative 2** and **Alternative 3** instruct the Regional Administrator (RA) to shorten fishing seasons or reduce quotas the following fishing period. Either action by the RA would have direct consequences on the short-term revenues and potentially the costs of commercial fishing vessels as well as the benefits and costs of anglers and the for-hire segment of the fishery. These effects would be greater on those less able to shift their fishing effort to other fisheries. Either action by the RA can result in shorter fishing seasons. But the shorter season option has slightly less economic impacts than the quota option, because it affords fishing participants better opportunity to plan their fishing activities. Fishermen may know that quota closures are coming, but the exact date is not generally known well in advance. This introduces a good deal of uncertainty into the planning activities of fishing operations. Even if presently there is a limited entry in the commercial and charter reef fish fisheries, the general tendency of fishermen is still to catch as much greater amberjack as they can before the quota is reached, or to schedule as many for-hire fishing trips as they can early in the season. This type of decisions can only result in earlier closures and thus introduce even more uncertainties into the planning activities of fishing operations. So long, however, as the RA's actions can effectively realign harvests to the target levels, the likelihood of achieving the rebuilding objective is not impaired, and long-term benefits may be expected.

There are generally two types of indirect economic effects that may ensue under **Preferred Alternative 2** and **Alternative 3**. 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 rebuilding becomes successful, 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 indirect 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.

Although the general nature of economic effects of **Preferred Alternative 2** and **Alternative 3** is similar, there are potential short-term and long-term differences in magnitudes. In the short term, **Alternative 3** allows for relatively higher target harvest levels and so would bring about less adverse economic impacts than **Preferred Alternative 2**. But **Alternative 3**, by allowing actual harvests to exceed target harvests in the first few years of the rebuilding period can potentially lower the likelihood of achieving the rebuilding target on time. Thus, its long-term impacts may take the shape of possibly postponing the realization of benefits from rebuilding the stock.

As hinted in Section 5.3.2, current mechanisms to arrest any overages would likely require a longer timeframe for corrective measures to be implemented than those under **Preferred Alternative 2** or **Alternative 3**. While **Alternative 1** may delay the occurrence of adverse economic impacts in the short term, it would also tend to delay the rebuilding of the fish stock and thus the realization of benefits from a rebuilt stock. It is possible, of course, that measures undertaken under **Alternative 1** can re-align the actual harvests to the target harvests and rebuild the stock on time. But this would entail more restrictive measures so as to possibly increase the overall economic costs of rebuilding the stock.

Since there is good reason to believe that if the stock is rebuilt on time under all alternatives, the ensuing post-rebuilding benefits would be the same for all alternatives, a higher cost incurred under an alternative during the rebuilding period would bring down the overall net benefits of that alternative. This is possibly the case with **Alternative 1** to the extent that significant delays to implement corrective measures can happen. It is mainly because of this that **Alternative 1** may be ranked lower than the other two alternatives. The ranking of the **Preferred Alternative 1** and **Alternative 3** cannot be made in the absence of quantitative estimates of the potential economic effects of both alternatives.

<u>Summary</u>

Of the three accountability alternatives considered, **Preferred Alternative 2** and **Alternative 3** have direct and indirect economic effects. As a no-action alternative, **Alternative 1** has no direct economic effects, but since corrective actions may still be needed, Alternative 1 may be considered to have indirect economic impacts.

In the event overages occur, both the **Preferred Alternative** and **Alternative 3** instruct the RA to shorten fishing seasons or reduce quotas the following fishing period. Either action by the RA would have direct consequences on the short-term revenues and potentially the costs of commercial fishing vessels as well as the benefits and costs of anglers and the for-hire segment of the fishery. Both the short season and quota options can shorten the fishing seasons. But the shorter season option has slightly less adverse economic impacts than the quota option, because it affords fishing participants better opportunity to plan their fishing activities.

One type of indirect effects from the various alternatives relate 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 and to the shift in fishing effort to other fisheries. Another type arises if the directly affected fishing participants shift their 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.

Although the general nature of economic effects of the **Preferred Alternative** and Alternative 3 is similar, there are potential short-term and long-term differences in magnitudes. In the short term, Alternative 3 allows for relatively higher target harvest levels and so would bring about less adverse economic impacts than the **Preferred Alternative**. But **Alternative 3**, by allowing actual harvests to exceed target harvests in the first few years of the rebuilding period can potentially lower the likelihood of achieving the rebuilding target on time. Thus, it can possibly postpone the realization of benefits from rebuilding the stock. While **Alternative 1** may delay the occurrence of adverse economic impacts in the short term, it would also tend to delay even further the rebuilding of the fish stock and thus the realization of benefits from a rebuilt stock.

5.2.4 Direct and Indirect Effects on Administrative Environment

Alternative 1, status quo, would have no direct or indirect affect on the administrative environment; however, **Preferred Alternative 2** and **Alternative 3** would require monitoring landings on a monthly or seasonal basis similar to how quotas are managed. This would put a significant burden on NMFS Enforcement, SERO, and SEFSC staff to collate and verify landings information, file a notification of a closure, and enforce closures or quota reductions.

5.3 Action 3: Greater Amberjack Recreational Management Alternatives.

This Action establishes management measures for the recreational fishery to reduce the landings by at least 26 percent. This reduction is based on the preferred rebuilding strategy in Action 1.

5.3.1 Direct and Indirect Effects on Physical Environment

The alternatives in this Action reduce greater amberjack landings by 26 percent or more which may have a minimal benefit to the physical environment by reducing fishing effort. Direct effects to the physical environment resulting from fishing include physical damage to habitat associated with anchoring, hook-and-line tear-offs and abrasions, and contact with bottom structures while spearfishing; however, the effects are likely to be minimal (see Section 5.1.1). The recreational fishery uses hook and line gear and spears to catch greater amberjack. This gear is unlikely to contact bottom habitat or cause any damage because greater amberjack mostly occur and are fished in the water column above structure. Anchoring over wrecks or other structure to fish for greater amberjack may have a negative effect on those structures and surrounding benthic habitat. Spears and hook and line gear and the methods for using this gear to catch greater amberjack are much less destructive to the benthic environment than other methods to catch reef fish such as traps and bottom longlines (Hamilton 2000; Barnette, 2001). Also, several habitat areas of particular concern, marine sanctuaries, and marine reserves already exist in the Gulf of Mexico providing additional protection to greater amberjack habitat and reducing impacts to the physical environment (see Section 3).

It is unlikely that differences among of any of these alternatives can be quantified. Recreational landings reductions range from 26 to 35 percent but compatible commercial regulations will ensure that fishery-wide reductions will equal or exceed the 32 percent necessary for the rebuilding plan. Since both sectors use the same gear and in similar ways, any effects related to how the reductions are shared will be minimal and likely un-measurable.

5.3.2 Direct and Indirect Effects on Biological /Ecological Environment

The alternatives in this Action will have a positive effect on the biological status of the greater amberjack in the Gulf of Mexico. Fishing mortality in 2004 was 52 percent too high and biomass was only 48 percent of B_{MSY} (SEDAR 9, Greater Amberjack, 2006). Target total landings reductions of at least 32 percent are required to reduce F to F_{OY}, end overfishing, and rebuild the stock to B_{MSY} by 2011. The Alternatives in this Action reduce recreational landings by 26 to 35 and combined with commercial reductions of 25 to 43 percent will attain the overall 32 percent reduction as specified by Action 1 rebuilding plans. If any of these assumptions are different once the Council picks final preferred alternatives, the reduction necessary to end overfishing and the associated recreational management measures for this action may change. Section 1.2 contains a detailed discussion of the current status of greater amberjack as determined by the SEDAR 9 stock assessment.

Alternative 1 would maintain the recreational minimum size limit of 28 inches FL and the bag limit of one fish per angler per trip. The greater amberjack stock would continue to undergo overfishing and remain at approximately 48 percent of B_{MSY} over the long-term assuming that future fishing mortality remains at F_{2004} (0.863). The stock is expected to remain at this biomass level through at least 2017 (Figure 1.2.1).

The minimum size of 28 inches FL is equal to the size at slightly less than 50 percent maturity at 1.4 years old for females while all females are mature at approximately 34 inches FL or 4.2 years old (Harris, 2004). This minimum size may be just barely sufficient to prevent recruitment overfishing, particularly since the recreational fishery currently lands approximately 68 percent of the resource. The 28 inch minimum size limit was implemented in 1990 and the SEDAR 9 assessment suggested that the stock improved slightly from 1990 to 1991 but thereafter, biomass continued to decline (Figure 1.2.1). The one fish bag limit was implemented in 1997 and is assumed to have been partially responsible, along with the commercial three-month closure implemented in 1998, for the increases in biomass since about 1998 (Figure 1.2.1). Stock biomass improved by approximately 125 percent between 1998 and 2003 but since has stabilized at approximately 4.2 mp female biomass (48 percent of B_{MSY}).

Alternative 2 would increase the minimum size limit to 32 inches FL, sufficient to reduce landings by 32 percent (Table 2.1.6). Fishing mortality would be reduced slightly below F_{OY}, end overfishing and rebuild the stock by 2011 assuming that commercial landings are reduced by 38 percent. **Alternative 2** would match the TAC requirements of any of the rebuilding plans specified Action 1. Increasing the minimum size limit to 32 inches FL will allow approximately 80 percent of all females to mature before being landed (Harris, 2004). The size frequency of fish in the population should increase rapidly adding more fish to the spawning population. Increasing the availability of legal fish should also increase the likelihood that anglers will catch their bag limit and increase landings in the future. **Alternative 2** would be more likely than the other alternatives in this Action to allow an increase in landings as the stock rebuilds. This would more closely match rebuilding plans that allowed landing to increase than the stepped approach which holds landings constant for three-year intervals.

Alternative 2 is expected to allow discards to increase from about 43 percent more than the number of legal fish to 279 percent more than the number of legal fish. At 20 percent release mortality, dead discards are expected to increase to as much as 94 percent by number and 24 percent by weight of total recreational harvest; whereas, dead discards in the current recreational fishery are about 12 percent by weight of landings. Although the percentage of dead discards to landings is estimated to increase, the magnitude of dead discards is actually estimated to decrease by 15 percent, because of the large reduction in recreational landings. When analyzing greater amberjack minimum size limits, discard mortality was accounted for when calculating needed harvest reductions (see Size Limit discussion above). Additionally, anglers can avoid targeting and catching greater amberjack as bycatch, unlike other species of reef fish, and increases to the minimum size limit may benefit yield-per-recruit (see Section 4). Also, greater amberjack grow quickly (i.e., it takes approximately 8 months for a greater amberjack to grow from 28 to 32 inches FL) and have a relatively low release mortality rate (~20 percent, although anecdotal information suggest it may be less), so any changes in the proportion or magnitude of dead discards may be short-lived. Strict accountability measures proposed in Action 2 will also assist managers in controlling harvest and fishing mortality.

Alternative 3 would set a recreational closed season from March 1 through May 15. This season matches most of the current closed season in the commercial fishery and closes much of the greater amberjack peak spawning season. Landings would be reduced by 29 percent. Over the short-term, landings would be reduced to match the yield at F_{OY}. **Alternative 3** should end overfishing and rebuild biomass to B_{MSY} by 2011 assuming that commercial landings are reduced by 38 percent. Discards are expected to be reduced in proportion to the reduction in fishing effort since a seasonal closure is not likely to alter the proportion of discards in relation to landings. When a seasonal closure is used to restrict landings, the effectiveness can decrease if anglers shift effort to open seasons or make more trips. During the open season, catch should increase in proportion to availability. **Alternative 3** would be more likely than **Alternative 2, 4, or 5** to allow short-term increases in landings that match the rebuilding plan specified by the constant F_{OY} rebuilding trajectory proposed in Action 1, Alternative 1.

Preferred Alternative 4 would increase the minimum size limit to 30 inches FL and eliminate captain and crew from retaining a bag limit of greater amberjack while under charter. Landings are expected to be reduced by 18 percent due to this regulation; but accountability measures (**Action 2**) will insure that the recreational fishery will not exceed the 26 percent harvest reduction necessary to accomplish the rebuilding plan established in Action 1. However, recent recreational catch and effort suggests that offshore fishing trips in the Gulf EEZ may have dropped by over 10 percent in 2007 versus the 2000-2004 assessment period. If greater amberjack fishing effort is ten percent less, collectively, the effective reduction in landings may be approximately 26 percent. Effort reductions caused by outside influences such as economic downturns or hurricanes are ephemeral; but, as stated above, accountability measures will hold the recreational fishery to their share of the resource regardless whether effort remains low. This should end overfishing and rebuild biomass to B_{MSY} by 2011 assuming that commercial landings are reduced by at least 43 percent.

Preferred Alternative 4 would increase the recreational proportion of TAC five percent with a similar decrease in the commercial proportion of TAC. Over the short-term, landings would be reduced to match the yield at F_{OY}. Increasing the minimum size limit to 30 inches FL would allow slightly more than 50 percent of all females to mature before being landed (Harris, 2004). Size frequency should increase rapidly but not as rapidly as for **Alternative 2**, increasing the availability of legal fish. **Preferred Alternative 4** may be more likely to allow an increase in landings as specified by the conservation equivalent or constant F_{OY} rebuilding trajectory as compared to the preferred stepped F_{OY} rebuilding plan proposed in Action 1. **Preferred Alternative 4** is expected to allow dead discards to increase from about 12 percent by weight of current recreational landings to about 18 percent by weight of total recreational landings. Although the percentage of dead discards to landings is estimated to increase, the magnitude of dead discards is actually estimated to decrease by 13 percent because of the large reduction in recreational landings. When analyzing greater amberjack minimum size limits, discard mortality was accounted for when calculating needed harvest reductions (see Size Limit discussion above). Additionally, anglers can avoid targeting and catching greater amberjack as bycatch, unlike other species of reef fish, and increases to the minimum size limit may benefit yield-per-recruit (see Section 4). Also, greater amberjack grow quickly (i.e., it takes less than six months for a greater amberjack to grow from 28 to 30 inches FL) and have a relatively low release mortality rate (~20 percent, although anecdotal information suggest it may be less), so any changes in the proportion or magnitude of dead discards may be short-lived. As stated above, strict accountability measures proposed in Action 2 will also assist managers in controlling harvest and fishing mortality.

Alternative 5 would set a recreational closed season from January 1 through the end of February, eliminate captain and crew from retaining a bag limit of greater amberjack while under charter, and increase the minimum size limit to either 30 inches FL (**Option a**) or 31 inches FL (**Option b**). The core of **Alternative 5** (season closure and no captain and crew bag limit) reduce landings by 16 percent. Adding a 30 inch FL size limit (**Option a**) reduces landings by 28 percent and should end overfishing and rebuild biomass to B_{MSY} by 2011 assuming that commercial landings are reduced by at least 40 percent. This alternative would increase the recreational proportion of TAC four percent with a like decrease in the commercial proportion. Adding a 31 inch minimum size limit (**Option b**) is expected to reduce landings by 35 percent and should end overfishing and rebuild biomass assuming that commercial landings are reduced by at least 26 percent. This alternative would decrease the recreational proportion of TAC three percent with a like increase in the commercial proportion. Over the short-term, landings would be reduced to match the yield at F_{OY} for either **Alternative 5** Options. Slightly more than 50 percent of all females would mature before reaching 30 inches FL (**Option a**); whereas, approximately 75 percent would be mature before being landed under a 31 inch minimum size limit (**Option b**) (Harris, 2004). Size frequency should increase rapidly under any of the size limit increases, but the larger the size limit increase, the longer the stock will take to stabilize under the new regulation. Dead discards are expected to increase more under **Option b** (31 inches FL: from 12 percent to 21 percent) than under **Option a** (30 inches FL: 12 percent to 18 percent). Although the percentage of dead discards to landings is estimated to increase for both **Options a** and **b**, the magnitude of dead discards is actually estimated to decrease by 15-21 percent, because of the large reduction in recreational landings resulting from these options. Based on overall reductions in landings, **Alternative 5b** is the most restrictive, followed by **Alternative 2, 3, 5a**, and the least restrictive **Preferred Alternative 4**.

Overall, there appears to be little difference between all the alternatives assuming the combination reductions from commercial and recreational fisheries reduce yield to F_{OY} levels. However, biological differences are affected by the change in the numbers of dead discards when minimum size limits are changed. All the alternatives are assumed to reduce dead discards in proportion to the expected overall reduction in landings; however, those alternatives that increase size limits will counter some of that decrease. Increases in the proportion of dead discards as a function of landings, range from 18 to 24 percent depending on what size limit is proposed. For instance, the increase in minimum size limit to 31 inches FL in **Preferred Alternative 4** is expected to increase the proportion of dead discards relative to landings from 12 percent to 21 percent. After accounting for the proposed decrease in landings and a similar decrease in dead discards, the overall decrease in the magnitude of dead discards is estimated to be 11 percent relative to the status quo. Likewise,

Alternatives 2 and **5a** effectively reduces dead discards by 15 percent and **Alternative 5b** by 19 percent. Even if the magnitude of discards increases after the size limit increase, historical trends (see Figure 4.1) indicate dead discards will quickly decline as the greater amberjack size distribution adjusts to a larger minimum size limit.

5.3.3 Direct and Indirect Effects on Economic/Social Environment

Action 3 considers recreational management measures that would result in recreational landings reductions of at least 26 percent. Potential measures include adjustments to the minimum size limit and to the recreational fishing season, and, the elimination of for-hire captain and crew bag limits. 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. Table 5.3.1 provides baseline effort levels in the headboat sector. Baseline landings and targeted effort estimates in the private and charter sectors are provided in Section 3, which includes a description of the recreational sector.

Table 5.3.1: Effort and Greater Amberjack Landings in the Head Boat Sector
Gulf of Mexico – 2003

State	Angler Days	Landings (# Fish)
Texas	74,432	4,309
Louisiana	6,636	2,699
Eastern Gulf of Mexico	144,211	4,968
Total	225,279	11,976

Source: NMFS Head Boat Survey

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 Reef Fish Amendment 27/14 (GMFMC, 2007). Estimated at $141 (in $2003), average net revenues per angler trip approximated $154 when updated to 2006 dollars using an All Urban Consumers CPI series from the Bureau of Labor Statistics[5]. In the headboat sector, net revenue per angler day, expressed in $2006, averaged $68. In evaluating producer surplus changes in the charter and

[5] 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 2006 are 160.5, 184.0, and 201.6, respectively.

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. Unitary catch elasticity was assumed due to the lack of published elasticity estimates specific to greater amberjack. Catch elasticity estimates for reef fish species in the Gulf of Mexico include estimates for red snapper reported by Gillig et al. (2000). This assumption, which does not account for species substitution by for-hire operators, is expected to overestimate computed producer surplus changes. 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. Between 2000 and 2004, the target rate for greater amberjack in the charter sector averaged 2.22 percent.

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 associated value per fish per trip remains constant. Hence, overall changes in economic value were only associated with changes in the number of fish (or pounds) landed. 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. (2001), the CV estimate of $3.52 per fish was updated to 2006 dollars using an All Urban Consumers CPI series from the Bureau of Labor Statistics resulting in an average CV of $4.42 (2006$) per fish. It should be noted that this value was not developed specifically for greater amberjack and is likely an overestimate of the true value for this species. The reason for this is that 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. Also, the lack of marginality considerations distorts the analysis.

Alternative 1, no action, would maintain a 28-inch minimum recreational size limit and a possession limit of one fish per angler per trip. In the short term, the status quo alternative is not expected to result in adverse economic impacts. However, under **Alternative 1**, greater amberjack would continue to undergo overfishing. Hence, conservation goals would not be met and more severe management restrictions would have to be implemented in the future, resulting in increased adverse economic impacts in the long run compared to the other alternatives.

Alternative 2 would increase the recreational size limit from 28 to 32 inches (fork length). The size limit increase is expected to result in a 32 percent reduction in greater amberjack recreational landings. Expected declines in targeted effort in the private, charter sectors are estimated at 18,608 and 5,388 angler trips, respectively. Expressed in angler days, effort decreases anticipated in the headboat sector were estimated at 1,600. Anglers targeting greater amberjack using private boats, charter vessels or headboats are expected to lose consumer surplus valued at $64,026, $73,057, and $16,939, respectively. Losses in producer surplus incurred by for hire operators, as measured by decreases in net revenues totaled

$938,583, approximately. Aggregate losses in economic value that are expected to result from the implementation of this alternative are estimated at $1.1 million, approximately. Expected decreases in targeted effort and greater amberjack landings as well as losses in producer and consumer surpluses associated with management alternatives considered under **Action 3** are presented in Table 5.3.2.

Alternative 3 would establish a recreational closed season from March 1 through May 15, resulting in a 29 percent decline in greater amberjack recreational landings. Decreases in targeted effort in the private and charter sectors anticipated from the implementation of the closed season are estimated at 16,863 and 4,883 angler days, respectively. In the headboat sector, effort declines estimated at 1,450 angler days are expected. Consumer surplus losses to anglers that are expected to result from the implementation of Alternative 5 are estimated at $140,000, approximately. Producer surplus losses incurred by for-hire operators are anticipated to reach $850,000. In the aggregate, losses in economic value associated with the season closure considered would total $990,000, approximately.

Table 5.3.2: Action 3 - Expected Decreases in Targeted Effort**, Landings, Consumer and Producer Surpluses, and Aggregate Economic Values

	Mode	Targeted Effort	Producer Surplus	Landings (# Fish)	Consumer Surplus	Economic Value
Alternative 2	Charter	5,388	$829,757	16,529	$73,057	$902,814
	Private	18,608		14,486	$64,026	$64,026
	Heaboat	1,600	$108,826	3,832	$16,939	$125,765
	TOTAL		$938,583	34,847	$154,023	$1,092,605
Alternative 3	Charter	4,883	$751,967	14,979	$66,208	$818,175
	Private	16,863		13,128	$58,024	$58,024
	Heaboat	1,450	$98,624	3,473	$15,351	$113,974
	TOTAL		$850,591	31,580	$139,583	$990,174
Preferred Alternative 4	Charter	4,378	674,178	13,430	59,359	733,536
	Private	15,119		11,770	52,021	52,021
	Heaboat	1,300	88,421	3,114	13,763	102,184
	TOTAL		762,599	28,313	125,144	887,742
Alternative 5 option a	Charter	4,714	726,038	14,462	63,925	789,962
	Private	16,282		12,675	56,023	56,023
	Heaboat	1,400	95,222	3,354	14,822	110,044
	TOTAL		821,260	30,491	134,770	956,030
Alternative 5 option b	Charter	5,893	$907,547	18,078	$79,906	$987,453
	Private	20,352		15,844	$70,029	$70,029
	Heaboat	1,750	$119,028	4,192	$18,527	$137,555
	TOTAL		$1,026,575	38,114	$168,462	$1,195,037

**Charter and Private effort are expressed in angler trips; Headboat effort in angler days

Preferred Alternative 4 would combine several management measures in order to achieve an 18 percent reduction in greater amberjack recreational landings. With an assumed 10 percent decrease in amberjack effort due to adverse economic conditions and raising fuel prices, the effective reduction in landings under this alternative is estimated at 26 percent, approximately. **Preferred Alternative 4** would maintain the one fish bag limit, increase the minimum recreational size limit to 30 inches and set the for-hire captain and crew bag limit to zero. Consumer surplus losses anticipated from the implementation of this suite of measures in the private, charter, and headboat sectors approximated $52,021, $59,359, and $13,763 respectively. Decreases in producer surplus in the for-hire sector are expected to total $762,599. Overall, declines in economic value resulting from the implementation of **Preferred Alternative 4** are expected to reach $890,000, approximately.

Alternative 5 would maintain the one fish bag limit and set the for-hire captain and crew bag limit to zero. In addition, **Alternative 5** would implement a January-February seasonal closure and increase the minimum recreational size limit to 30 (**Option a**) or 31 inches (**Option b**). Under **Option a**, a 28 percent reduction in recreational greater amberjack landings is anticipated. Associated decreases in consumer and producer surpluses are estimated at $135,000 and $821,000, approximately. Overall, net benefit losses resulting from this management scenario approximate $956,000. **Option b**, which adds a two-month closure to **Preferred Alternative 4**, is expected to achieve a 35 percent reduction in greater amberjack recreational landings. Aggregate losses in economic value anticipated from this management option are estimated at $1.2 million, approximately.

<u>Summary</u>

Decreases in targeted fishing effort required to achieve reductions in greater amberjack recreational landings considered in this action would be expected to result in short-term losses in consumer surplus for participating anglers and net revenue losses to charter and headboat operators. It is expected that, as the stock recovers in the long run, economic benefits would result from future increases in recreational landings. Analyses provided in this amendment focus on short-term effects since the alternative management measures, other than the status quo, all result in the resource achieving the same recovery goal by 2012. The results presented logically reflect the expectation that the greater the reduction in landings, the greater the short-term loss in economic value.

For the recreational sector, anticipated annual losses in economic value, i.e., consumer and producer surpluses, relative to the status quo range from approximately $888,000 under **Preferred Alternative 4** to approximately $1.2 million under **Alternative 5–Option b. Preferred Alternative 4** would maintain the one fish bag limit, increase the minimum recreational size limit to 30 inches and set the for-hire captain and crew bag limit to zero. **Preferred Alternative 4** contributes to the harmonization of bag limits for for-hire captain and crew operating in reef fish fisheries. The Gulf Council has, in recent amendments, set a zero bag limit for for-hire captain and crew in other reef fish fisheries, e.g., the red snapper fishery in Joint Reef Fish/Shrimp Amendment 27/14. **Option b** adds a two-month closure to management measures considered under **Preferred Alternative 4.** The status quo **(Alternative 1)** would maintain a 28-inch minimum recreational size limit and a possession limit of one fish per angler per trip. Under the status quo, short term adverse economic impacts are not anticipated. However, greater amberjack would continue to undergo overfishing and conservation goals would not be met. More severe management restrictions would have to be implemented in the future, resulting in sizeable losses in economic benefits in the long run. **Alternative 2** would increase the recreational size limit to 32 inches. Aggregate losses in economic value that are expected to result from the implementation of **Alternative 2** are estimated at $1.1 million, approximately. **Alternative 3** would establish a recreational closed season from March 1 through May 15. Losses in consumer and producer associated with **Alternative 3** would total $990,000, approximately.

Alternative 1, no action, would maintain the 28 inch size limit and a one-fish bag limit per angler. In the short term, this alternative would not have any negative effects on the fishermen, businesses, or fishing communities that depend on the recreational greater amberjack fishery, because it would not change the rules currently in place. However, under this alternative greater amberjack would continue to undergo overfishing. This would hurt those that depend on the fishery in the long term and would require more restrictive measures in the future to stop overfishing and rebuild the stock. Fishermen, businesses, and fishing communities will benefit when the stock is rebuilt and the TAC is higher.

Alternative 2 would increase the size limit for greater amberjack from 28 inches to 32 inches. Although this alternative would reduce landings by 32 percent it may increase the number of discards in the fishery. It may make it more difficult for fishermen to land a keeper fish, making the fishing experience less satisfying. If the size limit is increased, fishermen may decide it is not worth fishing for greater amberjack which would adversely affect the businesses and communities dependent on this fishery. If recreational fishermen take fewer trips in private boats, charter boats, or party boats, there would be less income for the for-hire sector and less money spent in the communities that cater to this fishery. Communities in Alabama and west Florida have the highest landings for the recreational sector and therefore would be most affected by a decreased share of the TAC. Increasing restrictions in the recreational fishery may put more pressure on other reef fish species as recreational fishermen target other species.

Alternative 2 would reduce landings by 32 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more greater amberjack to target, and presumably fewer restrictions than are currently in place in the recreational fishery.

Alternative 3 would establish a recreational closed season from March 1 through May 15 and is estimated to reduce landings by 29 percent. Unlike the other alternatives that keep the fishery open all year, this alternative would require a closed season. A closed season would result in fewer days for for-hire businesses to operate fishing trips and fewer days for recreational fishermen to fish. This could negatively impact businesses such as bait and tackle shops, businesses that offer food and lodging, and other businesses that cater to recreational fishermen targeting greater amberjack by reducing clientele which will reduce profits during the closed season. Communities in Alabama and west Florida have the highest landings for the recreational sector and therefore would be most affected by a decreased share of the TAC. Increasing restrictions in the recreational fishery may put more pressure on other reef fish species as recreational fishermen target other species. Some fishermen may prefer a closed season if it prevents more restrictive changes to the bag limits and size limits, while others would prefer to be able to target greater amberjack all year long even if it requires stricter regulations.

Alternative 3 would reduce landings by 29 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more amberjack to target, and presumably fewer restrictions than are currently in place in the recreational fishery.

Preferred Alternative 4 would maintain the one-fish per angler bag limit, increase the recreational minimum size limit for greater amberjack to 30-inches FL, and eliminate the bag limit for captain and crew. This alternative is estimated to reduce landings by 26 percent. Although this alternative is estimated to reduce landings by 26 percent it may increase the number of discards in the fishery. It may make it more difficult for fishermen to land a keeper fish, making the fishing experience less satisfying. If the size limit is increased, fishermen may decide it is not worth fishing for greater amberjack which would adversely affect the businesses and communities dependent on this fishery. If recreational fishermen take fewer trips in private boats, charter boats, or party boats, there would be less income for the for-hire sector and less money spent in the communities that cater to this fishery. Communities in Alabama and west Florida have the highest landings for the recreational sector and therefore would be most affected if people decide not to fish due to increased size limits which may make it more difficult to catch a keeper fish. Increasing restrictions in the recreational fishery may put more pressure on other reef fish species as recreational fishermen target other species.

Some fishermen may prefer to increase the size limit in order to keep a whole fish per person and to keep the season open all year. If the season is open all year it allows private and charter recreational fishermen to target greater amberjack all year which would benefit businesses that depend on this fishery.

Reducing the bag limit to zero for the captain and crew could negatively impact the captain and crew who are used to keeping the bag limit and providing fresh fish for their families. As prices for fuel, insurance and equipment continue to increase, captains and crew of charter vessels are making less profit. Fresh fish they take home supplements their food budget. Being allowed to keep their bag limit may also increase the enjoyment of the for-hire trip for the captain and crew. One of the reasons stated by captain and crew for working in this industry is the enjoyment of fishing it provides. If captain and crew are no longer allowed to fish, they may not enjoy the work as much, making it harder to retain crew and making the experience less enjoyable for the captains. By being allowed to keep the bag limit, the captain and crew may also feel like they are sharing the experience with the clients, making the trips more enjoyable for everyone.

Preferred Alternative 4 would reduce landings by an estimated 26 percent which in the long term would help the stock recover. Once the stock recovers, fishermen, businesses, and communities will benefit from having more amberjack to target, and presumably fewer restrictions than are currently in place, in the recreational fishery.

Alternative 5 would maintain the one-fish per angler bag limit, implement a January-February seasonal closure, eliminate the bag limit for captain and crew, and increase the size limit to option a: 30 inches, or option b: 31 inches. This alternative is estimated to reduce landings by 28 percent for Option (a) and 35 percent for Option (b). Although this alternative is estimated to reduce landings, it may increase the number of discards in the fishery. It may make it more difficult for fishermen to land a keeper fish, making the fishing experience less satisfying. If the size limit is increased, fishermen may decide it is not worth fishing for greater amberjack which would adversely affect the businesses and communities dependent on this fishery. If recreational fishermen take fewer trips in private boats, charter boats, or party boats, there would be less income for the for-hire sector and less money spent in the communities that cater to this fishery. Communities in Alabama and west Florida have the highest landings for the recreational sector and therefore would be most affected if people decide not to fish due to increased size limits which may make it more difficult to catch a keeper fish. Increasing restrictions in the recreational fishery may put more pressure on other reef fish species as recreational fishermen target other species.

Alternative 5 would implement a seasonal closure for January –February. On the one hand a closure for these months could have negative impacts on the fishermen and businesses that depend on this fishery because recreational fishermen may decide not to fish during these months if their main target is greater amberjack. On the other hand, a closure in January and February will probably have fewer impacts on fishermen than there would be if the closure was during the summer months when more people typically fish. Some fishermen may prefer to increase the size limit in order to keep a whole fish per person and to keep the season open all year. If the season is open all year it allows private and charter recreational fishermen to target greater amberjack all year which would benefit businesses that depend on this fishery.

Reducing the bag limit to zero for the captain and crew could negatively impact the captain and crew who are used to keeping the bag limit and providing fresh fish for their families. As prices for fuel, insurance and equipment continue to increase, captains and crew of charter vessels are making less profit. Fresh fish they take home supplements their food budget. Being allowed to keep their bag limit may also increase the enjoyment of the for-hire trip for the captain and crew. One of the reasons stated by captain and crew for working in this industry is the enjoyment of fishing it provides. If captain and crew are no longer allowed to fish, they may not enjoy the work as much, making it harder to retain crew and making the experience less enjoyable for the captains. By being allowed to keep the bag limit, the captain and crew may also feel like they are sharing the experience with the clients, making the trips more enjoyable for everyone.

Alternative 5 would reduce landings by an estimated 28 percent for **option a** and 35 percent for **option b** which in the long term would help the stock recover. Once the stock recovers, fishermen, businesses, and communities will benefit from having more greater amberjack to target, and presumably fewer restrictions than are currently in place, in the recreational fishery.

It should be recalled that all of the estimates of the economic impacts of the various alternatives overestimate the likely impacts due to the caveats presented. In summary, these caveats include the assumptions that effort changes directly with landings, target behavior in the headboat sector is the same as in the charter sector, species substitution does not occur, and that the value per angler trip derived from a composite of species is appropriate for greater amberjack. Since these assumptions are used in the evaluation of each of these alternatives, they are not expected to substantially affect the ranking of the alternatives. Caution is necessary, however, with attempting to compare these values with those generated for the commercial sector.

5.3.4 Direct and Indirect Effects on Administrative Environment

The closed season in **Alternative 5** will increase the burden on enforcement to publicize and enforce another closure. However, seasonal closures should not be as difficult to enforce as fractional bag limits because other reef fish (i.e. red snapper, red grouper, and vermilion snapper) have closures that anglers are familiar with. Size limit changes in **Alternative 2, 5** and **Preferred Alternative 4** will not change enforcement needs since a minimum size limit is already required for greater amberjack.

5.4 Action 4: Greater Amberjack Commercial Management Alternatives

This Action establishes management measures for the commercial greater amberjack fishery to reduce the landings by a minimum of 38 percent and up to 43 percent. This reduction is based on the preferred rebuilding strategy in Action 1 and the possible preferred alternatives in Action 3.

5.4.1 Direct and Indirect Effects on Physical Environment

The alternatives in this Action reduce landings by 38 percent or more which may have a minimal benefit to the physical environment by reducing fishing effort. Direct effects to the physical environment resulting from commercial fishing include physical damage to habitat associated with anchoring, longline snags on the bottom, and hook-and-line tear-offs and abrasions (see Section 5.1.1). Ninety-seven percent of the commercial landings are caught using hook-and-line gear. This gear is unlikely to contact bottom habitat or cause any damage because greater amberjack are pelagic and are primarily caught in the water column above structure. Anchoring over wrecks or other structure to fish for greater amberjack may have a negative effect on those structures and surrounding benthic habitat. Commercial longline vessels capture the other three percent of the total commercial greater amberjack landings; however, bottom longlines are not used to target greater amberjack so effort should not be affected by a reduction in TAC. Also, several habitat areas of particular concern, marine sanctuaries, and marine reserves already exist in the Gulf of Mexico providing additional protection to greater amberjack habitat and reducing impacts to the physical environment (see Section 3). Any benefits to the physical environment resulting from the proposed alternatives are expected to be greatest for **Alternative 5**, since an extended seasonal closure is expected to reduce effort more than any of the alternatives considered.

5.4.2 Direct and Indirect Effects on Biological /Ecological Environment

The alternatives in this Action will have a positive effect on the biological status of the greater amberjack in the Gulf of Mexico. Benefits associated with ending overfishing and rebuilding the stock include: expanding the size- and age-structure, increasing stock abundance and biomass, and reducing mortality. Fishing mortality in 2004 was 52 percent too high and biomass was only 48 percent of B_{MSY} (SEDAR 9 2006a). Target commercial landings reductions of 38 to 43 percent are required to reduce F to F_{OY}, end overfishing, and rebuild the stock to B_{MSY} by 2011 assuming that the recreational landings will be reduced by at least 26 percent. All the alternatives in this Action accomplish this and are expected to reduce overall landings by 32 percent as specified in Action 1. Section 1.2 contains a detailed discussion of the current status of greater amberjack as determined by the SEDAR 9 stock assessment.

Alternative 1 would maintain the commercial minimum size limit of 36-inches FL and the closed season from March through May. The greater amberjack stock would continue to undergo overfishing and remain at approximately 48 percent of B_{MSY} over the long-term assuming that future fishing mortality remains at F_{2004} (0.863). The stock is expected to remain at this biomass level through at least 2017 (Figure 1.2.1).

Dead discards are expected to remain at approximately 30 percent by weight of the commercial landings, most likely as a result of the 36-inch FL minimum size. The minimum size of 36-inches FL exceeds the size where all females are mature (Harris, 2004). This size limit was implemented in 1990 and the SEDAR 9 assessment suggested that the stock improved slightly from 1990 to 1991. Thereafter, biomass continued to decline (Figure 1.2.1). The three month season closure was implemented in 1998 and is assumed to have been partially responsible, along with the recreational one fish bag limit, for the increases in biomass from 1998 through 2003 (Figure 1.2.1). Stock biomass improved by approximately 125 percent between 1998 and 2003 but since has stabilized at approximately 4.25 mp female biomass.

Alternative 2 would establish a 1,100 pound commercial trip limit. Annual landings should be reduced by 38 percent, provide fishermen don't take more trips. In the short-term landings would be reduced to that required to reduce fishing mortality to F_{OY}. This reduction would end overfishing and rebuild the stock to B_{MSY} by 2011, assuming that recreational landings will be reduced by at least 29 percent. As the availability of legal fish increases over the first few years of rebuilding, it will be easier to catch the trip limit. Reducing the days necessary to catch the trip limit may reduce costs somewhat, but increased fuel prices and other costs may prevent those saved days from being combined into another fishing trip. In the first year, **Alternative 2** would match the TAC requirements of any of the proposed rebuilding plans. Trip limits proposed by **Alternative 2** may restrain future landings as availability increases better than other methods of reducing commercial landings, except hard quotas. If so, trip limits are likely to hold catch closer to the yearly TAC requirements of the stepped rebuilding approach or the linearly-increasing conservation equivalent. However, increased landings are more likely if more trips occur or if more trips obtain the 1,100 pound trip limit.

Alternative 2 should reduce discards proportionally to the reduction in landings. The proportion of dead discards in the commercial fishery (30 percent by weight) is currently much higher than in the recreational fishery (12 percent by weight). This difference is likely do to the differences in minimum size limits. A 38 percent reduction in discards would bring the commercial share of the dead discards to 56 percent rather than the current 60 percent. The preferred recreational management alternative (Action 3, Preferred Alternative 4) includes an increase in the minimum size limit from 28-inches FL to 31 inches FL. If that alternative remains the preferred, the commercial share of overall dead discards would drop to 51 percent under **Alternative 2**.

Alternative 3 would reduce the greater amberjack size limit to 33-inches FL and establish a trip limit of 700 pounds. Reducing the size limit from 36-inches FL to 33-inches FL would increase availability of legal fish and would be expected to increase annual landings by approximately 16 percent. To compensate for this increase, the trip limit would be reduced to 700 pounds which by itself is expected to reduce landings by 49 percent. Collectively, these two measures reduce annual landings by 41 percent, provided fishermen do not take more trips. In the short-term landings would be reduced to that required to reduce fishing mortality to F_{OY}. This reduction would end overfishing and rebuild the stock to B_{MSY} by 2011, assuming that the recreational landings will be reduced by at least 27 percent. In the first year, **Alternative 3** would match the TAC requirements of any rebuilding plan. Because all of the reduction in landings is the result of a trip limit, **Alternative 3** should restrain future landings as availability increases.

Alternative 3 should reduce discards significantly more than the equal reduction expected from **Alternative 2**. Changing the minimum size limit from 36-inches FL to 33-inches FL is expected to reduce discards by as much as 39-percent. Additionally, the trip limit is expected to reduce discards in proportion to the 49 percent reduction in annual landings. The proportion of dead discards is currently much higher proportionally in the commercial fishery most likely do to differences in minimum size limits. **Alternative 3** is likely to reduce overall discards in the commercial fishery by more than 69 percent, which would reduce the overall commercial share of dead discards to approximately 37 percent if Action 3 Alternative 4 for the recreational fishery remains preferred.

Preferred Alternative 4 would establish a hard quota for the commercial fishery based on a 43 percent reduction in landings. First-year annual TAC would match the TAC requirements of any rebuilding plan. Based on the preferred alternative in Action 1, TAC for 2008 through 2010 would be 503,000 pounds, TAC for 2011 through 2012 would be 938,000 pounds. Any increase in TAC after 2010 would be contingent on the results of the next greater amberjack stock assessment. In the short-term, landings would be reduced to that required to reduce fishing mortality to F_{OY}. This reduction would end overfishing, and rebuild the stock to B_{MSY} by 2011, assuming recreational landings are reduced by at least 26 percent. **Preferred Alternative 4** would match the TAC requirements of the stepped F_{OY} rebuilding plan (Action 1, Preferred Alternative 1). The increase in quota starting in 2011 is taken directly from the constant F_{OY} projection; however, there will be no information to verify that these increasing quotas are appropriate until the new stock assessment is conducted in 2010. The stock is expected to respond quickly to decreases in fishing mortality and as stock biomass increases the availability of legal fish will also increase. The quota should reduce discards in proportion to the overall reduction (43 percent) in annual landings. The quota in **Preferred Alternative 4** is the only management measure that prevents any significant overages for the stepped F_{OY} rebuilding plan and could be modified to accomplish the same for the constant or linearly increasing F_{OY} rebuilding plans. Quotas are likely to lead to derby fishing which will shorten the fishing season over time. Small overages may occur if the pattern of landings changes as the quota is approached since projections must be used to provide sufficient notification when the fishery will close.

Preferred Alternative 4 should reduce discards in proportion to the overall reduction (43 percent) in annual landings. This will have a similar affect on overall discards as described for **Alternative 3**.

Alternative 5 would add June 1 through August 9th to the current commercial closed season of March 1 through May 31, extending the total closed season to more than five months. In the short-term landings would be reduced by 38 percent as required to reduce fishing mortality to F_{OY}. This reduction would end overfishing and rebuild the stock to B_{MSY} by 2011, assuming recreational landings are reduced by at least 29 percent. The stock is expected to respond quickly to decreases in fishing mortality and as stock biomass increases, availability of legal fish will increase. **Alternative 5** is the least likely to constrain catch as availability increases; therefore, longer-term effects of **Alternative 5** would better match the constant F approach. It is expected that some effort will shift to the remaining open season reducing the effectiveness of the additional closure. Landings prior to the implementation of the March through May closed season were relatively stable at nine to ten percent per month between January and September and somewhat less during the last three months of the year. After the closed season was implemented, landings shifted mostly to the three months (June, July and August) after the closure (See Table 2.1.12). Maintaining the constant catch of the three-year stepped approach of Action 1, Preferred Alternative 1 would be more difficult if stock abundance improves as expected. However, with so little of the year left open, it may be difficult to shift much of the effort to the fall or winter.

Alternative 5 should reduce discards in proportion to the overall reduction (38 percent) in annual landings. This will have the same effect on overall discards as described for **Alternative 2.**

5.4.3 Direct and Indirect Effects on Economic/Social Environment

Action 4 considers management alternatives that could result in commercial landings reductions of greater amberjack of at least 38 percent. Measures considered include reductions in trip limits, adjustments in minimum size limits, and the implementation of seasonal closures. The analysis presented in this section assumes that the rebuilding plan considered in Action 1, Preferred Alternative 1 is in effect.

The evaluation of economic impacts expected to result from the implementation of these measures relies on estimates derived using a simulation model developed by Waters and updated by Perruso (Appendix A). Estimates of net operating revenues to owners, captain, and crew are generated by subtracting predicted trip costs from total revenues for all species harvested. Trip costs are 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. For each management alternative considered, discounted net operating revenues were calculated and summed over the duration of the proposed rebuilding schedule.

It should be noted that this analytical approach may overestimate 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 greater amberjack or other Gulf species. As a result, while the reduction of greater amberjack 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 chance, targeting substitute species in order to maintain revenues. In essence, current models can only eliminate trips, or allow then to occur with decreased revenues, but neither more trips nor trips with substituted revenues can be modeled at this time. Since this limitation applies to all of the management measures on the commercial greater amberjack fishery, 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.

Alternative 1, status quo, would maintain the greater amberjack commercial minimum size limit of 36 inches (fork length) and the closed season from March through May. In the short run, **Alternative 1** is not expected to result in adverse economic impacts. However, under the status quo alternative, greater amberjack would continue to undergo overfishing. Therefore, conservation goals would not be met and more severe management restrictions would have to be implemented in the future, resulting in sizeable adverse economic impacts in the long run.

Alternative 2 would establish a commercial greater amberjack trip limit of 1,100 pounds and maintain the existing 36-inch size limit. A 38 percent reduction in greater amberjack commercial landings is expected to result from the establishment of trip limits. The implementation of this alternative, compared to the status quo alternative, is anticipated to be associated with economic losses valued at $1.95 million, approximately. Economic impacts expected to result from the implementation of management measures considered in this action are provided in Table 5.4.1.

Table 5.4.1 Expected Changes in Economic Value Associated with Greater Amberjack Commercial Regulations – Action 4 (in thousand dollars)

Management Alternative	Change in Economic Value
1-No Action	Base
2-Trip Limits	-1,944
3-Reduction in Size Limit and Trip Limits	-2,248
4-Quotas	-1,109
5-Closed Seasons	-1,415

Alternative 3, which would reduce the commercial greater amberjack minimum size limit to 33 inches (fork length) and the commercial trip limit to 700 pounds, is anticipated to reduce landings by 41 percent. Additional forgone revenues, hence economic losses to the fleet, are due to trip cancellation resulting from the relatively lower trip limit. Expected economic losses incurred by the commercial fleet are estimated at $2.25 million, approximately.

Preferred Alternative 4 would establish a hard quota for the commercial greater amberjack fishery and result in a 38 percent reduction in landings. The annual commercial quota under a constant F_{OY} rebuilding strategy would increase from 547,000 pounds in 2008 to 1.02 million pounds in 2012, the last year of the rebuilding schedule. The establishment of a commercial quota is expected to be less restrictive than the implementation of a trip limit. Therefore, this alternative is anticipated to be associated with fewer trip cancellations, resulting in smaller economic losses incurred by the commercial fleet. Economic losses anticipated to result from the establishment of a hard quota in the commercial greater amberjack fishery are estimated at $1.11 million, approximately.

Alternative 5 would add June 1 through August 9 to the current three-month closed season and reduce commercial landings by 38 percent. The extension to the existing season closure is expected to result in economic losses to the commercial fleet estimated at $1.41 million, approximately. Additional economic losses may be incurred due to foreseeable difficulties that would exist in maintaining viable markets for a product that is not available for more than 6 months out of the year.

<u>Summary</u>

Reductions in greater amberjack commercial landings considered in this action would be expected to result in economic losses to the fleet. For the commercial sector, anticipated annual economic losses during the rebuilding schedule, relative to the status quo range from approximately $1.11 million under **Preferred Alternative 4,** which would establish a hard quota for the commercial greater amberjack fishery, to approximately $2.25 million under **Alternative 3,** which would reduce the commercial greater amberjack minimum size limit to 33 inches (fork length) and the commercial trip limit to 700 pounds. **Alternative 2**, which would establish a commercial greater amberjack trip limit of 1,100 is anticipated to result in economic losses estimated at $1.95 million. Under **Alternative 5**, the June 1 through August 9 extension to the existing closed season is expected to result in economic losses of $1.41 million to the commercial sector. Additional losses may be associated with this management alternative, due to the difficulties that would exist in maintaining a viable market for a product that is not available for more than half of the year.

Alternative 1, no action, would maintain the 36 inch size limit and a closed season from March through May in the commercial fishery. In the short term, this alternative would not have any negative effects on the fishermen, businesses, or fishing communities that depend on the commercial greater amberjack fishery, because it would not change the rules currently in place. However, under this alternative greater amberjack would continue to undergo overfishing. This would hurt those that depend on the fishery in the long term and would require more restrictive measures in the future to stop overfishing and rebuild the stock. Fishermen, businesses, and communities dependent on the fishery will benefit when the stock is rebuilt and the TAC is higher.

Alternative 2 would establish a commercial greater amberjack trip limit of 1,100 pounds and is estimated that it will reduce landings by 38 percent. Any reduction in landings has the potential to negatively impact fishermen, businesses, and communities that depend on the commercial greater amberjack fishery. Some fishermen may argue that it is not as profitable to return to shore with less fish than they are currently catching. A reduction in landings could affect the processors that process greater amberjack, reducing profits and possibly causing a loss of jobs in the processing sector. Potentially, the communities with the highest landings of greater amberjack such as Madeira Beach, St. Petersburg, and Islamorada, Florida would be the most impacted by reductions in landings. **Alternative 2** is estimated to reduce landings by 38 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more greater amberjack to target, and there may be less restrictions on the commercial fishery in the future.

Alternative 3 would reduce the commercial greater amberjack minimum size limit to 33 inches and the commercial trip limit to 700 pounds. Reducing the commercial size limit would allow the fishermen to keep more of the fish they catch which would benefit the fishermen and possibly save them time and fuel expense to catch their limit. As in **Alternative 2,** any reduction in landings has the potential to negatively impact fishermen, businesses, and communities that depend on the commercial greater amberjack fishery. Some fishermen may argue that it is not as profitable to return to shore with less fish than they are currently catching. A reduction in landings could affect the processors that process greater amberjack, reducing profits and possibly causing a loss of jobs in the processing sector. Potentially, the communities with the highest landings of greater amberjack such as Madeira Beach, St. Petersburg, and Islamorada, Florida would be the most impacted by reductions in landings. **Alternative 3** will have more negative impacts on the commercial fishery in the short term than **Alternative 2** because the trip limit is lower. **Alternative 3** is estimated to reduce landings by 42 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more amberjack to target, and there may be fewer restrictions on the commercial fishery in the future.

Preferred Alternative 4 will establish a quota for the commercial fishery under a constant Foy rebuilding plan. The commercial quota would be 547,000 pounds in 2008 and increased to 1.09 million pounds by 2012. Although some fishermen may prefer a quota so that they are not restricted by a trip limit, there will be uncertainty as to when the quota will be met and the fishery will be shut down. On the one hand, fishermen can maximize their catch per trip but they will not know when the fishery will close. Some may prefer a quota system so they can maximize their catch while others may prefer to be able to catch greater amberjack all year round, even if the trip limit is reduced. A closure of the fishery once the quota is met could have negative impacts for the fishermen, businesses, and communities dependent on the fishery. Establishing a quota is projected to decrease landings by 38 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities dependent on the fishery will benefit from having more greater amberjack to target, and there may be less restrictions on the commercial fishery in the future.

Alternative 5 would add June 1 through August 9 to the current three month closed season and will reduce the commercial landings. Any reduction in landings has the potential to negatively impact fishermen, businesses, and communities that depend on the commercial greater amberjack fishery. It may be difficult for fishermen to redirect fishing effort to other species in the reef fish complex due to other quotas and season closures. Closing the greater amberjack fishery for over five months each year may have an impact on the processors and other businesses that depend on the fishery possibly causing a loss of jobs in the processing sector. **Alternative 5** is projected to decrease landings by 38 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more amberjack to target, and there may be fewer restrictions on the commercial fishery in the future.

It should again be noted that this analytical approach may overestimate actual impacts due to the inability of the current model to accommodate fishing behavioral changes. Since this limitation applies to all of the management measures on the commercial greater amberjack fishery, 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.

5.4.4 Direct and Indirect Effects on Administrative Environment

The alternatives in this Action will have a significant effect on enforcement and monitoring. **Alternative 2 and 3** implement trip limits which would require increased compliance enforcement. **Preferred Alternative 4** establishes a hard quota which would require both increase enforcement as well as seasonal monitoring to determine the closure date. Commercial fishermen are used to trip limits and hard quotas in the grouper fishery and should have no difficulty adapting to them for greater amberjack. **Alternative 5** would increase the closed season by more than two months, extending the enforcement time commitment. **Alternative 3** and **Preferred Alternative** change the minimum size limit which shouldn't require changes in enforcement procedures or commitment.

5.5. Action 5 Gray Triggerfish Thresholds and Benchmarks.

5.5.1. 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 (see Section 5.1.1). The degree a habitat is affected by fishing gear depends largely on the vulnerability of the affected habitat to disturbance, and on the rate that the habitat can recover from disturbance (Barnette, 2001). For example, the complex structure and vertical growth pattern of coral reef species makes reef habitat more vulnerable to adverse impacts from fishing gear and slower to recover from such impacts than is sand and mud bottom habitat (Barnette, 2001). For a description of gray triggerfish habitat, see Section 3.2.1 and GMFMC, 2004a.

Most gray triggerfish are caught by vertical lines. Vertical lines include handlines, rod-and-reels, and multi-hook lines known as bandit gear. Vertical-line gear catches most (>90 percent) commercial and nearly all recreational gray triggerfish (SEDAR 9 2006). In the commercial fishery, gray triggerfish caught by traps annually account for five to nine percent of landings, and longlines annually account for two to four percent of the fish landed. For the recreational fishery, some gray triggerfish are caught by spearfishing.

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). However, because gray triggerfish often move off reefs to feed (Kurz 1995), the effects of directed hook-and-line fishing for gray triggerfish on the physical environment are less than those associated with directed fisheries for reef fish species that stay around reefs. If gray triggerfish are being caught incidentally as other species are being targeted, then this advantage is less. 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.

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 gray triggerfish 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).

Very few gray triggerfish are caught by other gears and so are likely caught incidentally in the use of these gears. Barnette (2001) has summarized the effects of these gears on benthic habitats in detail. Traps are often set on live substrate and can cause damage to corals, gorgonians, sponges, and submerged aquatic vegetation. Trawls and seines cause a variety of negative affects including scraping, ploughing, sediment resuspension, physical habitat destruction, and removal or scattering of not-target benthos. Gillnets and trammel nets generally do not effect the bottom; however, if set near coral and other hard bottom habitats, the gear can snare and break off benthic structures. Spear fishing has minimal effects on the bottom. Additionally, many of these gears are regulated by the Council to minimize their effects; for example, fish traps were phased out in February 2007. Roller trawls, a type of trawl that can be fished over hard bottom, is excluded from fishing in stressed areas as defined by the Council.

Establishing status determination criteria should not directly affect benthic habitat or the water column because they simply provide fishery managers with a defined harvest target to consider in developing fishery management measures. Managers use these criteria in part to evaluate whether the stock removal (fishing) and fishing mortality rate are within desirable ranges. Therefore, the Alternatives in this Action 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 1) end overfishing in the short term and 2) sustain the stock over the long term.

Alternative 1 could have negative effects on the physical environment if harvest levels were set at OY levels, which correspond to a yield associated with fishing at $F_{20\%SPR}$. However, the current MFMT value is based on a more conservative value of F ($F_{30\%SPR}$). Based on data through 2004, recent estimates of fishing mortality indicate that $F/F_{30\%SPR}$ is greater than one, indicating overfishing is occurring. Remedial actions to end overfishing are included in this amendment and addressed in Actions 6, 9, and 10. Therefore, effort will need to be lower than it is at present. Over the short-term (<10 years), F will need to be reduced such that the overfishing ends. The degree that F is reduced and where these reductions occur are dependent on the preferred alternatives of Actions 6-10. However, as specified above, effects of the gears used in this fishery on the physical environment are relatively minor compared to other gear types (e.g., trawls), and so the effects of these measures should be minimal.

It is difficult to assess the differences in effects between the **Preferred Alternative 2** and **Alternative 3**. The effects on the physical environment for both the **Preferred Alternative 2** and **Alternative 3** should be beneficial because they will require reductions in fishing effort similar to **Alternative 1** in response to overfishing. Once the fishing mortality rate has stabilized to a rate where overfishing has ended, the stock will be managed at a level corresponding to the more conservative F_{OY} of either 75 percent or 90 percent of $F_{30\%SPR}$ as dictated by **Preferred Option a** and **Option b** of each alternative.

5.5.2. Direct and Indirect Effects on Biological/Ecological Environment

Fishery management actions that affect the biological/ecological environment mostly relate to the impacts of fishing on a species' population size, life history, and the role of the species within its habitat. Removal of fish from the population through fishing reduces the overall population size. MSY is the largest average catch that can be taken at a sustained level of harvest from a stock under average environmental conditions. Associated with MSY is F_{MSY} and B_{MSY}, from which OY, MSST, and MFMT are generally derived. If fishing is allowed to exceed F_{MSY} for several years, then the stock size will decline to a level where the harvest can no longer be maximized. This overfishing can manifest itself in two ways. The first is growth overfishing where the fishing pressure on smaller fish is too high to allow the fishery to produce MSY. The second is recruitment overfishing where the fishing pressure is so high that the population is no longer able to replace itself. Recruitment overfishing for an extended period of time could lead to the collapse of the stock, or a condition where all fishing effort including bycatch from non-directed fisheries, would need to be severely curtailed or ended for the stock to rebuild. Taken to its extreme, recruitment overfishing could result in the economic and biological extinction of a stock.

Fishing pressure can affect various aspects of a species' life history. For some reef fish species (e.g., vermilion snapper; Zhao et al. 1997, Hood and Johnson 1999), fishing appears to have shifted the size distribution to smaller sizes. Increased fishing pressure has also been associated with a depression in the size at maturity. However, because historical studies of gray triggerfish are limited, it is difficult to assess whether fishing pressure has caused changes in life history patterns.

Changes in the abundance of gray triggerfish are likely to have ecological effects. Gray triggerfish prey primarily on benthic invertebrates (Harper and McClellan, 1997). While they are adapted to feed on well-armored prey, they are not specialized feeders (Vose and Nelson, 1994). Changing triggerfish diets have been found to be indirectly related to prey densities (McClanahan 1994; Kurz 1995).

The relationships among species in marine ecosystems are complex and poorly understood. As a result, the nature and magnitude of ecological effects are difficult to predict with any accuracy. Additionally, red snapper, vermilion snapper, greater amberjack, red grouper, and gag stocks are being managed to improve their stock condition. The gray triggerfish population represents a relatively small proportion of the entire snapper-grouper complex in the northern Gulf. Therefore, the effects of improving the gray triggerfish stock may be undetectable compared to those associated with rebuilding other stocks. This would compound any attempt to predict interactions within the reef fish complex.

Recent advances in ecosystem modeling may provide some insight into the cascading effects of an increasing gray triggerfish stock. Currently, the only model for the GOM that could address these issues is an Ecopath model being developed by the Florida Marine Research Institute and NOAA Fisheries (Behzad Mahmoudi, personal communication). The development of this model is in the early stages and it would be impractical to apply at this time. Without knowing how an increase or decrease in the abundance of gray triggerfish would affect other populations or that it would even be detectable compared to a rebuilding red snapper stock, the ecological effects of the various alternatives cannot be distinguished at this time.

Establishing thresholds and benchmarks should not directly affect the biological/ecological environment because they simply provide fishery managers with defined harvest targets to consider in developing fishery management measures. Managers use these measures in part to evaluate whether the stock removal (fishing) and fishing mortality rates are within desirable ranges. Therefore, **Alternatives 1-3** should have no direct effect on the biological/ecological environment. However, specifying these values would indirectly affect the biological/ecological environment by defining the future level of fishing effort that will 1) end overfishing on the stock, and 2) sustain the stock over the long term in accordance with the NSGs.

Alternative 1, if selected as preferred would still require overfishing on the gray triggerfish stock to be addressed, however, MSY and MSST would not be established, and OY would remain inconsistent with MFMT. No criterion for an overfished level for the stock (MSST) could lead to the stock becoming depleted. If this depletion caused the stock to be reduced to a very low level, stock recovery could be lengthy. Currently the stock size relative to $B_{30\%SPR}$ is approximately 0.64.

Preferred Alternative 2 and **Alternative 3** would set MFMT equal to the yield at F_{MSY} with proxy values based on specific estimates of F ($F_{30\%SPR}$). This MSY proxy value would be consistent with the current MFMT value and would constrain total harvest, including shrimp bycatch to 1.64 mp. Therefore, to achieve the management goals set by establishing an MSY value with its associated $F_{30\%SPR}$ and $SSB_{30\%SPR}$, management measures would need to be implemented to reduce F to end overfishing (see Actions 9 and 10). This would provide a biological benefit to the stock by allowing the stock to grow, thus avoiding a continued stock depletion that could ultimately lead to the stock becoming overfished.

Once the stock is at equilibrium, the overfished threshold (MSST) provides a buffer to the stock and its ability to sustain MSY. Because **Preferred Alternative 2** has the biomass level closest to $SSB_{30\%SPR}$, the degree that this alternative can buffer the stock from becoming overfished is less than **Alternative 3**. However, should the stock fall below this threshold, it can be rebuilt more quickly than if the stock biomass were to fall below the thresholds set by **Alternative 3**. Therefore, **Preferred Alternative 2** provides greater assurances the stock can be rebuilt should the stock biomass be reduced below B_{MSY}. The tradeoff associated with this assurance is that natural variation in recruitment could cause the gray triggerfish stock to more frequently alternate between an overfished and rebuilt condition, even if the fishing mortality rate applied to the stocks was within the limits specified by the MFMT. However, the likelihood of this occurring would be reduced if the gray triggerfish stock were managed to achieve the preferred OY alternative (**Preferred Option a**: yield associated with an F of $0.75*F_{MSY}$).

5.5.3 Direct and Indirect Effects on Economic/Social 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 public behavior. This behavior 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, legal action, or pursuit of political relief from management action. Positive behavior supports the efficient use of both the natural resource and the economic and human capital resources dedicated to the management process. Negative behavior harms 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 behaviors 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.

Although the MSST is a biological concept, the higher the value is, the greater will be the likelihood that the stock may fall below the MSST. This would result in a designation of being overfished, and trigger the implementation of additional, restrictive management measures. Among the alternatives, **Alternative 1** may be ruled out because it does not set MSST as required by the MSFCMA. Of the remaining alternatives, **Alternative 2** represents the more conservative (higher) value and, therefore, would be expected to be associated with a higher likelihood that the stock could be determined overfished. Conversely, MSST **Alternative 3** would establish a lower conservative benchmark, theoretically allowing a larger reduction in the biomass before the resource is declared overfished. Thus, MSST **Alternative 2** would more likely require restrictive management measures in the short term, resulting in more adverse short-term economic impacts on resource users. To the extent that it also reduces the likelihood of maintaining more sustainable stock level, future benefits may be reduced as well.

MFMT is another biological concept that may require changes in management regulations. The alternatives considered do not materially differ from one another in terms of triggering changes in management regulations.

Alternative 1, no action. This alternative would not have any impacts on the fishermen, businesses, or communities that depend on the commercial gray triggerfish fishery in the short term because there would not be any changes made to the fishery. On the other hand, if no changes are made, the fishery will continue to undergo overfishing and will not rebuild which would have negative impacts on the fishermen, businesses, and communities that depend on this fishery in the future.

Preferred Alternative 2 and **Alternative 3** would not have any impacts on the fishermen, businesses, or fishing communities in the short term that depend on the gray triggerfish fishery because it does not alter the landings. If these alternatives aid in rebuilding the stock and ending overfishing in the gray trigger fish fishery than in the long term it will benefit the fishermen, businesses, and communities that depend on the fishery because it will allow for a higher TAC once the fishery is rebuilt.

5.5.4 Direct and Indirect Effects on Administrative Environment

Section 1.4 outlines the history of management of gray triggerfish in the Gulf. This stock is regulated through size and bag limits, and commercial and for-hire vessels are required to have a reef fish permit to harvest this species. In addition, NOAA Fisheries Service monitors both commercial and recreational catches to assess the stock. The purpose of defining status criteria is to establish a management program that will sustain the stock over the long term. The TAC levels that would be defined by the alternatives after the stock rebuilds may be different from those prescribed to end overfishing; however, such adjustments would fall within the scope and capacity of the current management system. Therefore, direct effects on the administrative environment are not determined to be significant. **Alternative 1** would not define a gray triggerfish MSST, and would have an OY and MFMT value that are inconsistent. If selected as preferred, this alternative would have no direct effects on the administrative environment.

The only foreseeable indirect effect to the administrative environment associated with **Preferred Alternative 2** and **Alternative 3** relates to potential management measures needed to end overfishing. Implementing these rules would require informing the public of regulatory changes, continuing to monitor the harvest of this stock, and conducting periodic assessments to insure that overfishing ends and the stock does not become overfished.

5.6. Action 6. Gray Triggerfish Rebuilding Plan

5.6.1 Direct and Indirect Effects on Physical Environment

The alternatives in Action 6 establish overall TAC reductions and will not directly affect the physical environment. The proposed TACs and harvest reductions will indirectly affect the management measures necessary to constrain harvest, and therefore affect the physical environment through changes in effort. The recreational fishery uses hook-and-line and spears to harvest gray triggerfish, while 90+ percent of commercial landings are made using hook and line gear. Bottom longlines account for 4 percent of the commercial landings and prior to 2007, fish traps accounted for 6 percent of the commercial landings. As of February 7, 2007, fish traps are prohibited in the Gulf of Mexico.

Direct effects to the physical environment resulting from these gears include: hook-and-line tear-offs and abrasions and direct damage to bottom structures. Vertical line gear is less likely to contact the bottom than is bottom longline gear, but it still has the potential to snag and entangle bottom structures. The line and weights used by this gear type also can cause abrasions (Barnette 2001). Bottom longlines and traps have the potential to damage or move hard structures on the sea floor, including rocks, corals, sponges, other invertebrates, and algae (Barnette 2001).

All of the alternatives in Action 6 are expected to have small or no effects on the physical environment. **Alternative 1** would maintain status quo conditions and not implement a rebuilding plan. This would allow effort and habitat-gear interactions to remain at current levels, unless the Council implements management measures to end overfishing, without adopting a rebuilding plan for gray triggerfish. **Alternatives 2** and **3** would both reduce the initial harvest of gray triggerfish by 49 percent. Although the reduction in harvest is significant, it is not expected to greatly change fishing effort and habitat-gear interactions relative to status quo conditions because few recreational anglers and commercial fishermen target gray triggerfish. Additionally, direct and indirect effects to the physical environment are expected to be small for each of the alternatives because the primary gear used is hook-and-line, which has less impact on the physical environment then other gear types, and the gray triggerfish fishery accounts for only a small percentage of overall Gulf-wide reef fish landings.

5.6.2. Direct and Indirect Effects on Biological/ecological Environment

Based on the Council's preferred definition for MSST (see Action 5, Preferred Alternative 2), the gray triggerfish stock is overfished. The stock first became overfished (dropped below MSST = (1-M)*$SSB_{30\%SPR}$) in 1996, increased above MSST during 2001 and 2002, and returned to an overfished condition in 2003 and 2004 (Figure 1.2.4).

Alternative 1 would maintain status quo conditions and would not establish a rebuilding plan for gray triggerfish. This alternative could only be selected if the Council selects a less conservative definition for MSST, i.e., 0.5*$SSB_{30\%SPR}$ (see Action 6, Alternative 3). SEFSC projections using current fishing mortality rates (Sladek-Nowlis 2007a) indicate the stock would remain below the Council's overfished threshold if no management measures were implemented to end overfishing and rebuild the stock. If management measures to constrain harvest and prevent overfishing are not implemented, as proposed in Actions 9 and 10, SSB would continue to decline and remain well below the SSB associated with $F_{30\%SPR}$ (Figure 1.2.4). In 2004, SSB was estimated to be 64 percent of the SSB associated with 30 percent SPR and fishing mortality was estimated to be 1.6 times greater than the fishing mortality at 30 percent SPR.

Preferred Alternative 2 and **Alternative 3** propose rebuilding plans for gray triggerfish based on either a constant or stepped F_{OY} rebuilding strategy. **Preferred Alternative 2** would establish a constant F_{OY} rebuilding plan for gray triggerfish, which would allow TAC to increase annually. F_{OY} is defined as fishing at a rate that is 75 percent of $F_{30\%SPR}$ (see Action 6, Preferred Alternative 2). The rebuilding plan would require an initial 49 percent reduction in directed harvest to end overfishing immediately in 2008. Thereafter, total allowable catches would increase consistent with a constant fishing mortality rate that optimizes yield. SEFSC projections indicate this rebuilding plan would allow the stock to increase above MSST by 2009 ($SSB_{2009}/SSB_{30\%SPR} = 0.73$). The stock would be fully rebuilt within six years ($SSB_{2013}/SSB_{30\%SPR} > 1.0$) to the SSB associated with 30 percent SPR. Fishing mortality throughout the rebuilding plan would be held at 25 percent less than the fishing mortality rate (F_{MSY}) that maximizes yield (proxy =$F_{30\%SPR}$). If the fishing mortality rate is maintained at F_{OY} after rebuilding the stock in 2013, SSB would continue to increase. By 2018, SSB would be 89 percent larger than the SSB in 2007. Direct benefits to the stock from **Preferred Alternative 2** would include increased stock abundance and an expanded size and age distribution.

Alternative 3 is a modification of the constant F_{OY} rebuilding plan summarized for **Preferred Alternative 2**. **Alternative 3** would require an initial 49 percent reduction in directed harvest; however, unlike **Preferred Alternative 2**, which allows increases in TAC annually, **Alternative 3** would set TAC constant in three year intervals. TAC for each interval would be set equal to the first year of the corresponding TAC in the constant F_{OY} rebuilding projection. By holding TAC constant in three year intervals, fishing mortality would be reduced to a greater extent than **Preferred Alternative 2**, allowing the stock to rebuild slightly faster. Projections indicate the stock would increase above MSST by 2009 ($SSB_{2009}/SSB_{30\%SPR} = 0.73$) and be fully rebuilt within five years ($SSB_{2012}/SSB_{30\%SPR} > 1.0$) to the SSB associated with 30 percent SPR. If the fishing mortality rate is maintained at F_{OY} after rebuilding the stock in 2012, SSB would continue to increase. By 2018, SSB would be

98 percent larger than the SSB in 2007. Direct benefits to the stock from **Alternative 3** would include increased stock abundance and an expanded size and age distribution.

As a comparison, the shortest time to rebuild (T-min) would be 2.5 years with no harvest (F_0), including no dead discards. The stock would rebuild to SSB_{MSY} by mid-2010 and to SSB_{OY} by mid-2011. Annual landings would then be allowed at the yield associated with F_{OY} or approximately 0.976 mp. From 2008 through 2011, there would be on average approximately 22 to 23 percent more fish in the water annually under the F_0 strategy. The initial effects would be a healthier gray triggerfish stock which may provide some minimal improvement in ecosystem function. Thereafter, the F_0 strategy would keep SSB at SSB_{OY}, either **Preferred Alternative 2** or **Alternative 3** rebuilding plans would allow SSB to increase to the same SSB_{OY} level by 2024 or 2023 respectively. The more rapid short-term increases in SSB would provide some short-term improvement in the biological environment; but in the longer-term the populations would be the same under any of the strategies.

Both rebuilding plans (**Preferred Alternative 2** and **Alternative 3**) require a 49 percent reduction in fishing mortality across all sectors of the fishery (including shrimp trawl bycatch). The SEFSC examined spatial distributions of gray triggerfish, red snapper, and brown shrimp and found both gray triggerfish and red snapper had similar distributions to brown shrimp (Nichols, pers. comm.). Based on measures proposed in Amendment 27/14 to the Reef Fish and Shrimp FMPs, reductions in red snapper fishing mortality via spatially mediated effort reduction are expected to be sufficient to reduce gray triggerfish bycatch to target levels (Nichols, pers. comm.). If, however, measures imposed for red snapper are not sufficient to reduce gray triggerfish shrimp trawl fishing mortality rates, then lower directed TACs would be necessary.

5.6.3 Direct and Indirect Effects on Economic/Social Environment

Defining a rebuilding schedule is an administrative action and, as such, does not directly affect the economic environment since it would not directly alter the current harvest or use of a resource. Direct effects only accrue to actions that alter harvest or other use of the resource. All entities could continue normal and customary behaviors until such time as harvest restrictions are imposed. Participation rates and harvest levels could continue unchanged. Since there would be no direct effect on resource harvest or use, there would be no direct effects on fishery participants, associated industries, or communities.

Defining a rebuilding schedule, however, may result in indirect effects by delimiting the types of management measures to be adopted. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. Further, defining the rebuilding schedule determines the length of time over which rebuilding efforts can be extended and affects the severity of the measures implemented during the recovery period. Generally for a given rebuilding target, the shorter the recovery period and the more severe the necessary harvest restrictions are, the greater will be the short term adverse economic effects. In the present case, the rebuilding period is the same under both alternatives so it is not a factor in the potential differential effects of the two alternatives.

With respect to individual user groups, depending on the value of the resource and the yield stream of benefits realized upon recovery, particularly severe restrictions may result in losses to current users that cannot be recovered in the long term since, dollar for dollar, current benefits are more valuable than future benefits. The magnitude of actual effects, however, cannot be determined independent of the specific measures that would be implemented to achieve the required harvest reductions. These effects are influenced by the rebuilding strategy and by the specific management measures (e.g., seasons, trip and bag limits, size limits, etc.) the Council selects to limit harvests to the goals established by the strategy. The magnitude of these effects are partly conditioned by the level of user group participation in the fishery, noting that various user groups, e.g., commercial and recreational, assign generally different valuations to the same resource.

The status quo alternative (**Alternative 1**) becomes a viable alternative only if the selected MSST is less conservative so that the stock may not be considered overfished and therefore no rebuilding strategy is required. In that event, **Alternative 1** would have no direct or indirect economic effects on fishing participants and associated industries and fishing communities. Considering the Council's current preferred alternative of a more conservative MSST under which the stock is considered overfished, maintaining status quo would not rebuild the stock. One implication of this is that setting a more conservative MSST and rebuilding the stock would bring about a higher sustainable stock level after the rebuilding period. Selecting **Alternative 1** then means that current economic benefits would be maintained at the cost of forgoing larger benefits in the future. In the absence of quantitative information, comparison of these two sets of benefits cannot be made.

The other two alternatives are constant F strategies and require the same target rebuilding date of 2017. These features may be expected to result in similar indirect economic effects. The areas where the two differ are in the manner TACs are established and date the stock would be fully rebuilt. **Alternative 3** implies more restrictive management measures over a longer period than **Preferred Alternative 2**, and thus would more likely indirectly result in larger short-run adverse economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{MSY}, the resulting post-rebuilding benefits under both alternatives would slightly differ. The reason for this is that **Alternative 3** would fully rebuild the stock one year ahead of **Preferred Alternative 2**. If this difference in future benefits is not significant, the alternative with lower short-term cost (**Preferred Alternative 2**) may be adjudged more beneficial than **Alternative 3**. The key condition in this conclusion is the extent to which specific management measures under each alternative are effective in aligning actual harvest to the alternative's target harvest trajectory. This condition is partly examined in the discussion of the economic effects of various specific measures. Two scenarios examined below provide some insights on the nature of this condition.

The first scenario abstracts from any specific management measures by comparing changes in vessel net operating revenues due to the rebuilding alternatives. An economic model of the fishery is used for this purpose (Appendix A). The net present value difference between **Alternative 1** and **Alternative 2** for rebuilding is -$247,000, the difference between

Alternative 1 and **Alternative 3** is -$144,000, and the difference between **Preferred Alternative 2** and **Alternative 3** is +$103,000. This means that the highest net present value can result from **Alternative** 1, followed by **Alternative 3**, and lastly by **Preferred Alternative 2**. The basic assumption here is that benefits from the various TACs under any alternative are fully realized. This occurs under the condition that the alternatives perfectly align actual harvests to target harvests such that no TAC underages or overages occur.

The second scenario compares the benefits/losses of the three rebuilding alternatives given various specific management measures. Net present value changes provided in Table 5.6.1 below were derived using the methodology described in Appendix A. The results are presented mainly for comparing alternatives and not as absolute numbers resulting from adoption of any specific management measures. Regardless of specific management measures considered, **Alternative 1** would result in the least negative impacts, followed by **Alternative 3**, and then by **Preferred Alternative 2**. It needs reiterating here that **Alternative 1** is not really a viable alternative given the Council's preferred MSST choice. As the case with greater amberjack rebuilding alternatives, the results for **Preferred Alternative 2** and **Alternative 3** are at first surprising, considering that **Alternative 3** provides for generally higher TACs during the rebuilding period. Again, the main reason for this is that the management measures are so constraining as to result in forgoing more benefits from higher TACs. In other words, the management measures, assumed to be the same under all rebuilding alternatives, would result in underages. The harvests forgone under each management measure translate into forgone economic values. This scenario implies that the same management measures adopted for all the more liberal and less liberal TACs would result in more losses for the more liberal alternative.

Table 5.6.1 Net Present Value Changes, in thousand dollars

Management Alternatives	Rebuilding Alternatives		
	Alternative 1	Preferred Alternative 2	Alternative 3
2—Trip Limits	-615	-871	-764
3--Size Limit	-594	-767	-695
4—Size & Trip Limits	-545	-736	-656
5—Size & Trip Limits	-549	-769	-678
6—Size Limit and Quota	-558	-828	-716

It should be pointed out that each rebuilding alternative necessitates harvest reductions relative to the 2000-2004 harvest average in the first few years of this amendment's implementation (e.g., 49% in 2008). This implies that specific management measures, if effective, would likely reduce benefits to the resource users in the short term. Implicitly assumed then in these rebuilding alternatives is the likelihood for long-term benefits to outweigh short-term losses. The sooner the stock is rebuilt, the greater will likely be the present value of future benefits, although in the present case it is difficult to assess if one year makes a significant difference in future values particularly when taking into account the discounting factor.

For economic comparison, under an F_0 strategy, the fishery would lose 1.72 mp (**Alternative 3**) and 1.97 mp (**Preferred Alternative 2**) from 2008 through mid-2011 while no landings would be allowed. The commercial fishery would likely lose the small markets for fresh triggerfish and possibly have difficulty rebuilding those markets once the commercial fishery re-opened in 2012. Recreational fishermen in the northeastern Gulf would have to change target species possibly to red snapper or vermilion snapper. Thereafter, the fishery would be allowed to land the yield at F_{OY}, more per year than under either **Preferred Alternative 2** or **Alternative 3**; however, through 2022, the total cumulative yield under the F_0 strategy would still be approximately 1.36 mp (annually about 91,000 pounds) less than for **Preferred Alternative 2** and approximately 0.815 mp (54,000 pounds annually) less than for **Alternative 3**. The fishery would never be able to recover these loses since the yield would be the same from 2023 forward for all the strategies.

<u>Summary</u>

A rebuilding schedule does not directly affect the economic environment since it would not alter the current harvest or use of a resource. It does have indirect effects by conditioning the types of management measures to be adopted.

The status quo alternative (**Alternative 1**) becomes a viable alternative only if the selected MSST is less conservative so that the stock may not be considered overfished and therefore no rebuilding strategy is required. In that event, **Alternative 1** would have no direct or indirect economic effects on fishing participants and associated industries and fishing communities. Considering the Council's current preferred alternative of a more conservative MSST under which the stock is considered overfished, maintaining status quo would not rebuild the stock. One implication of this is that setting a more conservative MSST and rebuilding the stock would bring about a higher sustainable stock level after the rebuilding period. Selecting **Alternative 1** then means that current economic benefits would be maintained at the cost of forgoing larger benefits in the future.

The other two alternatives are constant F strategies and require the same target rebuilding date of 2012. These features may be expected to result in similar indirect economic effects. The areas where the two differ are in the manner TACs are established and date the stock would be fully rebuilt. **Alternative 3** implies more restrictive management measures over a longer period than **Alternative 2**, and thus would impose larger short-run adverse economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{msy}, the resulting post-rebuilding benefits under both alternatives would slightly differ. The reason for this is that **Alternative 3** would fully rebuild the stock one year ahead of **Alternative 2**. If this difference in future benefits is not significant, the alternative with lower short-term cost (**Alternative 2**) may be adjudged more beneficial than Alternative 3.

Alternative 1, status quo. This alternative would not have any impacts on the fishermen, businesses, or communities that depend on the commercial gray triggerfish fishery in the short term because there would not be any changes made to the fishery. On the other hand, if no changes are made, the fishery will continue to undergo overfishing and will not rebuild which would have negative impacts on the fishermen, businesses, and communities that depend on this fishery in the future.

Preferred Alternative 2 and **Alternative 3** would not have any impacts on the fishermen, businesses, or fishing communities that depend on the gray triggerfish fishery in the short term because it does not alter the landings. If these alternatives aid in rebuilding the stock and ending overfishing in the gray trigger fish fishery than in the long term it will benefit the fishermen, businesses, and communities that depend on the fishery because it will allow for a higher TAC once the fishery is rebuilt.

5.6.4. 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 reduce landings, which will affect enforcement and monitoring. The specific administrative effects change depending on which methods are used to reduce landings (see Sections 5.9.4 and 5.10.4).

5.7. Action 7. Accountability Measures for Gray Triggerfish

5.7.1 Direct and Indirect Effects on Physical Environment

Action 7 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. However, as discussed in Sections 5.6.1, 5.9.1, and 5.10.1, changes in fishing effort and habitat-gear interactions relative to status quo conditions are expected to be small regardless of the management measure used to constrain harvest, because few recreational anglers and commercial fishermen target gray triggerfish. Additionally, the primary gear used is hook-and-line, which has fewer impacts on the physical environment then other gear types, and the gray triggerfish fishery accounts for only a small percentage of overall Gulf-wide reef fish landings.

5.7.2. Direct and Indirect Effects on Biological/Ecological Environment

Gray triggerfish are undergoing overfishing and are overfished, requiring the Council to develop a rebuilding plan (see Action 6) and implement management measures to end overfishing (see Actions 9 and 10). Action 7 includes four accountability measure alternatives. With the exception of **Alternative 1** (status quo), all of the alternatives are intended to reduce the likelihood of overfishing while successfully rebuilding gray triggerfish within the necessary rebuilding timeframe.

The Council has chosen management measures for the gray triggerfish fishery that reduce catches by approximately 60 percent rather than the 49 percent required by the constant F_{OY} preferred rebuilding plan. The recreational size limit is expected to increase to 14 inches TL and reduce landings by 60 percent in the first year; whereas, the commercial fishery is expected to have a hard quota of 80,000 pounds in 2008 which reduces landings by 61 percent. These reductions were chosen by the Council partially because the recreational fishery was willing to accept the 14 inch minimum size in order to avoid a decrease in the bag limit; whereas, for the commercial fishery, this was their long-term average share of the resource and gray triggerfish are one of the least targeted commercial reef fish species. Collectively, the stock is likely to rebuild more quickly allowing TACs to increase more rapidly. The greater reduction in harvest will also increase the likelihood that overfishing does not occur.

With target landings set 60 percent below current levels, accountability triggers are being set at F_{OY} levels for all of the accountability alternatives to insure that the rebuilding plan is adhered to. If accountability measures were set at the maximum values allowed by the MSA to prevent overfishing ($0.9*F_{30\%SPR}$) while the targets required a 60 percent reduction, the buffer would have been approximately 55 percent above the target instead of approximately 18 percent using F_{OY} triggers. A very large buffer might never trigger accountability causing the rebuilding plan to be exceeded; but if they are exceeded, the cuts necessary to bring landings back to the targets would be more than 50 percent. An 18 percent buffer is sufficient to prevent any significant overages while preventing major disruptions should accountability be triggered.

Alternative 1 would maintain status quo regulations and would not require AMs to ensure harvest is constrained within TAC levels, as specified in the preferred rebuilding plan in Action 6. The Council could implement management measures through framework action to constrain harvest if 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 TACs and/or fishing mortality levels. If management measures in Actions 9 and 10 do not adequately reduce mortality throughout the duration of the rebuilding plan or the Council does not take subsequent actions to constrain mortality, then overfishing may occur. By exceeding annual catch limits (AM triggers), stock recovery would be slower than expected and additional reductions in harvest may be required after the next assessment (currently scheduled for late 2012) to rebuild the stock. **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 to meet the reauthorized Magnuson-Stevens Act mandate.

Alternative 2 proposes a mechanism for implementing AMs for each sector if the annual catch limit (AM trigger) for a sector, as summarized in Table 2.2.2, is exceeded. Yields triggering AMs are set at 75 percent of $F_{30\%SPR}$ and are equal to the rebuilding plan TACs in Action 6 (see also Table 2.2.1), providing a buffer between the preferred alternatives to regulate the fishery (target TACs) and the yields triggering AMs. The SEFSC would estimate gray triggerfish landings by sector and if a sector's landings are determined to exceed the AM triggers specified in Table 2.2.2, the Council would request the RA implement temporary regulations in the following year to return landings to the target annual TAC level as specified in Table 2.2.2 which are approximately 50 percent of $F_{30\%SPR}$. This alternative allows the Council to specify regulatory changes to bag limits, size limits, or trip limits in addition to season closures.

If the cumulative sum of landings for all sectors does not exceed the cumulative yield triggering AMs, then no changes would be required. This would potentially allow one sector to exceed the yield triggering AMs if another sector was below the yield triggering AMs. This could result in a de facto shift in allocation if one sector regularly exceeds the yield triggering AMs while the other does not. It also should be noted that yields triggering AMs are only summarized through 2012 or 2013 (see Table 2.2.2). If the stock is successfully rebuilt by that time, then the yield triggering AMs thereafter could potentially be based on a constant $F_{30\%SPR}$ rebuilding strategy, rather than a constant 0.75* $F_{30\%SPR}$ rebuilding strategy. While all the alternatives use the same F_{OY} trigger, **Alternative 2** and **Alternative 5** would be more conservative than **Alternatives 1**, but less conservative than **Alternative 3** and **Preferred Alternative 4** because they allow some discussion of the types of regulations to be implemented to bring the sector into compliance with the accountability measures and therefore, require more time to implement.

The effects of **Alternative 3** is identical to the effects of **Alternative 2**, except the Council would provide the RA authority to file a notification of a closure for each sector if landings meet or exceed the specified yield triggering AMs (Table 2.2.2). **Alternative 3** would therefore provide less flexibility when setting management measures to constrain harvest if overages occur; however, using this authority, the RA could implement the closure more quickly than under **Alternative 2**. The Council would not be able to request the RA modify bag limits, size limits, trip limits, or other management measures. The RA would only have the authority to reduce the length of the following fishing season. If landings exceed the AM trigger, the RA would reduce the commercial and/or recreational season lengths in the following season by the amount of the overage in the previous fishing year to return landings to specified TAC levels. By authorizing the RA to file a notification to close the season, the offending fishery would be closed more quickly, in effect reducing the overall harm to the resource and possibly the long-term affect on the fishery as well. Because release mortality is extremely low for gray triggerfish (1.5 percent), implementing a seasonal closure to constrain harvest is not estimated to substantially increase dead discards, since most gray triggerfish would survive release. The biological benefits of **Alternative 3** would be similar to **Preferred Alternative 4** and more conservative than **Alternative 2** and **Alternative 5** because less time is required to implement the reductions necessary to constrain the catch.

Preferred Alternative 4 provides a slightly different approach for implementing AMs. Rather than using a single year to determine if landings have been sufficiently constrained, **Preferred Alternative 4** proposes to use a multi-year average based on F_{OY} yields to determine if recreational landings have been sufficiently constrained except for the first and second years of the rebuilding plan. During the first year (2008), the accountability trigger would be the harvest associated with 75 percent $F_{30\%SPR}$ for 2008. This value is the yield at F_{OY} under a constant F rebuilding strategy that would allow the stock to rebuild within approximately six years (See Table 2.2.1). During year 2 of the rebuilding plan (2009) under this AM, only two years of landings (2008-2009) would be averaged based on F_{OY} yields to determine if harvest during this time frame has been sufficiently constrained. Thereafter, the trigger would be the three-year average of the F_{OY} yields. Landings would have to be approximately 25 percent above the F_{OY} AM trigger to exceed MFMT and could not exceed F_{OY} the second year without triggering the AM early in the year. Although year-to-year landings fluctuations for gray triggerfish are significantly less than those observed for species such as grouper, landings can vary from year-to-year due to recruitment variability, regulatory restrictions on other species, and prevailing economic conditions. During 2000-2004, commercial landings varied by 12 to 43 percent (24 percent average) from one year to the next while recreational landings varied by 7 to 34 percent (10 percent average). By averaging across multiple years, year-to-year fluctuations in landings would be mitigated. If landings meet or exceed the multi-year average, as summarized in Table 2.2.3, then **Preferred Alternative 4** would require the RA to issue a notice reducing the length of the recreational fishing season in the following fishing year to return landings to the target annual TAC level (see Table 2.2.3). **Preferred Alternative 4** would also provide the RA authority to close the recreational fishery in-season if the AM trigger is projected to be met. **Preferred Alternative 4** assumes that the Council will choose a hard quota for the commercial fishery; so, quota monitoring would determine the closure date for the year. If commercial landings data indicate that the AM trigger (commercial annual catch limit) was exceeded, the RA would reduce the following year's quota by the amount that previous year's AM trigger was exceeded, no three-year averages would be used. Unlike **Alternatives 2** and **3**, this alternative would not allow the cumulative sum of landings for all sectors to exceed the cumulative yield triggering AMs. The yields triggering AMs for **Preferred Alternative 4** are the same as the other alternatives but the method of implementation makes the alternative more conservative than **Alternative 2 and 5**.

Alternative 5 uses the same three-year average as **Preferred Alternative 4** with modifications for the first two years as to determine if landings have been sufficiently constrained. By averaging across multiple years, year-to-year fluctuations in landings resulting from recruitment variability, regulatory restrictions on other species, and prevailing economic conditions would be diminished. If landings exceed the multi-year average, the Council would request the Regional Administrator (RA) implement temporary regulations in the following year to return landings to the target annual TAC level. **Alternative 5** assumes that the Council will choose a hard quota for the commercial fishery; so, quota monitoring would determine the closure date for the year. If final landings data indicate that the quota was exceeded, the RA would reduce the following year's quota by the amount that previous year's quota was exceeded, no three-year averages would be used. Like **Alternative 2**, the Council would be able to request the RA modify bag limits, size limits, trip limits, or other management measures to constrain landings. Like **Preferred Alternative 4**, this alternative would not allow the cumulative sum of landings for all sectors to exceed the cumulative yield triggering AMs.

Alternative 1 provides no biological benefits for rebuilding the gray triggerfish stock. The benefits resulting from **Alternative 2** and **Alternative 3** use the same yield trajectories for triggering AMs; however, **Alternative 3** is slightly more conservative because the regulations can be implemented more quickly. **Preferred Alternative 4** and **Alternative 5**

use three-year averages that allow some natural variability in landings which has social and economic benefits while maintaining the same overall triggers as for **Alternatives 2** and **3**. **Alternative 5** is less conservative than **Preferred Alternative 4** only because the time it takes to implement a temporary rule; but is likely more conservative than **Alternatives 2** and **3**.

5.7.3 Direct and Indirect Effects on Economic/Social Environment

With the exception of **Alternative 1**, all other four accountability alternatives have direct economic effects. 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.

Alternatives 2 and **3** require that AMs be implemented only if the combined harvests of the commercial and recreational sectors exceed the overall target levels. If a sector's underage fully compensates another's overage, these two alternatives would allow one sector to incur lower losses or generate more benefits than the other. The net effect depends on the values each sector gets out of the fishery. If the specific measures to control the respective sector's harvest played no role in this situation, consideration of net effects due to either alternative would be a minor economic issue. On the other hand, if those specific measures were mainly responsible for the differential harvests, then consideration of net effects would be of significance because net benefits from the fishery can be either lower or higher, and **Alternatives 2** and **3** helps to maintain that change in net benefits. Naturally, if the resulting net effect is positive, **Alternatives 2 or 3** may be ranked higher than **Alternatives 4** or **5**; conversely, **Preferred Alternative 4** and **Alternative 5** may be ranked higher if the said net effects are negative.

If AMs are triggered by overages, both **Alternatives 2 and 3** would impose restrictions that would result in economic losses to both sectors. The severity of the measures would be sector specific, and it is possible only one sector would face additional restrictions if the other did not exceed its trigger harvests. Whereas **Alternative 2** provides for a variety of allowable AMs, **Alternative 3** limits such measures to only fishery closure. As far as controlling harvests of any sector, closure is probably a more effective tool and provides a better way of re-aligning actual harvests to the target harvests. But closures can potentially be lengthy as to generate more losses to the fishing participants than some other measures. If commercial trip limits or recreational bag limits are deemed to be sufficient to control harvests, then if closures were instead implemented more economic losses would ensue mainly because of the wide ranging impacts of fishing cessation during the closed season.

Preferred Alternative 4 and **Alternative 5** are more restrictive than the other measures in the sense that each sector's overage can trigger the implementation of AMs. Both alternatives afford a better chance of realigning harvests than **Alternatives 2** or **3** when overages occur in the commercial and/or recreational sectors. They even provide a buffer in the event only one sector incurs overages and the combined harvests of both sectors fall below the target harvests. But there are short-term and long-term implications of this buffer. In the long term, it can greatly aid in rebuilding the stock possibly over a shorter timeframe, and thus enable the realization of economic benefits from the fishery before the discounting factor takes a heavier toll. Over the short term, this buffer results in forgone benefits to the sector with overages and thus would add to the short-term costs of the AMs. Depending on the magnitude of these forgone benefits or higher costs, overall net benefits from the fishery would not be as high as can be expected from rebuilding the stock. One other potential effect of these two alternatives is they would tend to re-enforce current relative participation of both commercial and recreational sectors by compelling each sector to remain within its target harvests or else be selectively penalized in the succeeding years.

In terms of AMs, **Preferred Alternative 4** is similar to **Alternative 3** by allowing only closure as the measure of choice for addressing overages while **Alternative 5** is similar to **Alternative 2** by allowing a variety of AMs. Based on earlier discussions of **Alternatives 2 and 3**, it appears that **Preferred Alternative 4** would offer higher long-term benefits but also higher short-term costs than **Alternative 5**.

There are generally two types of indirect economic effects of the various alternatives for accountability. 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 rebuilding becomes successful, 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 indirect 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 these benefit changes 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.

As hinted in Section 5.2.2, current mechanisms to arrest any overages would likely require a longer timeframe for corrective measures to be implemented than those under **Alternatives 2-5**. While **Alternative 1** may delay the occurrence of adverse economic impacts in the short term, it would also tend to delay the rebuilding of the fish stock and thus the realization of benefits from a rebuilt stock. It is possible, of course, that measures undertaken under **Alternative 1** can re-align the actual harvests to the target harvests and rebuild the stock on time. But this would entail more restrictive measures so as to possibly increase the overall economic costs of rebuilding the stock.

Since there is good reason to believe that if the stock is rebuilt on time under all alternatives, the ensuing post-rebuilding benefits would be the same for all alternatives, a higher cost incurred under an alternative during the rebuilding period would bring down the overall net benefits of that alternative. This is possibly the case with **Alternative 1** to the extent that significant delays to implement corrective measures can happen and thus adopted measures would likely be highly restrictive. It is mainly because of this that **Alternative 1** may be ranked lower than the other two alternatives. The ranking of the other alternatives cannot be made in the absence of quantitative estimates of the potential economic effects of both alternatives. However, in the qualitative discussions above, **Preferred Alternative 4** may be ranked higher than the other alternatives.

Summary

With the exception of **Alternative 1**, all other three accountability alternatives have direct economic effects. **Alternative 1**, however, may be considered to have indirect economic impacts as it allows regulatory changes that can alter the economic conditions in the fishery.

If a sector's underage fully compensates another's overage, then AMs are required under **Alternatives 2 and 3**. Such situation would allow one sector to incur lower losses or generate more benefits than the other. The net effect depends on the values each sector gets out of the fishery. If AMs are triggered by overages, both **Alternatives 2 and 3** would impose restrictions that would result in economic losses to both sectors. The severity of the measures would be sector specific, and it is possible only one sector would face additional restrictions if the other did not exceed its trigger harvests.

Preferred Alternative 4 is more restrictive than the other measures in the sense that each sector's overage can trigger the implementation of AMs. It appears that this measure offers better chances of effectively realigning harvests when overages occur in the commercial and/or recreational sector, and thus would provide better chances of rebuilding the stock. One rather interesting case under this alternative is when one sector incurs overages but the combined harvests of both sectors fall below the target harvests. Although **Preferred Alternative 4** tends to preserve current relative participation of the commercial and recreational sectors as well as penalize only the offending sector, it can result in less overall benefits or higher overall costs during the rebuilding period. Depending on the magnitude of these lower benefits or higher costs, overall net benefits from the fishery would not be as high as can be expected from the rebuilding of the stock. Hence, while **Preferred Alternative 4** offers the highest future benefits than the other alternatives, it has the also the potential to result in higher short-run costs.

One type of indirect effects from the various alternatives relate 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 and to the shift in fishing effort to other fisheries. Another type arises if the directly affected fishing participants shift their 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.

Alternative 1, no action, will have no direct impacts on the fishermen, businesses, or communities that depend on the gray triggerfish fishery. In the short term there will be no changes made to the fisheries. However, if no action is taken now, then more extreme measures, such as a total closure of the fisheries, may be necessary in the future to meet the rebuilding goals. This would have direct impacts on the commercial and recreational fisheries in the long term.

Alternative 2, allows the Regional Administrator to implement temporary regulations to return landings to the target annual TAC if the yield is exceeded in either sector. The Regional Administrator could adjust the TAC for the sector that exceeded the quota. If the total TAC is not exceeded then no adjustment measures would be required.

Alternative 2 and 3 allow the Regional Administrator (RA) to change the TAC or reduce the fishing season for either sector of the fishery for the time necessary to recover the overage if the landings show they are exceeding their share of the TAC. If the total TAC for both sectors is not exceeded, then no adjustments will be necessary. In the case of an overage, some fishermen may prefer a shortened fishing season while others may prefer that the season not be shortened and other restrictive measures be employed such as reduced trip limits, reduced bag limits, or changes in the size limits.

Alternative 2 would allow the Regional Administrator to return landings to the target TAC if either sector exceeds the TAC. If the cumulative total between both sectors does not exceed the TAC then no adjustment would be necessary. If the TAC is reduced in either sector there would be direct impacts on the fishermen, businesses, and communities dependent on that fishery. If it is necessary to reduce the TAC, then in the short term there would be negative impacts on the fishermen, businesses, and communities dependent on this fishery.

In the short term, a reduction in the TAC for the commercial fishery would have negative impacts on the fishermen, processors, and businesses that depend on this fishery. Communities with the highest commercial landings such as Destin, and Panama City, Florida and, Golden Meadow, Louisiana would be the most affected by a reduction in the commercial TAC.

If the TAC is reduced in the recreational fishery there would be negative impacts on the private recreational fishermen and the for-hire sector. Businesses that cater to the recreational fishermen that target gray triggerfish could be affected if fishermen go on fewer trips and therefore spend less money in the communities on fuel, lodging, food, bait and tackle, and other things needed. There may also be fewer for-hire trips, reducing profits for the for-hire sector if the season is reduced. The communities in Alabama and West Florida that cater to the recreational fishermen who target gray triggerfish would be impacted the most because the highest recreational landings are in these communities.

Alternative 3 would allow the Regional Administrator to reduce the length of the fishing season for either sector if either sector exceeds the TAC. If the cumulative total between both sectors does not exceed the TAC then no adjustment would be necessary. If it is necessary to reduce the fishing season for the commercial sector, there will be a loss of revenue to the fishermen, processors, and businesses that depend on this fishery. There could be a loss of jobs in the processing sector or in other businesses catering to the commercial fishermen in this fishery. It is becoming more difficult for commercial fishermen to shift their targets to other species in the reef fish complex and may be difficult to make up revenues lost due to an early closure for gray triggerfish. Potentially, the communities with the highest landings of greater amberjack such as Destin and Panama City, Florida and Golden Meadow, Louisiana would be the most impacted by a reduction in the commercial fishing season.

Recreational fishermen may shift their fishing efforts to other species in the reef fish complex, putting pressure on the other species. The for-hire sector may experience a reduction in trips and therefore revenues and private recreational fishermen may take fewer fishing trips. This would reduce the revenues coming in to communities that support this fishery. Communities in Alabama and West Florida have the highest landings for the recreational sector and therefore would be most affected if the recreational fishing season were reduced.

However, if readjusting the length of the fishing season will keep the rebuilding schedule on track, once the stock is rebuilt the commercial and recreational fishermen, businesses and communities dependent on the gray triggerfish fishery will benefit in the long term as the TAC increases.

Preferred Alternative 4 would allow the Regional Administrator to reduce the length of the fishing season for either sector if either sector exceeds the three-year running average TAC associated with fishing at Foy. The length of the fishing season will be reduced for the sector with the overage by a percentage equal to the average percentage overage during the previous three years. This alternative considers the TAC limits for each sector and does not allow for a cumulative total between the commercial and recreational sector. If it is shown that either sector does have an overage and is necessary for the Regional Administrator to reduce the length of the fishing season there will be negative impacts to that sector with the overage that is dependent on the gray triggerfish fishery. As with **Alternative 3**, any reduction in the fishing season will have negative impacts on the fishermen, businesses and communities that depend on this fishery.

If it is necessary to reduce the fishing season for the commercial sector, there will be a loss of revenue to the fishermen, processors, and businesses that depend on this fishery. There could be a loss of jobs in the processing sector or in other businesses catering to the commercial fishermen in this fishery. Fishermen may shift their fishing effort to other species in the reef fish complex, putting pressure on the other species. It is becoming more difficult for commercial fishermen to shift their targets to other species in the reef fish complex and may be difficult to make up revenues lost due to an early closure for gray triggerfish. Potentially, the communities with the highest landings of gray triggerfish such as Destin and Panama

City, Florida and Golden Meadow, Louisiana would be the most impacted by a reduction in the length of the commercial fishing season.

If it is necessary to reduce the length of the fishing season for the recreational fishery, the for-hire sector may experience a reduction in trips and therefore income and private recreational fishermen may take fewer fishing trips. Fishermen may shift their fishing effort to other species in the reef fish complex, putting pressure on the other species. This may also reduce the revenues coming in to communities that support this fishery. Communities in Alabama and West Florida have the highest landings for the recreational sector and therefore would be most affected if the recreational season were reduced.

Readjusting the length of the fishing season will keep the rebuilding schedule on track, and once the stock is rebuilt the commercial and recreational fishermen, businesses and communities dependent on the gray triggerfish fishery will benefit in the long term as the TAC increases.

Alternative 5 requires that if either sector exceeds the three-year running average TAC associated with fishing at Foy, the Regional Director will implement temporary regulations in the following year to return the landings to the target annual TAC level as specified in Action 6. With preferred Alternative 5 the RA will decide what regulations will be necessary to make the reductions to return the landings to the target annual TAC.

If there is an overage in either sector, new regulations will be required to reduce the overage. Any new regulations that reduce the landings of gray trigger fish will have negative impacts for the fishermen, businesses, or communities dependent on the gray triggerfish fishery. The impacts will vary depending on which temporary regulations are imposed so it is not possible to describe the impacts on the fishermen, businesses, or communities that are dependent on the commercial and recreational fisheries until it is known what the regulations will be implemented. In the short term, a reduction in landings will have negative impacts on the fishermen, businesses, and communities dependent on this fishery. In the long term, they will benefit from a rebuilt stock that will allow for a higher TAC.

5.7.4 Direct and Indirect Effects on Administrative Environment

Action 7 would directly effect the administrative environment. **Alternative 1** would not require AMs for gray triggerfish. By not imposing AMs, the administrative environment may be negatively affected if harvest is not sufficiently constrained and stock recovery is slower than expected. This could increase the burden on Council staff and NOAA Fisheries Service to develop regulatory 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 annually monitor landings. 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 landings information. Additionally, **Alternative 2** and **5** would provide the RA authority to implement a temporary rule to constrain harvest. Depending on the NEPA analysis required, this could result in a significant burden on NOAA Fisheries Service, Southeast Regional Office, to develop and implement a temporary rule in a timely fashion. **Alternative 3** and **Preferred Alternative 4** would provide the RA authority to file a notification of a closure to return landings to levels necessary to constrain harvest. Currently, *Federal Register* rules and Fishery Bulletins are published by the RA to inform commercial fishermen of quota closures. Filing a notification resulting from AMs are therefore expected to not substantially increase the burden on the RA and Southeast Regional Office.

5.8 Action 8. Gray Triggerfish Regional Management

Most gray triggerfish, approximately 82 percent, are landed in the eastern Gulf. Concern has been expressed that the 2006 gray triggerfish assessment did not reflect the condition of the stock throughout its range; rather it reflected the condition of the stock where most of the harvest occurs, Alabama and west Florida. Tagging information indicates gray triggerfish are highly site specific (Ingram 2001), thus the possibility for localized depletions within the stock may occur. None of the SEDAR 9 panels suggested the stock should be viewed regionally because there was no evidence to support more than one biological stock in the Gulf of Mexico. However, they did not preclude the possibility that localized depletion may occur in heavily fished sites. Additional information provided to the Council in July (Sladek Nowlis, 2007b) indicates that portions of both eastern and western stocks are undergoing overfishing. The Council chose only one regional management option besides no action (Gulf-wide management). That option, analyzed by Sladek Nowlis (2007b) divided the Gulf into two regions based on fishing statistical zones (eastern 1-12 and western 14-21). Other finer boundaries were discussed; however, from an enforcement perspective, the difficulty in using finer scale data, and the difficulty in tracking where harvest occurred compared to where fish were landed, these boundaries were considered impractical for evaluation.

5.8.1 Direct and Indirect Effects on Physical Environment

Effects to the physical environment by the reef fish fishery are summarized in Section 5.5.1. Because both the commercial and recreational fisheries are primarily hook-and-line fisheries, the effects on the physical environment, regardless of what area effort is directed, should not have a significant impact. In addition, most trips where gray triggerfish are caught are not specifically targeting this species. Thus, any restrictions on gray triggerfish harvest, regardless of where they occur, are not likely to shift overall commercial or recreational reef fish trips. For those few trips targeting triggerfish, **Preferred Alternative 1** would reduce effort Gulf-wide, while **Alternative 2** would reduce effort only in the eastern Gulf where the fishery is primarily prosecuted.

5.8.2 Direct and Indirect Effects on Biological/Ecological Environment

Because most gray triggerfish are landed in the northeastern Gulf, concern has been expressed that the condition of the stock in the northeastern Gulf may be in a worse condition as a result of overfishing. Tagging information indicates gray triggerfish are highly site specific (Ingram 2001), thus the possibility for localized depletions within the stock range could occur as inferred by Bohnsack (1989) for high site fidelity species. Reducing fishing mortality in the eastern Gulf, either specifically in **Alternative 2**, or more generally in **Preferred Alternative 1**, should allow the gray triggerfish in this region to remain at a sustainable population size with respect to Action 6. **Alternative 2** would provide more relief to the eastern Gulf population than **Preferred Alternative 1**; however, **Alternative 2** would provide no relief to western Gulf populations which are also undergoing overfishing, although to a lesser extent (SEFSC, presentation at 3/07 Council meeting)

With respect to fishing effort, because gray triggerfish are generally not targeted, any management measures placed on the fishery would result in little effort reduction within the reef fish fisheries. Even though this may increase discards of gray triggerfish, this species would be minimally affected because of the very low discard mortality rate exhibited by gray triggerfish.

5.8.3 Direct and Indirect Effects on Economic/Social Environment

Action 8 considers a regional approach for the purpose of managing gray triggerfish in the Gulf of Mexico. Alternatives included in this action would either continue the current Gulf-wide management of gray triggerfish or divide the Gulf into two distinct management zones with differing management measures.

Preferred Alternative 1, no action, would continue to manage gray triggerfish on a Gulf-wide basis. Gulf-wide management measures implemented should reduce landings by at least 49 percent in order to end overfishing and rebuild the gray triggerfish stock. Economic effects expected from a Gulf-wide management approach are simply the sum of the economic losses to the recreational sector described in Action 9 and the losses incurred by the commercial sector discussed under Action 10. The magnitude of the aggregate economic effect expected depends on the selection of preferred options under each action.

Alternative 2 would manage gray triggerfish on a regional basis. Under a regional approach, gray triggerfish landings in the eastern Gulf (statistical areas 1-12; Mississippi through Florida) would be reduced by 59 percent in order to end overfishing and rebuild the stock. It is not possible to predict changes in fishermen's behavior and potential effort shifting decisions following the implementation of regional restrictions. However, the added enforcement difficulties inherent to geographical differences in management measures may suggest that **Alternative 2** would be more onerous than the status quo alternative.

<u>Summary</u>

Action 8 considers the establishment of differing regulatory measures between the eastern and western Gulf of Mexico to manage gray triggerfish. While it is not possible to predict changes in fishermen's behaviour once geographical discrepancies in regulation are introduced, foreseeable monitoring and enforcement difficulties would suggest that **Preferred Alternative 1**, the status quo, i.e., Gulf-wide management, constitutes a superior management option.

Preferred Alternative 1, no action, would continue to manage gray triggerfish as one management unit and would reduce gray triggerfish landings by 49 percent. Fishermen, businesses, and communities dependent on the gray triggerfish fishery would not be impacted by the continuation of a management plan that managed the fishery as one unit. However, there would be negative impacts if the landings are reduced by 49 percent.

Alternative 1 would benefit the fishermen in the eastern gulf where most of the gray triggerfish are caught because the reductions would be shared throughout the gulf. This alternative would have negative impacts on fishermen in the western gulf because the same reductions would apply to them, even though they land a smaller percentage of gray triggerfish than the fishermen in the eastern gulf do.

Commercial fishermen who fish for gray triggerfish may lose profits if landings are reduced or they may target other species, putting pressure on other reef fish species. Any reduction in the commercial landings would have a negative impact on the processors and communities that depend on the commercial gray triggerfish fishery. Potentially, the communities with the highest commercial landings of gray triggerfish such as Destin and Panama City, Florida and Golden Meadow, Louisiana would be the most impacted by a reduction in the commercial fishing season.

If landings are reduced for the recreational fishery, the for-hire sector may experience a reduction in trips and therefore income and private recreational fishermen may take fewer fishing trips. This may also reduce the revenues coming in to communities that support this fishery. Fishermen may shift their fishing effort to other species in the reef fish complex, putting pressure on the other species. Communities in Alabama and West Florida have the highest landings for the recreational sector and therefore would be most affected if the recreational season were reduced.

A 49 percent reduction in landings will help to end overfishing and rebuild the stock. In the long term, once the stock is rebuilt, fishermen, businesses, and communities that depend on this fishery will benefit if the TAC can be raised.

Alternative 2 would manage gray triggerfish on a regional basis and reduce the landings for the eastern gulf by 59 percent. This alternative would not have any impact on the fishermen in the western gulf because their landings would not be reduced. Fishermen, businesses, and communities in the eastern gulf that are dependent on the fishery would be impacted by this alternative due to the reduction in landings. They would absorb all of the reductions which would be more severe than a reduction for the total gulf.

As with **Alternative 1**, any reduction in the amount of landings of gray triggerfish will have negative impacts on the communities that depend on the fishery in the short run. Commercial fishermen who fish for gray triggerfish may lose profits if landings are reduced or they may target other species, putting pressure on other reef fish species. Any reduction in the commercial landings would have a negative impact on the processors and communities that depend on the commercial gray triggerfish fishery. Potentially, the communities with the highest landings of gray triggerfish such as Destin and Panama City, Florida and Golden

Meadow, Louisiana would be the most impacted by a reduction in the commercial fishing season.

If landings are reduced for the recreational fishery, the for-hire sector may experience a reduction in trips and therefore income and private recreational fishermen may take fewer fishing trips. This may also reduce the revenues coming in to communities that support this fishery. Fishermen may shift their fishing effort to other species in the reef fish complex, putting pressure on the other species. Communities in Alabama and West Florida have the highest landings for the recreational sector and therefore would be most affected if the recreational season were shortened.

A 59 percent reduction in landings for the eastern gulf will help to end overfishing and rebuild the stock. In the long term, once the stock is rebuilt, fishermen, businesses, and communities that depend on this fishery will benefit if the TAC can be increased.

5.8.4 Direct and Indirect Effects on Administrative Environment

Section 1.4 outlines the history of management of gray triggerfish in the Gulf. This stock is regulated through size and bag limits, and commercial and for-hire vessels are required to have a reef fish permit to harvest this species. In addition, NOAA Fisheries Service monitors both commercial and recreational catches to assess the stock. Regardless of the alternative selected, NOAA Fisheries Service would need to monitor the harvest Gulf-wide to ensure needed reductions in F for each respective fishery was maintained. **Alternative 2** could create confusion to the public, particularly in areas around the Mississippi River, which would divide the eastern from western Gulf. Fishermen could harvest fish from the same area, but dependent of where they landed their fish (e.g., Louisiana vs. Mississippi), they could be subject to different regulations. Educational activities would need to be developed to reduce confusion. This potential for confusion in regulations would not be a factor for **Preferred Alternative 1** because regulations would apply Gulf-wide.

5.9 Action 9. Gray Triggerfish Recreational Management Alternatives

5.9.1 Direct and Indirect Effects on the Physical Environment

Section 5.5.1 provides a generic description of effects on the physical environment associated with various management actions and is incorporated herein by reference. Effects are primarily associated with increases in fishing effort; i.e., the more effort there is the greater the impacts to the physical environment. The primary gears used in the recreational fishery to harvest gray triggerfish are hook-and-line and spears. Direct effects to the physical environment resulting from fishing include physical damage to habitat associated with anchoring, hook-and-line tear-offs and abrasions, and contact with bottom structures while spearfishing. If hook-and-line gear is not removed, long-term indirect effects to habitat may occur if marine life becomes entangled or overgrown with algae (Hamilton 2000; Barnette 2001).

All of the alternatives in Action 9 are expected to have small or no effects on the physical environment. Gray triggerfish are rarely the primary target species on a recreational fishing trip and therefore any change in regulations is expected to have a small effect on overall fishing effort and subsequent habitat-gear interactions. Additionally, gray triggerfish inhabit both artificial and natural reef structures and most landings occur in the eastern Gulf of Mexico off Alabama and Northwest Florida (SEDAR 9 2006) where bottom substrate is largely comprised of mud and sand, as well as hard bottom habitat. Direct and indirect effects to the physical environment are expected to be small for each of the alternatives because a large portion of the catch is taken from artificial structures residing on sand and mud bottom, the primary gear used is hook-and-line, and the recreational gray triggerfish fishery represents only a small portion of the overall reef fish fishery in the Gulf of Mexico. Also, several habitat areas of particular concern, marine sanctuaries, and marine reserves already exist in the Gulf of Mexico providing additional protection to gray triggerfish habitat and reducing impacts to the physical environment (see Section 3.2.1).

Alternative 1 would maintain status quo regulations (12-inch TL minimum size limit and included in 20-fish aggregate bag limit) and therefore would have the least effects on the physical environment, because effort would be similar to current conditions. **Preferred Alternative 2** would increase the minimum size limit to 14-inches FL and could increase the effects on the physical environment if fishermen choose to fish longer (increase effort) to obtain their bag limit. However, as mentioned previously gray triggerfish are rarely the primary target species and therefore any increase to the minimum size limit is expected to have negligible effects on fishing effort. **Alternative 3** would increase the minimum size limit to 13-inches FL and establish an eight gray triggerfish bag limit. This alternative is expected have similar effects on the physical environment as **Preferred Alternative 2**. Fishermen may spend more time harvesting gray triggerfish than under status quo conditions because the size limit is increased. However, this increase in effort would be partially offset by a reduction to the bag limit. Effort and impacts to the physical environment are expected to be slightly less than status quo for those anglers that previously harvested more fish than the proposed eight fish bag limit. However, similar to **Preferred Alternative 2**, any changes to the size limit or bag limit are expected to result in negligible effects on fishing effort. **Alternative 4** would reduce the bag limit to one fish. Reducing the bag limit will prevent anglers from harvesting large numbers of gray triggerfish while targeting other reef fishes, such as snappers and groupers. However, fishermen would likely continue fishing once the one fish bag limit is met, since gray triggerfish is typically caught as a secondary species. Because fishermen would continue to fish, effort would not greatly change and benefits to the physical environment would be negligible relative to the status quo.

5.9.2 Direct and Indirect Effects on the Biological/Ecological Environment

The results of the most recent gray triggerfish stock assessment are summarized in Section 1.2. Gray triggerfish are undergoing overfishing (SEDAR 9 2006) and based on the Council's preferred definition for MSST (see Action 6, **Preferred Alternative 2a**) the stock is overfished. The SEDAR 9 stock assessment panel concluding fishing mortality in 2004 was 1.6 times greater than the Council's approved fishing mortality threshold. Spawning stock biomass in 2004 was 64 percent of $SSB_{30\%SPR}$. As required by the Magnuson-Stevens

Act, management measures shall prevent overfishing, while achieving on a continuing basis, the OY from a fishery. Stock status projections provided by the SEFSC (Sladek Nowlis 2007a) indicate a 49 percent or greater reduction in total directed fishery landings relative to 2000-2004 average landings is required to achieve the fishing mortality rate that produces optimum yield. Based on the preferred alternatives selected in Actions 6 (rebuilding plan) and 8 (regional management), a 49 percent reduction in recreational landings is required to achieve F_{OY} and rebuild the gray triggerfish stock.

Alternative 1 would maintain status quo recreational regulations, which include a 12-inch TL minimum size limit and 20-fish aggregate bag limit. Fishing mortality has been well above $F_{30\%SPR}$ since the early 1980s and has increased in recent years after declining during the late 1990s (Figure 1.2.3). Spawning stock biomass has declined significantly over time. Based on the Council's preferred definition for MSST in Action 5 (Preferred Alternative 2a), the stock was first overfished between 1996 and 2000, increased to above MSST (not overfished) during 2001 and 2002, and dropped below MSST again in 2003 and 2004 (the last year of the assessment).

The 20-fish aggregate bag limit was implemented in January 1997 for all reef fish that did not have a bag limit and the 12-inch TL minimum size limit was implemented in November 1999. Information available at that time indicated the minimum size limit corresponded to the size at first maturity (Manooch 1984; GMFMC 1999). The size limit was implemented by the Council at the request of the Florida Fish and Wildlife Conservation Commission to improve enforceability, increase compatibility with state regulations, increase SPR, and address a growing fishery (GMFMC 1999). The minimum size limit corresponds to the size-at-first maturity, which is approximately 12 to 14.5 inch TL (Ingram 2001; SEDAR 9 2006). This minimum size limit may be too small to allow a sufficient number of gray triggerfish to spawn prior to being harvested. Similarly, there was only one MRFSS intercept during 2003-2005 that reported 20 or more gray triggerfish per angler. The current aggregate bag limit is therefore not limiting to anglers and will allow overfishing to continue. Allowing overfishing would negatively effect the age and size-structure of the stock and cause SSB to decline further in the future. If overfishing is not ended, population abundance would decrease resulting in less fish for anglers to catch and land (Figures 5.9.1 and 5.9.2). SEFSC projections indicate SSB would decrease 14 percent between 2004 and 2018 and the population would remain well below the SSB at 30 percent SPR (ratio of $SSB/SSB_{30\%SPR}$ is less than 1.0; Figure 5.9.1). In contrast, **Alternatives 2-4** would all result in lower landings over the next 6+ years (Figure 5.9.2), but would allow SSB to nearly double (75%*F30%SPR projection, Figure 5.9.1).

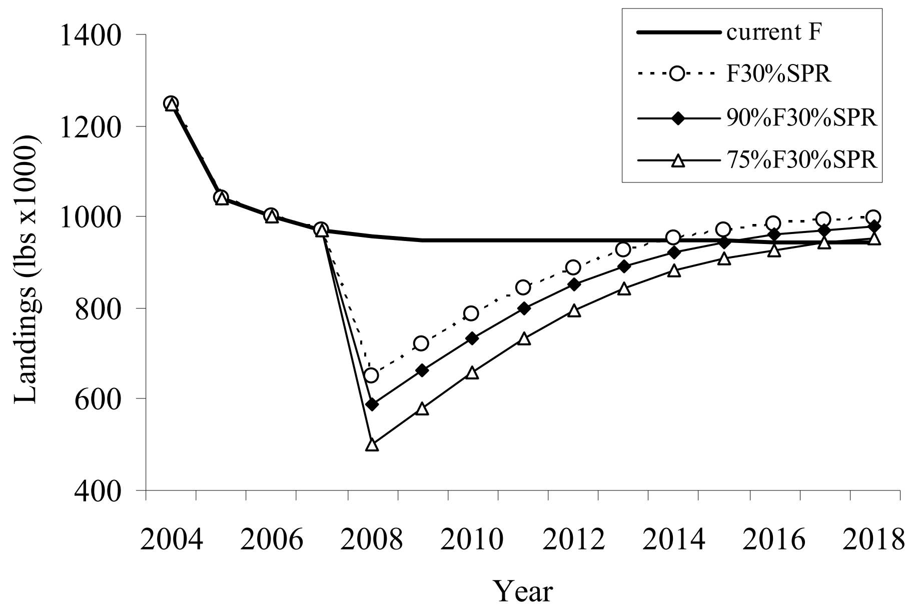

Figure 5.9.1 Projections of gray triggerfish landings for various fishing mortality rates. Current F refers to the current rate of fishing mortality. F30%SPR refers to the fishing mortality rate that would produce 30 percent SPR.

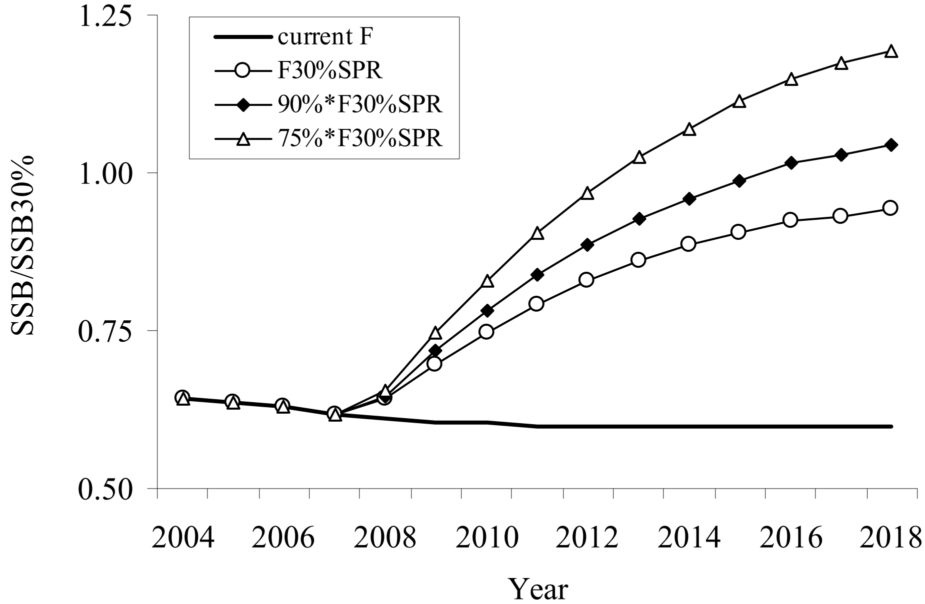

Figure 5.9.2. Projections of gray triggerfish spawning stock biomass relative to the spawning stock biomass associated with an SPR of 30 percent. Current F refers to the current rate of fishing mortality. F30%SPR refers to the fishing mortality rate that would produce 30 percent SPR

Preferred Alternative 2 would increase the recreational minimum size limit from 12 inches TL (10.44 inches FL) to 14 inches FL. Increasing the minimum size limit is estimated to reduce landings by 60 percent (SERO 2007b). A 14-inch FL minimum size limit is equivalent to a 16.2-inch TL minimum size limit; therefore the size limit would be increased by a total of 4.2 inches. Unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish are hearty fish that have a very low release mortality rate. Ingram (2001) visually assessed the condition of tagged gray triggerfish upon release and estimated 1.5 percent of gray triggerfish died. Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release and therefore would not significantly diminish the overall effectiveness of this alternative. Using age-growth information summarized in SEDAR 9 (2006), this increase to the minimum size limit would delay harvest of gray triggerfish by 2 years (i.e., the average age of a 12-inch TL gray triggerfish is 2 years whereas the average age of a 14-inch FL gray triggerfish is 4 years). Delaying the age at first harvest would allow gray triggerfish to spawn two more seasons before becoming susceptible to fishing mortality. Additionally, the number of eggs produced by a gray triggerfish increases exponentially by size and age (SEDAR 9 2006), allowing for increased spawning potential. A 14-inch FL gray triggerfish produces approximately 2.7 times more eggs per spawning event (654,664 eggs) as a 12-inch TL gray triggerfish (244,325 eggs).

Overall, **Preferred Alternative 2** would reduce landings more than any other alternative considered in Action 9, and therefore would provide the greatest benefits to the biological environment. Positive benefits would include: increased abundance and spawning stock biomass (Figure 5.9.2), lower fishing mortality, and a greater number of fish surviving to older ages and larger sizes. The reduction in landings associated with **Preferred Alternative 2** would be greater than necessary to achieve F_{OY} and could potentially allow the stock to rebuild faster than projected (Figure 5.11.2)

Alternative 3 would increase the minimum size limit from 12 inches TL (10.44 inches FL) to 13 inches FL and establish an eight fish bag limit for gray triggerfish. Increasing the minimum size limit by 2.56 inches (13 inches FL minus 10.44 inches FL) is estimated to reduce landings by 43 percent (SERO 2007b). Reducing the bag limit to eight fish is estimated to reduce landings by 4.5 percent (SERO 2007b). In combination, these measures would reduce recreational landings by 45 percent.

Similar to **Preferred Alternative 2**, increasing the minimum size limit to 13 inches FL will delay harvest and allow more, larger gray triggerfish to survive to larger sizes and older ages. Increasing the minimum size limit to 13 inches FL would delay harvest of gray triggerfish by approximately 1.2 years (i.e., the average age of a 12-inch TL gray triggerfish is 2 years whereas the average age of a 13-inch FL gray triggerfish is 3.2 years). On average, gray triggerfish would become susceptible to harvest at 3.2 years of age. A 13-inch FL gray triggerfish produces twice as many eggs per spawning event (496,341 eggs) as a 12-inch TL gray triggerfish (244,325 eggs). Lowering the bag limit to eight fish is also expected to positively benefit the biological environment. Because gray triggerfish are typically caught as a secondary species on most fishing trips, reducing the bag limit will limit the number of gray triggerfish anglers are able to land while targeting other species. An eight-fish bag limit will not likely stop anglers from fishing once the bag limit is met. Therefore, imposing a lower bag limit will reduce fishing mortality by requiring anglers to release gray triggerfish once their bag limit is met.

Overall, **Alternative 3** would reduce landings slightly less than **Alternative 4**, but much less than **Preferred Alternative 2.** Positive benefits resulting from **Alternative 3** management measures would include: increased abundance and spawning stock biomass, lower fishing mortality, and a greater number of fish surviving to older ages and larger sizes.

Alternative 4 would establish a one fish bag limit. Implementing a one fish bag limit is estimated to reduce landings by 50 percent (SERO 2007b). A one fish bag limit would reduce fishing mortality and prevent anglers from opportunistically harvesting large numbers (i.e., greater than five) of gray triggerfish while targeting other reef fishes, such as snappers and groupers. This will allow more gray triggerfish to survive to older ages and sizes. The one fish bag limit would not likely deter fishing trips from occurring, since gray triggerfish is typically caught as a secondary species. The bag limit would increase discards, but discard mortality is very low (1.5 percent) and was incorporated in analyses evaluating harvest reductions for various bag limits. Unlike **Preferred Alternative 2** or **Alternative 3**, **Alternative 4** would maintain the 12-inch TL gray triggerfish minimum size limit. Although the bag limit is expected to increase the survival of gray triggerfish to older ages, allowing the harvest of smaller gray triggerfish (12-inches TL vs. 13 or 14 inches FL) may affect spawning potential and success (reduce number of spawning seasons before becoming susceptible to harvest).

Overall, **Alternative 4** would reduce landings more than **Alternative 3**, but less than **Preferred Alternative 2**, and would therefore have intermediate benefits when compared to the other Action 9 alternatives. The reduction in landings associated with **Alternative 4** would be greater than necessary to achieve F_{OY} and could potentially allow the stock to rebuild faster than projected (Figure 5.9.2)

5.9.3 Direct and Indirect Effects on the Economic/Social Environment

Action 9 considers recreational management scenarios that are expected to reduce recreational landings of gray triggerfish at least by 45 percent. Potential measures include adjustments to the minimum size and bag limits. Changes in economic values presented in this section were computed using the methodology discussed in Section 5.3.3. However, it is worth noting that, for a secondary species such as gray triggerfish, an average compensating variation value per fish of $4.42 is likely to overestimate the consumer surplus losses, hence the overall decreases in economic value associated with management measures considered in this section. Table 5.9.3 provides baseline effort levels in the headboat sector. Baseline gray trigger fish landings and targeted effort estimates in the private and charter sectors are provided in Section 3, which includes a description of the recreational sector.

Alternative 1, status quo, would maintain a 12-inch minimum recreational size limit and include gray triggerfish in the 20 fish aggregate reef fish possession limit per angler. In the short run, the status quo alternative is not expected to result in adverse economic impacts. However, under **Alternative 1**, gray triggerfish would continue to undergo overfishing. Therefore, conservation goals would not be met and more severe management restrictions would have to be implemented in the future, resulting in sizeable adverse economic impacts in the long run.

Table 5.9.3: Effort and Gray Triggerfish Landings in the Head Boat Sector
Gulf of Mexico - 2003

State	Angler Days	Landings (# Fish)
Texas	74,432	12,780
Louisiana	6,636	4,233
Eastern Gulf of Mexico	144,211	46,468
Total	225,279	63,481

Source: NMFS Head Boat Survey

Preferred Alternative 2 would increase the recreational minimum size limit from 12-inch (total length) to 14-inch (fork length). This management measure is expected to result in a 60 percent reduction in gray triggerfish landings. Decreases in targeted effort anticipated in the private and charter sectors were estimated at 18,026 and 5,220 angler trips. In the headboat sector, a decline in targeted effort of 1,550 angler days is expected. In dollar terms, consumer surplus losses incurred by anglers targeting gray triggerfish using private boats, charter vessels or headboats are expected to reach $453,597, $343,317, and $168,352, respectively. Producer surplus losses incurred by for-hire operators are anticipated to total $909,000, approximately. Expected aggregate decreases in economic value associated with **Preferred Alternative 2** are estimated at $1.06 million, approximately. Anticipated declines in targeted effort and gray triggerfish landings as well as losses in producer and consumer surpluses associated with management measures considered under Action 9 are presented in Table 5.9.4.

Table 5.9.4: Expected Decreases in Gray Triggerfish Targeted Effort**, Landings, Consumer and Producer Surpluses, and Aggregate Economic Values

	Mode	Targeted Effort	Producer Surplus	Landings (# Fish)	Consumer Surplus	Economic Value
Preferred Alternative 2	Charter	2,950	$454,294	77,674	$343,317	$797,611
	Private	10,321		102,624	$453,597	$453,597
	Heaboat	879	$59,744	38,089	$168,352	$228,096
	TOTAL		$514,038	218,386	$965,266	$1,479,304
Alternative 3	Charter	2,212	$340,720	58,255	$257,488	$598,208
	Private	7,741		76,968	$340,198	$340,198
	Heaboat	659	$44,808	28,566	$126,264	$171,072
	TOTAL		$385,528	163,789	$723,949	$1,109,478
Alternative 4	Charter	2,507	$386,150	66,023	$291,820	$677,969
	Private	8,773		87,230	$385,557	$385,557
	Heaboat	747	$50,782	32,375	$143,099	$193,881
	TOTAL		$436,932	185,628	$820,476	$1,257,408

**Charter and Private effort are expressed in angler trips; Headboat effort in angler days

Alternative 3, which would establish a bag limit of 8 gray triggerfish within the 20 reef fish aggregate and set a 13-inch (fork length) recreational size limit for gray triggerfish, is expected to reduce landings by 45 percent. Decreases in targeted effort in the private and charter sectors anticipated from this alternative are estimated at 7,741 and 2,212 angler days, respectively. In the headboat sector, effort declines estimated at 659 angler days are expected. Consumer surplus losses to anglers that are expected to result from the implementation of **Alternative 3** are estimated at $724,000, approximately. Producer surplus losses incurred by for-hire operators are anticipated to reach $386,000. In the aggregate, losses in economic value associated with the season closure considered would total $1.11 million, approximately.

Alternative 4 would establish a bag limit of one gray triggerfish within the 20 reef fish aggregate. This measure is anticipated to reduce gray triggerfish recreational landings by 51 percent. In the private, charter, and headboat sectors, consumer surplus losses anticipated from the implementation of this alternative approximated $386,000, $292,000, and $143,000, respectively. Decreases in producer surplus in the for-hire sector are expected to total $437,000. Overall, declines in economic value resulting from the implementation of **Alternative 4** are expected to reach $1.26 million, approximately.

<u>Summary</u>

Decreases in targeted fishing effort required to achieve reductions in gray triggerfish recreational landings considered in this action would be anticipated to result in short-term net revenue losses to for-hire operators and consumer surplus losses to participating anglers. As the stock recovers in the long run, it is expected that economic benefits would result from future increases in recreational landings. The evaluation of management alternatives considered in this section focus on short-term effects. Estimates provided logically reflect the expectation that the greater the reduction in landings, the greater the corresponding short-term loss in economic value.

For the recreational sector, anticipated annual losses in economic value, i.e., consumer and producer surpluses, relative to the status quo range from approximately $1.1 million under **Alternative 3,** which would establish a bag limit of 8 gray triggerfish within the 20 reef fish aggregate and set a 13-inch (fork length) recreational size limit for gray triggerfish, to approximately $1.5 million under **Preferred Alternative 2,** which would increase the recreational minimum size limit from 12-inch (total length) to 14-inch (fork length). **Alternative 4,** which would set a bag limit of one gray triggerfish within the 20 reef fish aggregate, would result in aggregate consumer and producer surplus losses valued at $1.3 million, approximately. Although **Alternative 3** may appear superior because it minimizes losses in economic value, **Preferred Alternative 2** and **Alternative 4** achieve greater reductions in gray triggerfish recreational landings, thereby improving the probability of success of the rebuilding plan.

Preferred Alternative 2 may be better than other alternatives considered under this action due its association with the largest reduction in recreational landings, i.e., the highest probability of rebuilding success other things equal, and to the inherent hardiness of gray triggerfish. Unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish have a very low release mortality rate; about 1.5 percent of gray triggerfish die after release.

Alternative 1, no action, would maintain the 12 inch total length minimum size limit and include gray triggerfish in the 20 fish aggregate bag limit. In the short term, this alternative would not have any negative effects on the fishermen, businesses, or fishing communities that depend on the recreational gray triggerfish fishery, because it would not change the rules currently in place. However, under this alternative gray triggerfish would continue to undergo overfishing and the stock would not be rebuilt. This would hurt those that depend on the fishery in the long term and would require more restrictive measures in the future to stop overfishing and rebuild the stock. Fishermen, businesses, and fishing communities will benefit when the stock is rebuilt and the TAC is higher.

Preferred Alternative 2 would increase the recreational size limit to 14 inches fork length. Although this alternative would reduce landings by a projected 60 percent it may increase the number of discards in the fishery. It may make it more difficult for fishermen to land a keeper fish, making the fishing experience less satisfying. However, there would not be a limit to the number of fish they can keep within the 20 reef fish aggregate bag limit. Fishermen may decide it is not worth fishing for greater amberjack if the size limit is increased. This would adversely affect the businesses and communities dependent on this fishery. If fishermen take fewer trips in private boats, charter boats, or party boats, there would be less income for the for-hire sector and less money spent in the communities that cater to this fishery. Communities in Alabama and West Florida have the highest landings for the gray triggerfish recreational sector and therefore would be most affected by a decreased share of the TAC. Increasing restrictions in the recreational fishery may put more pressure on other reef fish species as recreational fishermen target other species.

Preferred Alternative 2 is projected to reduce recreational landings of gray triggerfish by 60 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and possibly fewer restrictions than are currently in place in the recreational fishery.

Alternative 3 would establish a recreational bag of eight triggerfish within the 20 bag limit of reef fish. It would also increase the size limit to 13 inches fork length. As in **Preferred Alternative 2,** in the short term, this alternative would have negative impacts on the recreational fishermen who are targeting gray triggerfish because it would reduce the size limit, making it more difficult to catch keeper fish, and it would reduce the bag limit of gray triggerfish. Having a smaller bag limit and an increased size limit may make fishing a less satisfying experience overall for recreational fishermen. Fishermen may decide it is not worth targeting gray triggerfish if the size is changed and the bag limit reduced. Fishermen may target other species of fish in the reef fish complex, putting more pressure on those species. Changes in the recreational fishery could change the number of trips a recreational fisherman takes on private boats, charter boats, or party boats. This in turn would reduce profits for the for-hire sector as well as businesses that cater to recreational fishermen. Communities in Alabama and west Florida have the highest landings for the gray triggerfish recreational sector and therefore would be most affected by a decrease in the bag limit and an increase in the size limit.

Alternative 3 is projected to reduce recreational landings of gray triggerfish by 45 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and possibly fewer restrictions than are currently in place in the recreational fishery.

Alternative 4 would establish a bag limit of one gray triggerfish within the 20 reef fish aggregate bag limit. As in **Alternative 3**, this alternative would reduce the number of gray triggerfish a fisherman can keep. Having a smaller bag limit and an increased size limit may make fishing a less satisfying experience overall for recreational fishermen. Fishermen may decide it is not worth targeting gray triggerfish if the size is changed and the bag limit reduced. More restrictions in the recreational fishery could reduce the number of trips a recreational fisherman takes on private boats, charter boats, or party boats. This in turn would reduce profits for the for-hire sector as well as businesses that cater to fishermen. Communities in Alabama and west Florida have the highest landings for the gray triggerfish. Fishermen may also target other species in the reef fish complex putting pressure on those species.

Alternative 4 is projected to reduce recreational landings of gray triggerfish by 51 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and presumably fewer restrictions than are currently in place in the recreational fishery.

5.9.4 Direct and Indirect Effects on the Administrative Environment

All of the alternatives in Action 9 are expected to have small or no effects on the administrative environment. **Alternative 1** would maintain status quo regulations and therefore result in no additional regulatory measures to implement or enforce. **Preferred Alternative 2** would increase the recreational minimum size limit and change the way the size limit is measured. Administrative effects for this action would be small and would include the time and cost of implementing and enforcing the new minimum size limit. Because the method of measurement would change (FL vs. TL), administrative effects may be initially greater due to potential reductions in angler compliance associated with changes in the measurement method. However, because many gray triggerfish have filamentous tails, and proposed regulations exclude caudal filaments when determining TL (50 CFR 622.2), angler compliance may actually increase thereby reducing the burden on enforcement to determine compliance with regulations. **Alternative 3** would reduce the bag limit for gray triggerfish and increase the minimum size limit. Similar to **Preferred Alternative 2**, administrative effects for this action would be small and largely associated with implementation and enforcement costs. Reducing the bag limit from a maximum of 20 gray triggerfish to 8 would reduce the burden on enforcement when determining compliance with regulations. The administrative effects associated with modifications to the minimum size limit would be the same as those described for **Preferred Alternative 2**. **Alternative 4** would reduce the gray triggerfish bag limit to one. This alternative is expected to have minimal effects on the administrative environment because it would only be a slight modification to an existing regulation (specifies an individual bag limit versus an aggregate bag limit). However, seasonal closures have been implemented for many other fisheries to protect spawning fish and reduce fishing mortality. The administrative effects associated with the lower bag limit would be slightly greater but similar to **Alternative 3**, because anglers would be allowed to catch slightly more gray triggerfish.

5.10 Action 10. Gray Triggerfish Commercial Management Alternatives

5.10.1 Direct and Indirect Effects on the Physical Environment

Sections 5.5.1 and 5.9.1 provide a generic description of effects on the physical environment associated with various management actions and are incorporated herein by reference. Effects are primarily associated with increases in fishing effort. The primary gears used in the commercial fishery to harvest gray triggerfish are handlines, traps, and longlines. Handlines accounted for 90 percent of the commercial landings during 2002-2004, traps accounted for 6 percent, and longlines accounted for 4 percent. Direct effects to the physical environment resulting from these gears include: hook-and-line tear-offs and abrasions, direct damage to bottom structures. Vertical line gear is less likely to contact the bottom than is bottom longline gear, but it still has the potential to snag and entangle bottom structures. The line and weights used by this gear type also can cause abrasions (Barnette 2001). Bottom longlines and traps have the potential to damage or move hard structures on the sea floor, including rocks, corals, sponges, other invertebrates, and algae (Barnette 2001). As of February 7, 2007, fish traps are prohibited from being used in the Gulf of Mexico.

All of the alternatives in Action 10 are expected to have small or negligible effects on the physical environment. Few commercial fishing trips target gray triggerfish. During 2003-2005, only 6 percent of trips landed 200 pounds or more of gray triggerfish and only 1.6 percent of trips landed 500 pounds or more of gray triggerfish. Additionally, direct and indirect effects to the physical environment are expected to be small for each of the alternatives because the primary gear used is hook-and-line, which has less impacts on the physical environment then other gear types, and the commercial fishery accounts for only a small percentage of both gray triggerfish landings (21 percent) and Gulf-wide reef fish landings (< 1 percent).

Alternative 1 would maintain status quo regulations (12-inch TL minimum size limit) and therefore would have the least effects on the physical environment of any of the alternatives, because effort would be remain similar to current conditions. **Alternative 2** would establish a 40 pound trip limit. The trip limit is expected to have negligible effects on fishing effort because fishermen will most likely continue fishing once their trip limit is met. **Alternative 3** would increase the minimum size limit to 16-inches FL. The larger size limit may result in fishermen spending more time harvesting gray triggerfish than under status quo conditions because the size limit is greater. However, as mentioned above, most trips harvest gray triggerfish while targeting other species and the higher size limit is not likely to increase fishing effort. Similar to **Alternative 2**, any changes to the size limit is expected to result in negligible effects on fishing effort. **Alternatives 4** and **5** would increase the minimum size limit to 15 and 14 inches FL, respectively, an establish trip limits of 210 pounds or 90 pounds respectively. **Preferred Alternative 6** would increase the commercial minimum size limit from 12 inches TL to 14 inches FL and establish an 80,000 pound hard quota. The trip limits in **Alternatives 4** and **5** would result in similar, although slightly less benefits to the physical environment than **Alternative 2**, because fishermen would be able to harvest more fish before reaching their limit. As discussed in **Alternative 3**, the higher minimum size limits proposed in **Alternatives 4**, **5** and **6** are not expected to increase fishing effort since few trips directly target gray triggerfish. The hard quota specified in Alternative 6 will constrain total annual landings but, as with all other alternatives, the regulations are not likely to change fishing effort because most trips harvest gray triggerfish as bycatch while targeting other species.

5.10.2 Direct and Indirect Effects on the Biological/Ecological Environment

The results of the most recent gray triggerfish stock assessment are summarized in Sections 1.2 and 5.9.2 and are incorporated herein by reference. A 49 percent reduction in directed fishery landings relative to 2000-2004 landings is required to achieve the fishing mortality rate that produces optimum yield. Based on the range of proposed alternatives selected in Action 9 (regional management), a 61 percent reduction in commercial landings could be required to achieve F_{OY} and rebuild the gray triggerfish stock.

Alternative 1 would maintain status quo commercial regulations, which include a 12-inch TL minimum size limit. As discussed in Section 5.9.1, maintaining status quo regulations would allow fishing mortality to remain well above $F_{30\%SPR}$ and SSB would be well below the SSB associated with 30 percent SPR. This will lead to lower landings (Figure 5.9.1), lower spawning stock biomass (Figure 5.11.2), and a truncated size and age distribution. SEFSC projections (Sladek Nowlis 2007a) indicate SSB would decrease from 1.34 trillion eggs in 2004 to 1.15 trillion eggs in 2018 if current fishing mortality rates are maintained. The population would remain overfished and well below the SSB at 30 percent SPR. The current minimum size limit corresponds to the size-at-first maturity, which is approximately 12 to 14.5 inch TL (Ingram 2001; SEDAR 9 2006). This size limit may be too small to allow a sufficient number of gray triggerfish to spawn prior to being harvested.

Alternative 2 would establish a 40-pound trip limit. This trip limit is estimated to reduce commercial landings by 63 percent (SERO 2007b). Because gray triggerfish are typically caught as a secondary species on most commercial fishing trips, implementing a trip limit will limit the number of gray triggerfish commercial fishermen land while targeting other species. During 2003 through 2005, 67 percent of all commercial fishing trips landing gray triggerfish landed 40 pounds or less. A 40-pound trip limit will not likely stop fishermen from ending their trip once the trip limit is met because most commercial trips are targeting more economically valuable species, such as snappers and groupers. Therefore, the trip limit is expected to reduce fishing mortality by requiring commercial fishermen to release gray triggerfish once the trip limit is reached. Because survival after release is high, most fish released in excess of the trip limit would survive. **Alternative 2** is expected to have similar benefits to the biological environment as **Alternatives 3-5**, because each alternative reduces landings by approximately the same percent and all would end overfishing.

Alternative 3 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 16 inches FL and. Increasing the commercial minimum size limit by 5.56 inches is estimated to reduce landings by 63 percent (SERO 2007b). The benefits to the biological environment resulting from the 16-inch FL minimum size limit are similar to those described for Action 9, Alternative 2. Benefits would include delaying the age and size at harvest and increasing spawning potential (larger, older gray triggerfish produce more eggs). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release (1.5 percent release mortality rate) and therefore would not significantly diminish the overall effectiveness of this alternative. Using age-growth information summarized in SEDAR 9 2006b, this increase to the minimum size limit would delay harvest of gray triggerfish by 3-5 years (i.e., the average age of a 12-inch TL gray triggerfish is 2 years whereas the average age of a 16-inch FL gray triggerfish is > 5 years). Delaying the age at first harvest would allow gray triggerfish to spawn several more seasons before becoming susceptible to fishing mortality. Additionally, the number of eggs produced by a gray triggerfish increases exponentially by size and age (SEDAR 9 2006), allowing for increased spawning potential. A 16-inch FL gray triggerfish produces approximately 4.7 times more eggs per spawning event (1,138,928 eggs) as a 12-inch TL gray triggerfish (244,325 eggs).

Alternative 4 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 15 inches FL and establish a 210-pound trip limit. Increasing the commercial minimum size limit by 4.56 inches is estimated to reduce landings by 48 percent (SERO 2007b). Implementing a 210-pound commercial trip limit is estimated to reduce landings by 26 percent (SERO 2007b). In combination, these measures are estimated to end overfishing (when combined with recreational management measures in Action 11) and reduce commercial landings by 62 percent. The benefits to the biological environment resulting from the 15-inch FL minimum size limit are similar to those described for **Alternative 3**. However, benefits would be slightly less because commercial fishermen would be allowed to land slightly smaller gray triggerfish (15 inches FL versus 16 inches FL). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release (1.5 percent release mortality rate) and therefore would not significantly diminish the overall effectiveness of this alternative. The larger minimum size limit is estimated to delay the age at first harvest by as much as three years, allowing gray triggerfish to spawn several more seasons before becoming susceptible to harvest. Additionally, a 15-inch FL gray triggerfish produces approximately 3.5 times more eggs per spawning event (863,490 eggs) as a 12-inch TL gray triggerfish (244,325 eggs).

The 210-pound trip limit is expected to reduce fishing mortality and prevent large numbers of gray triggerfish from being landed when fishermen are targeting other species, such as snappers and groupers. During 2003 through 2005, 94 percent of all commercial fishing trips landing gray triggerfish landed 210 pounds or less. Relative to the other alternatives, **Alternative 4** would result in similar benefits to the biological environment. Benefits for **Alternative 4** may be slightly higher than those associated with **Alternative 5**, and slightly lower than **Alternative 3**, if the higher minimum size limit allows for increased spawning potential.

Alternative 5 would increase the commercial minimum size limit from 12 inches TL (10.44 inches FL) to 14 inches FL and establish a 90-pound trip limit. Increasing the commercial minimum size limit by 3.56 inches is estimated to reduce landings by 31 percent (SERO 2007b). Implementing a 90-pound commercial trip limit is estimated to reduce landings by 45 percent (SERO 2007b). In combination, these measures are estimated to end overfishing (when combined with recreational management measures in Action 11) and reduce commercial landings by 62 percent. The benefits to the biological environment resulting from the 14-inch FL minimum size limit are similar to those described for **Alternatives 3** and **4**. However, benefits would be slightly less because commercial fishermen would be allowed to land slightly smaller gray triggerfish (14 inches FL versus 15 or 16 inches FL). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release (1.5 percent release mortality rate) and therefore would not significantly diminish the overall effectiveness of this alternative. The larger minimum size limit is estimated to delay the age at first harvest by as much as two years, allowing gray triggerfish to spawn several more seasons before becoming susceptible to harvest. Additionally, a 14-inch FL gray triggerfish produces approximately 2.7 times more eggs per spawning event (654,664 eggs) as a 12-inch TL gray triggerfish (244,325 eggs).

The 90-pound trip limit is expected to reduce fishing mortality and prevent large numbers of gray triggerfish from being landed when fishermen are targeting other species, such as snappers and groupers. This trip limit would affect more trips than **Alternative 4**, but fewer trips than **Alternative 2**. During 2003 through 2005, 84 percent of all commercial fishing trips landing gray triggerfish landed 90 pounds or less. Relative to the other alternatives, **Alternative 5** would result in similar benefits to the biological environment. Benefits for **Alternative 4** may be slightly lower than those associated with **Alternatives 3** and **4**, if higher minimum size limits allow for increased spawning potential.

Preferred Alternative 6 would increase the commercial minimum size limit to 14 inches FL and establish a commercial quota based on a 61 percent reduction in harvest from 2000-2004 average landings. The quota would be80,000 pounds in 2008 and would increase thereafter based on a constant fishing mortality strategy. Increasing the commercial minimum size limit to 14 inches FL will slow the harvest of gray triggerfish, possibly shorten the amount of the season that is closed due to the hard quota, and will increase discards. The benefits to the biological environment resulting from the 14-inch FL minimum size limit are similar but slightly less than those described for **Alternatives 3** and **4** because commercial fishermen would be allowed to land smaller gray triggerfish on average. Benefits would include delaying the age and size at harvest and increasing spawning potential as with **Alternative 5** (larger, older gray triggerfish produce more eggs). Increasing the minimum size limit would result in only a small percentage of gray triggerfish dying due to release and therefore would not significantly diminish the overall effectiveness of this alternative.

Overall, **Alternatives 2** through **6** are all expected to end overfishing, when combined with recreational management measures in Action 9. Ending overfishing would benefit the biological environment by increasing SSB (Figure 5.9.2) and restoring the population to a more natural age and size distribution. If overfishing is ended and fishing mortality is maintained at the fishing mortality rate producing OY, then SSB is estimated to double in the next 10 years (75%*F30%SPR projection, Figure 5.9.1).

5.10.3 Direct and Indirect Effects on the Economic/Social Environment

Action 10 considers management alternatives that could result in commercial landings reductions of gray triggerfish of at least 61 percent. Measures considered include the establishment of trip limits and adjustments to the commercial minimum size limit. The evaluation of economic impacts expected to result from the implementation of these measures is based on estimates derived using the simulation model developed by Waters and updated by Perruso (Appendix A) discussed in **Action 4**. Estimates are only discussed assuming that the rebuilding schedule proposed in **Alternative 3- Action 6**.

Alternative 1, status quo, would maintain the current 12-inch (total length) minimum size limit in the gray triggerfish commercial fishery. **Alternative 1** is not expected to result in adverse economic impacts in the short run. However, under the status quo alternative, gray triggerfish would continue to undergo overfishing. Therefore, conservation goals would not be met and more severe management restrictions would have to be implemented in the future, resulting in sizeable adverse economic impacts in the long run.

Alternative 2 would establish a commercial gray triggerfish trip limit of 40 pounds. A 63 percent reduction in gray triggerfish commercial landings is anticipated from the establishment of trip limits. The implementation of this alternative, compared to the status quo alternative, is expected be associated with economic losses valued at $764,000 approximately. Economic impacts expected to result from the implementation of management measures considered under this action are provided in Table 5.12.1.

Table 5.10.1 Expected Economic Impacts Associated with Gray Triggerfish Commercial Regulations - Action 10 (in thousand dollars)

Management Alternative	Change in Economic Value
1-No Action	Base
2-Trip Limits	-764
3-Increase in Size Limit	-695
4- Increase in Size and Trip Limits	-656
5- Increase in Size and Trip Limits	-678
6- Quota and Increase in Size Limit	-716

Alternative 3, which would increase the commercial gray triggerfish minimum size limit to 16 inches (fork length), is anticipated to reduce landings by 63 percent. Expected economic losses incurred by the commercial fleet are estimated at $695,000, approximately.

Alternative 4 would increase the commercial gray triggerfish minimum size limit to 15 inches (fork length) and set a commercial trip limit of 210 pounds. A 62 percent reduction in landings is anticipated from the implementation of this alternative. **Alternative 4** is expected to result in economic losses to the commercial sector estimated at $656,000, approximately.

Alternative 5 would increase the commercial gray triggerfish minimum size limit to 14 inches (fork length) and establish a 90-pound commercial trip limit, resulting in a 62 percent reduction in commercial landings. Economic losses associated with the implementation of this alternative are expected to reach $678,000, approximately. Compared to **Alternative 4**, this alternative would result in slightly higher economic losses, suggesting that trip limits maybe a bit more restrictive than size limit adjustments.

Preferred Alternative 6 would increase the commercial minimum size limit to 14 inches FL and establish a 80,440 lbs hard quota based on an F_{OY} rebuilding plan starting in 2008. This results in a 61 percent reduction in commercial landings. Under this alternative, expected economic losses incurred by the commercial fleet are estimated at $716,000, approximately.

<u>Summary</u>

Reductions in gray triggerfish commercial landings considered in this action would be expected to result in economic losses to the fleet. For the commercial sector, anticipated annual economic losses during the rebuilding schedule, relative to the status quo range from approximately $0.66 million under **Alternative 4,** which would increase the commercial gray triggerfish minimum size limit to 15 inches (fork length) and set a commercial trip limit of 210 pounds, to approximately $0.77 million under **Alternative 2,** which would establish a commercial gray triggerfish trip limit of 40 pounds. **Preferred Alternative 6** would increase the commercial gray triggerfish minimum size limit to 14 inches (TL) and establish 80,440 lbs hard quota. Losses in economic value incurred by the commercial fleet are expected to reach $0.72 million. **Preferred Alternative 6** appears to be better than the other alternatives considered under this action because it clearly sets a limit to commercial harvests and adjusts the minimum size limit in the commercial fishery. Given the hardiness and low discard mortality of gray triggerfish, alternatives focusing on size limit adjustments may be superior to those establishing trip limits.

Alternative 1, no action, would maintain the 12 inch total length size limit. In the short term, this alternative would not have any negative effects on the fishermen, businesses, or fishing communities that depend on the commercial greater amberjack fishery, because it would not change the rules currently in place. However, under this alternative gray triggerfish would continue to undergo overfishing and the stock would not be rebuilt. This would hurt those that depend on the fishery in the long term and would require more restrictive measures in the future to stop overfishing and rebuild the stock. Fishermen, businesses, and fishing communities will benefit when the stock is rebuilt and the TAC is higher.

Alternative 2 would establish a trip limit of 40 pounds for the commercial gray triggerfish fishery. Because gray triggerfish is not usually a targeted species in the commercial sector, but is caught while fishermen are targeting other fish in the reef fish complex, there would be minor impacts on the fishermen, businesses, or communities involved with this fishery if a trip limit is imposed. Commercial fishermen may lose some revenue from a reduced trip limit but would not be expected to change their fishing practices with this alternative. **Alternative 2** is projected to reduce commercial landings of gray triggerfish by 63 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and presumably fewer restrictions than are currently in place in the recreational fishery.

Alternative 3 would increase the commercial size limit to 16 inches fork length. Because gray triggerfish is not usually a targeted species in the commercial sector, but is caught while fishermen are targeting other fish in the reef fish complex, there would be minor impacts on the fishermen, businesses, or communities involved with this fishery if the size limit is increased. Commercial fishermen may lose some revenue from an increased size limit, due to catching less fish, but would not be expected to change their fishing practices with this alternative. **Alternative 3** is projected to reduce commercial landings of gray triggerfish by 63 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and possibly fewer restrictions than are currently in place in the recreational fishery.

Alternative 4 would increase the size limit to 15 inches fork length and establish a commercial trip limit of 210 pounds. Because gray triggerfish is not usually a targeted species in the commercial sector, but is caught while fishermen are targeting other fish in the reef fish complex, there would be minor impacts on the fishermen, businesses, or communities involved with this fishery if the size limit is increased or a trip limit imposed. Commercial fishermen may lose some revenue from an increased size limit and trip limits of 210 pounds, but would not be expected to change their fishing practices with this alternative. **Alternative 4** is projected to reduce commercial landings of gray triggerfish by 62 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and presumably fewer restrictions than are currently in place in the recreational fishery.

Alternative 5 would increase the size limit to 14 inches fork length and establish a commercial trip limit of 90 pounds. Because gray triggerfish is not usually a targeted species in the commercial sector, but is caught while fishermen are targeting other fish in the reef fish complex, there would be minor impacts on the fishermen, businesses, or communities involved with this fishery if the size is increased or a trip limit imposed. Commercial fishermen may lose some revenue from an increased size limit and trip limits of 90 pounds, but would not be expected to change their fishing practices with this alternative. **Alternative 5** is projected to reduce commercial landings of gray triggerfish by 62 percent which would aid in the rebuilding of the stock. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and possibly fewer restrictions than are currently in place in the recreational fishery.

Preferred Alternative 6 would increase the size limit to 14 inches fork length and establish a commercial hard quota based on a constant F_{OY} rebuilding plan starting at 80,440 pounds in 2008. Because gray triggerfish is not usually a targeted species in the commercial sector, but is caught while fishermen are targeting other fish in the reef fish complex, there would be minor impacts on the fishermen, businesses, or communities involved with this fishery. Commercial fishermen may lose some revenue from an increased size limit and a hard quota, due to catching less fish, but would not be expected to change their fishing practices with this alternative. **Preferred Alternative 6** would decrease landings of gray triggerfish which would help end overfishing and aid in the rebuilding of the stocks. Once the stock recovers, fishermen, businesses, and communities will benefit from having more gray triggerfish to target, and possibly fewer restrictions than are currently in place in the recreational fishery.

5.10.4 Direct and Indirect Effects on the Administrative Environment

All of the alternatives in Action 10 are expected to have small or no effects on the administrative environment. **Alternative 1** would maintain status quo regulations (12-inch TL minimum size limit) and therefore result in no additional regulatory measures to implement or enforce. **Alternatives 2, 4, and 5** would establish commercial trip limits. Commercial trip limits are currently used to control the rate of harvest in the grouper fishery and were previously used to limit harvest in the red snapper fishery prior to implementation of the individual fishing quota (IFQ) program. Implementing a commercial trip limit would represent a new regulation to enforce and therefore would increase the burden on the administrative environment, particularly enforcement, by a small extent. **Alternative 2** would result in the greatest burden on enforcement, followed by **Alternative 5**, then **Alternative 4**, because it would be the most restrictive trip limit and therefore the most likely to be met or exceeded. **Alternatives 3-6** would all increase the commercial minimum size limit. Increasing the minimum size limit would have similar effects on the administrative environment as those discussed for **Alternatives 2** and **3** in Action 9. Effects would largely pertain to potential reductions in compliance associated with changes in the measurement method (FL vs. TL). The higher the commercial minimum size limit is increased, the less fish enforcement would potentially have to measure. **Alternative 6** would require monitoring landings of gray triggerfish until the quota is met and noticing the closure which is likely to have the most impact overall on SEFSC, SERO and NMFS Enforcement. However, other quotas have been and are still being monitored in the reef fish complex (red snapper up to 2007 and grouper since 2004) so the burden is expected not to be significant.

5.11 Cumulative Effects Analysis (CEA)

As directed by NEPA, federal agencies are mandated to assess not only the indirect and direct impacts, but cumulative impacts of actions as well. 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 5.1-5.12);
II. Which resources, ecosystems, and human communities are affected (Section 3); 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.

Greater amberjack are distributed throughout tropical oceans, including the Gulf of Mexico. Gray triggerfish occur in the western Atlantic from Nova Scotia south to Argentina, including the Gulf. Gulf greater amberjack undergo seasonal migrations within the Gulf and have low site fidelity; whereas, gray triggerfish are highly site specific (Ingram, 2001). Larvae of both species are planktonic and small juveniles of both species are associated with sargassum mats and flotsam.

3. Establish the timeframe for the analysis

The SEDAR 9 greater amberjack and gray triggerfish stock assessments used data from 1986 through 2004 and from 1963 through 2004 respectively for analysis of stock status. This amendment and associated FSEIS focuses on short term goals to reduce greater amberjack and gray triggerfish fishing mortality in 2008 in order to achieve adequate rebuilding progress consistent with the Council's approved rebuilding plans for these stocks. Greater amberjack TAC must be reduced to keep the rebuilding plan on a trajectory to achieve the goal of rebuilding the stock by 2012 as established by Secretarial Amendment 2. Gray triggerfish are overfished and require a plan to end overfishing immediately and rebuild the stock by at least 2017. The Council may, in the future, alter the measures approved in this amendment as necessary to ensure stock rebuilding or to mitigate damage done inadvertently by one or more of the management measures.

4. Identify the other actions affecting the resources, ecosystems, and human communities of concern

Past actions affecting greater amberjack and gray triggerfish fisheries are summarized in Section 1.3. Greater amberjack minimum size limits were set to 28 inches FL for the recreational and 36 inches FL for the commercial fisheries and a bag limit of three fish was established for the recreational fishery in 1990. The recreational bag limit was reduced to one fish and gray triggerfish were made part of a 20 reef fish aggregate recreational bag limit for all reef fish species not having a bag limit in 1997. A commercial closed season was implemented in 1999 Gray triggerfish. A gray triggerfish minimum size limit was set at 12 inches TL in late 1999.

Reef Fish Amendment 18A examined enforcement and monitoring issues, including simultaneous commercial and recreational harvest on a vessel, maximum crew size on a USCG inspected vessel when fishing commercially, use of reef fish for bait, and VMS requirements on commercial reef fish vessels. This amendment also addressed administrative changes to the framework procedure for setting TAC for reef fish, and measures to reduce bycatch and bycatch mortality of endangered sea turtles and smalltooth sawfish taken inadvertently in the commercial and charter/headboat reef fish fisheries. The effective date was September 8, 2006 for all actions except the VMS requirement. The VMS requirement for permitted commercial reef fish vessels became effective May 6, 2007.

The Gulf of Mexico red snapper stock is overfished and undergoing overfishing. Red snapper are taken as catch and bycatch in the commercial and recreational red snapper fisheries, and also taken as bycatch in the Gulf of Mexico shrimp trawl fishery. The considerable influence of all three fisheries on the status of red snapper challenges fishery managers to balance competing interests and goals in rebuilding the red snapper stock. The current red snapper rebuilding plan, implemented in 2005, is designed to end overfishing of red snapper between 2009 and 2010 and rebuild the red snapper stock by 2032. Joint Amendment 27/14 as approved by the Council in June 2007 will reduce the TAC for the directed fishery to 5mp, reduce bag limits and increase the length of the closed season for the recreational fishery, reduce the quota for the commercial fishery and establish measures to control shrimp fishing effort to maintain at least a 74 percent reduction in bycatch of red snapper. This regulation is expected to have a similar effect on the reduction of gray triggerfish in shrimp trawl bycatch.

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 greater amberjack or gray triggerfish.

Two grouper regulatory amendments established commercial trip limits for all grouper species, reduced the red grouper recreational bag limit, and established a February 15 to

March 15 recreational seasonal closure for red grouper, gag, and black grouper. The intended effect of these amendments was to slow the rate of commercial grouper harvest prolonging the commercial fishing season, reduce recreational red grouper landings to levels consistent with the rebuilding plan, and prevent or minimize increases in gag and black grouper fishing mortality resulting from more restrictive recreational red grouper management actions. Effective dates for these amendments were December 29, 2005 for the commercial fishery and July 17, 2006 for the recreational fishery.

Reef Fish Amendment 25 and Coastal Migratory Pelagics (CMP) Amendment 17 (a joint plan amendment) extended the current moratorium on for-hire Reef Fish and CMP permits indefinitely by creating a limited access system. The intended effect of these amendments was to cap the number of for-hire vessels operating in these two fisheries at the current level. The final rules associated with this amendment became effective on June 15, 2006.

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 is currently being developed. The Council has also initiated an amendment to address overfishing in gag, and an amendment to evaluate an IFQ program for the Gulf grouper fishery.

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.

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.

Greater Amberjack

The Gulf of Mexico greater amberjack commercial fishery is considered a secondary reef fish fishery compared to primary reef fish fisheries such as grouper and red snapper. Greater amberjack are not the target of most commercial reef fish fishing trips but are caught opportunistically to supplement targeted catch. There are a few commercial fishermen from Florida who target greater amberjack when the market is available; however, changes in the greater amberjack fishery do not significantly influence the viability of the commercial reef fish fishery. Commercial landings of greater amberjack have averaged slightly more than one million pounds since 1990. The fishery has been managed since 1990 when the minimum size limit was set to 36 inches FL for the commercial fishery. That regulation reduced commercial catches by approximately 35 percent and increased dead discards to approximately 30 percent of the landings. A commercial closed season of March – May was implemented in 1998 which temporarily reduced catch approximately 30 percent but catches since have slowly increased as the stock improved.

The Gulf of Mexico greater amberjack, as well as the other large reef fish, are a target species for recreational anglers and spearfishermen. Greater amberjack are typically considered a sportfish although they are also kept for eating. Greater amberjack are strong fighters and provide good action for charter/headboat clients and private anglers alike as part of a reef fish trip. However, as with the commercial fishery, greater amberjack provide sport and income to some charter fishermen who specialize in catching greater amberjack. However, changes in the resource do not represent a significant influence on the viability of the recreational reef fish fishery as a whole. The 1990 regulations set a 28 inches FL minimum size limit and a bag limit of three fish for recreational fishers. These regulations reduced the recreational fishery by about 45 percent based on the average landings before and after 1990 and caused dead discards to increase to approximately 12 percent of landings. Average landings since 1990 have been approximately 1.8 mp. The recreational bag limit was reduced to one fish in 1997 which reduced landings by approximately 50 percent for the next two years. Despite these regulations, the recreational fishery seems to have benefited from the stock increase by more than tripling landings over five years to levels not seen since 1993. However, during 2004 and 2005, landings declined and most of the previous five years was lost.

Gray Triggerfish

Gray triggerfish are a very small component of the Gulf of Mexico reef fish fishery; total directed fishery has landed between 0.6 to 1.2 mp per year. Most of that comes from the northeastern Gulf, primarily from waters off Alabama and parts of the Florida Panhandle where recreational and commercial fishermen occasionally target gray triggerfish. Most recreational fishermen discard gray triggerfish because they are difficult to clean. Anecdotal information indicates that the commercial catch is funneled through only a few restaurants. The only regulations for gray triggerfish (part of the 20 reef fish aggregate bag limit for recreational anglers and a 12 inch FL minimum size limit) were the result of generic regulations to prevent excessive harvest of otherwise un-regulated reef fish species. As with greater amberjack, changes in the resource or regulations are unlikely to create significant problems in the Gulf reef fish fisheries.

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.

<u>Greater Amberjack</u>

Sustainable Fisheries Act compliant thresholds and targets were defined in Secretarial Amendment 2. Maximum fishing mortality threshold (MFMT) is defined as the fishing mortality rate at MSY. Minimum stock size threshold (MSST) is defined as (1-M)*B_{MSY} with natural mortality (M) equal to 0.25. Maximum sustainable yield (MSY) is the yield associated with F_{MSY} when the stock is at equilibrium and optimum yield (OY) is the yield associated with $F_{40\%\ SPR}$ when the stock is at equilibrium. $F_{30\%SPR}$ was defined as the proxy for F_{MSY} for greater amberjack because biomass-based estimates were considered less accurate than SPR-based estimates in the 2000 assessment. However, the more recent SEDAR 9 assessment accepted the biomass-based estimates for these parameters.

A new assessment was conducted in 2006 under the SEDAR stock assessment process. Based on the parameter estimates for 2004, the stock was overfished (B_{2004} / B_{MSY} = 0.479) and undergoing overfishing (F_{2004} / F_{MSY} > 1.52). Stock biomass declined from at least 1986 through 1998, indicated an overfished condition starting in 1990 and then increased through 2003 but still has not rebuilt to MSST (Figure 1.2.1). The base-case model weighted the indices by the proportion of total catch for each sector over the last eight years. (Review Panel Advisory Report in SEDAR 9 Assessment Report, 2006). The stock is currently at only 48 percent of B_{MSY} and current fishing mortality is about 52 percent too high. The measures proposed in this Amendment will immediately relieve stress on the greater amberjack stock and over the rebuilding period relieve stress on the ecosystem. Landings will initially be reduced by approximately 32 percent but the stock rebuilds quickly. Within three years, landings are expected to be at current levels and within the five-year rebuilding period, are expected to be higher than seen since 1993.

<u>Gray Triggerfish</u>

No thresholds or benchmarks have been set specifically for gray triggerfish. Amendment 1 to the Reef Fish FMP, implemented in 1990 before the Sustainable Fisheries Act (SFA) was passed, established the Minimum Spawning Stock Biomass (MSST) 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, $F_{30\%SPR}$, was approved and implemented. Definitions for OY and MSST were disapproved because they were not biomass-based.

A new stock assessment was completed in 2006 using an age-structured production model (SEDAR 9, Assessment Report 1, 2006). The stock was determined to be undergoing overfishing but it was uncertain whether the stock was also overfished (Table 1.3.1). Based on the definition of MFMT ($F_{30\%SPR}$), the current fishing mortality rate is about 62 percent too high (Figure 1.2.3). The Review Panel also examined biomass based fishing mortality rates which were in the range of F_{MSY} but felt this measure was not acceptable because it was sensitive to the stock-recruitment relationship which is poorly estimated. The Review Panel stated that no conclusion could be made whether the stock is overfished although it appears to be approaching an overfished condition. Based on the definition of MSST ($SSB_{20\%SPR}$), current stock biomass as measured in eggs is slightly above the threshold but may be driven below the threshold in the near future (Figure 1.2.4). However, based on the preferred definition for MSST in this amendment, of (1-M)*SSB_{MSY} or proxy of $F_{30\%SPR}$, the stock is overfished. The measures proposed in this Amendment will immediately relieve stress on the gray triggerfish stock and over the rebuilding period, relieve stress on the ecosystem. Landings will initially be reduced by approximately 49 percent. Catches of gray triggerfish are not a significant portion of most fishing trips so social and economic stresses will be minimal. The stock is expected to rebuild within five years and landings should be near recent levels

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 greater amberjack was conducted in 1996 and then again in 2000. 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 are available back to 1986. Recreational data are available since 1981. Within this timeframe, greater amberjack as been overfished since 1990 and overfishing has occurred since 1989.

The first stock assessment of gray triggerfish was conducted in 2001. 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 and recreational landings data were estimated back to 1963. Within this timeframe, gray triggerfish has been overfished since 1996 and overfishing has occurred since 1982.

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 Table 5.11.1.

Table 5.11.1. The cause and effect relationship of fishing and regulatory actions for greater amberjack 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 28-inch for recreational and 36 for commercial; 3 fish bag limit	Catches decline by approximately 40%
1997 - 1998	1 fish bag limit and 3 month commercial seasonal closure	Stock begins to rebuild
2002	Set benchmarks and Thresholds	No discernable effect

Table 5.11.2. The cause and effect relationship of fishing and regulatory actions for gray triggerfish within the time period of the CEA

Time periods	Cause	Observed and/or expected effects
1981 -1993	Growth and recruitment overfishing variable without trend	Declines in mean size and weight
1997	20 fish aggregate bag limit for reef fish species without a bag limit	No discernable effect, stock continues to decline.
1999	12 inches TL minimum size limit	Stock begins to rebuild until 2002, then declines

9. Determine the magnitude and significance of cumulative effects.

The main objective of this amendment and associated FSEIS is to end overfishing in the short-term and rebuild greater amberjack and gray triggerfish stocks to B_{OY} levels in the long-term. Actions 1 - 4 accomplish that for greater amberjack; while Actions 5 -10 do the same for gray triggerfish. The short- and long-term direct and indirect effects of each these Actions are provided in Sections 5.1 through 5.10 above. However, selectively examining the cumulative effects of each Action for greater amberjack or gray triggerfish are not possible because the Actions are not independent of each other. For instance, Action 1 establishes the reductions in greater amberjack landings required by each fishing sector, while Actions 5, 6, and 8 collectively establish the necessary reductions in gray triggerfish landings required by each fishing sector. Whereas, greater amberjack Actions 3 and 4 and gray triggerfish Actions 9 and 10 establish the regulations required to reduce landings to the target amount by sector. Collectively, the Actions for each species accomplish the objective of ending overfishing and rebuilding the stock and cause whatever cumulative effects are expected to the various environments in the Gulf.

Actions 1-4, Greater Amberjack

Action 1 establishes a stepped F_{OY} rebuilding plan that will require an initial 32 percent overall reduction in harvest and Action 2 establishes accountability measures to ensure that the management regulations in Actions 3 and 4 accomplish the reductions so that the rebuilding plan is maintained. Action 4 increases the recreational minimum size limit and eliminates the provision for captain and crew bag limits. Action 5 establishes a quota of 503,000 pounds for the commercial fishery.

The Actions necessary to rebuild the stock may add volatility to the reef fish fishery as some recreational and commercial fisherman change targeted species and fishing behavior. For the few fishermen that target greater amberjack, these Actions may be significant. However, for the reef fish fishery overall, it is expected that the short- and long-term cumulative effects of these actions on all the reef fish environments compared to all past reef fish management action (See item 4 above) will be minimal and the direction of change is unknown. Some recreational anglers may shift effort to other large gamefish such as king mackerel, wahoo, little tunny or billfishes adding pressure to those stocks. Commercial fishermen may rush to fish the available quota for greater amberjack and then shift effort to other reef fish species assuming those species remain open. However, greater amberjack are a small recreational fishery primarily for the charter fleet and even a smaller fishery for the commercial fleet relative to total reef fish harvest and the cumulative effects are expected to be minimal.

The biological status of greater amberjack is expected to improve to B_{OY} and TAC will be allowed to increase to slightly above current levels within five years. The short-term cumulative effect of these new regulations is likely to put more pressure on other reef fish resources, some of which already have recent regulations to help rebuild them; whereas, the long-term cumulative effect may be to remove some small amount of pressure on these other stocks. The fishing effort that may shift to these other species is small in relation to what effort is already applied to them and therefore is likely to have little appreciable effect on those resources. The coastal communities, docks, and infrastructure for the recreational for-hire are the same regardless of which offshore fishery resource is targeted. Likewise, the communities, docks, and infrastructure for the commercial reef fish fishery are the same for any of the targeted reef fish species in a particular area. Unless the cumulative effect of the greater amberjack regulations cause fisherman to quit fishing altogether or leave the Gulf of Mexico, which is very unlikely, the social and economic environments are also likely to remain unchanged as a result of any additional stress from the regulations in this amendment.

Actions 5 – 10, gray triggerfish

Action 5 sets preferred benchmarks that establish the gray triggerfish stock as overfished and undergoing overfishing. Action 6 establishes a constant F_{OY} rebuilding plan that will require an initial 49 percent overall reduction in harvest and Action 7 establishes accountability measures to ensure that the management in Actions 9 and 10 accomplish the reductions so that the rebuilding plan is maintained. Action 8 establishes Gulf-wide management measures rather than regional measures. Action 9 establishes a 14 inch FL minimum size limit for the recreational fishery and Action 10 establishes a 14 inch FL minimum size limit and establishes a quota of 80,000 pounds for the commercial fishery.

The Actions necessary to rebuild the gray triggerfish stock may add volatility to the reef fish fishery but it should be less than for greater amberjack and be localized to a small number of fishermen in Alabama and northwest Florida. Some recreational anglers from that area may shift effort to other stocks such as red snapper, vermilion snapper, or red grouper. Commercial fishermen are not expected to change targeted species or pressure because gray triggerfish is primarily a bycatch species. Therefore, it is expected that the short- and long-term cumulative effects of this action on all the reef fish environments compared to all past reef fish management action (See item 4 above) will be minimal and the direction of change is unknown.

The gray triggerfish stock is expected to improve to B_{OY} and TAC will be allowed to increase to slightly above current levels within six years. The short-term cumulative effect of these new regulations may put slightly more pressure on several other reef fish species, only one of which is already heavily regulated to help rebuild them. The long-term cumulative effect may be to remove some small amount of pressure on these other stocks. As with greater amberjack, the coastal communities, docks, and infrastructure for the gray triggerfish the same regardless of which offshore fishery resource is targeted and localized to Alabama and northeast Florida. Unless the cumulative effect of gray triggerfish regulations cause fisherman to quit fishing altogether or leave the Gulf of Mexico, which is very unlikely, the social and economic environments are also likely to remain unchanged as a result of any additional stress from the regulations in this amendment.

10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.

The cumulative effects of the rebuilding plans for greater amberjack and gray triggerfish rebuilding plans on the biophysical and socioeconomic environments are positive since they will ultimately restore the stocks to a level that will allow the maximum benefits in yield and recreational fishing opportunities to be achieved. However, short-term negative impacts on the socioeconomic environment may occur to the fisheries 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. Commercial data is collected through trip ticket programs, port samplers, and logbook programs. Currently, SEDAR assessments of Gulf of Mexico greater amberjack and gray triggerfish are scheduled for 2010 and 2012, respectively.

5.12 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. SEDAR 9 (2006) reports the discard mortality rates in the commercial and recreational greater amberjack and gray triggerfish fisheries. The best available scientific information estimates a commercial discard mortality rate of 20 percent for greater amberjack and 1.5 percent for gray triggerfish.

During the recent years, the commercial fishery released approximately 75 percent of the greater amberjack discards. Setting a quota that reduces landings by 43 percent as the preferred management measure may reduce total discards proportionally to landings reductions but will have no additional benefit to reducing dead discards. Recreational minimum size limit for greater amberjack is proposed to be increased which may reduce the effect of landings reduction on discards. Gray triggerfish discards are minimal and any size limit increases as proposed will have a negligible effect on dead discards.

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 for both species and allow the greater amberjack to recover. Because both greater amberjack and gray triggerfish are not major species in the reef fish complex, short-term losses are not expected to be significant, and other species may be substituted to make up for losses to the fishery. With recovery of the stock in the future, 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 5.1-5.10. 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.

5.13 Relationship between Short-term Uses and Long-term Productivity

The primary objective of this amendment and associated FSEIS is to end overfishing on greater amberjack and gray triggerfish, and allow the greater amberjack stock to recover by the target date of 2011. This objective requires 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 both species are not major species within the reef fish complex, these effects are not expected to be significant.

5.14 Mitigation, Monitoring, and Enforcement Measures

The process of rebuilding greater amberjack and gray triggerfish stocks is 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 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 directed and shrimp trawl fishery.

To ensure the greater amberjack and gray triggerfish stocks rebuild according to their respective rebuilding plans, alternatives include a periodic review of progress made towards rebuilding. 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 insufficient or unexpectedly rapid rebuilding progress occur. 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 is scheduled to occur in 2010 for greater amberjack and 2012 for gray triggerfish. 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 that allowed by the greater amberjack or gray triggerfish rebuilding plan. Depending on assessment outcome, the Council may determine further management action should be taken if the greater amberjack or gray triggerfish harvest exceed, or be expected to exceed, the harvest dictated by the rebuilding plan. 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 or Shrimp 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 greater amberjack or gray triggerfish 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, reef fish for-hire, and commercial shrimp 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. 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.

5.15 Irreversible and irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of agency resources proposed herein. The actions to change quotas/allocations, size limits, bag limits, and fishing seasons are readily changeable by the Council in the future. There may be some loss of immediate income (irretrievable in the context of an individual not being able to benefit from compounded value over time) to some sectors from the restricted fishing seasons.

5.16 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 5.1-5.10. 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. Item h is discussed in sections 3 and 5, with particular mention in Section 5.14. 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 these stocks and rebuild or maintain the stocks at a biomass level sufficient to allow the fisheries to harvest at OY. 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 Endangered Species Act (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, and threatened loggerhead sea turtles. 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 2007 List of Fisheries (72 FR 14466, March 28, 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. In general, problems and issues addressed in this document include the overfished condition of the greater amberjack stock and slower than expected recovery of the stock. Issues related to gray triggerfish include the continuing overfishing of the stock.

6.3 Objectives

Management measures considered in this amendment aim to address SEDAR 9 (2006) assessment recommendations. This amendment proposes to reduce the harvest of greater amberjack and gray triggerfish in order to end overfishing and rebuild the stocks. The amendment also proposes to set management thresholds and targets for gray triggerfish that comply with the SFA.

6.4 Description of the Fisheries

Descriptions of the greater amberjack and gray triggerfish are provided in Sections 3.1 and 3.2 of this document and are included 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: Modifications to Greater Amberjack Rebuilding Plan

A detailed analysis of the expected impacts of this action is contained in Section 5.1.3 and is incorporated herein by reference. This action has no direct effect on the economic environment since it would not directly alter the current harvest or use of a resource. Its indirect effects come in the form of conditioning the types of management measures to be adopted. Restrictive management measures could be necessary to rebuild a resource, and direct effects accrue to these measures. **Preferred Alternative 1** implies more restrictive management measures over a longer period than **Alternative 2** or **Alternative 3**, and thus would more likely indirectly result in larger short-run adverse economic impacts. It should be noted, though, that **Preferred Alternative 1** and **Alternative 3** only slightly differ in their economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{msy}, the resulting post-rebuilding benefits under both alternatives would be approximately the same. In this case, the less costly alternative (**Preferred Alternative 2**) may be adjudged more beneficial than **Alternative 1**. The key condition in this conclusion is the extent to which specific management measures under each alternative are effective in aligning actual harvest to the alternative's target harvest trajectory. It appears that **Preferred Alternative 1** would offer a higher chance of faster recovery than the other alternatives.

6.5.2 Action 2: Accountability measures for the Greater Amberjack Rebuilding Plan.

A detailed analysis of the expected impacts of this action is contained in Section 5.2.3 and is incorporated herein by reference. Of the three accountability alternatives considered, **Preferred Alternative 2** and **Alternative 3** have direct and indirect economic effects. As a no-action alternative, **Alternative 1** has no direct economic effects, but since corrective actions may still be needed, **Alternative 1** may be considered to have indirect economic impacts. In the event overages occur, both the **Preferred Alternative 2** and **Alternative 3** instruct the RA to shorten fishing seasons or reduce quotas the following fishing period. Either action by the RA would have direct consequences on the short-term revenues and potentially the costs of commercial fishing vessels as well as the benefits and costs of anglers and the for-hire segment of the fishery. Both the short season and quota options can shorten the fishing seasons. But the shorter season option has slightly less adverse economic impacts than the quota option, because it affords fishing participants better opportunity to plan their fishing activities.

One type of indirect effects from the various alternatives relate 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 and to the shift in fishing effort to other fisheries. Another type arises if the directly affected fishing participants shift their 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. Although the general nature of economic effects of the **Preferred Alternative 2** and **Alternative 3** is similar, there are potential short-term and long-term differences in magnitudes. In the short term, Alternative 3 allows for relatively higher target harvest levels and so would bring about less adverse economic impacts than the **Preferred Alternative**. But **Alternative 3**, by allowing actual harvests to exceed target harvests in the first few years of the rebuilding period can potentially lower the likelihood of achieving the rebuilding target on time. Thus, it can possibly postpone the realization of benefits from rebuilding the stock. While **Alternative 1** may delay the occurrence of adverse economic impacts in the short term, it would also tend to delay even further the rebuilding of the fish stock and thus the realization of benefits from a rebuilt stock.

6.5.3 Action 3: Greater Amberjack Recreational Management Alternatives

A detailed analysis of the expected impacts of this action is contained in Section 5.3.3 and is incorporated herein by reference. Decreases in targeted fishing effort required to achieve reductions in greater amberjack recreational landings considered in this action would be expected to result in short-term consumer surplus losses to participating anglers and net revenue losses to charter and headboat operators. It is expected that, as the stock recovers in the long run, economic benefits would result from future increases in recreational landings. Analyses provided in this amendment focus on short-term effects. Results presented logically reflect the expectation that the greater the reduction in landings, the greater the short-term loss in economic value. For the recreational sector, anticipated annual losses in economic value, i.e., consumer and producer surpluses, relative to the status quo range from approximately $888,000 under **Preferred Alternative 4** to approximately $1.2 million under **Alternative 5–Option b.** **Preferred Alternative 4** would maintain the one fish bag limit, increase the minimum recreational size limit to 30 inches and set the for-hire captain and crew bag limit to zero. **Preferred Alternative 4** contributes to the harmonization of bag limits for for-hire captain and crew operating in reef fish fisheries. The Gulf Council has, in recent amendments, set a zero bag limit for for-hire captain and crew in other reef fish fisheries, e.g., the red snapper fishery in Joint Reef Fish/Shrimp Amendment 27/14. **Option b** adds a two-month closure to management measures considered under **Preferred Alternative 4.** The status quo **(Alternative 1)** would maintain a 28-inch minimum recreational size limit and a possession limit of one fish per angler per trip. Under the status quo, short term adverse economic impacts are not anticipated. However, greater amberjack would continue to undergo overfishing and conservation goals would not be met. More severe management restrictions would have to be implemented in the future, resulting in sizeable losses in economic benefits in the long run. **Alternative 2** would increase the recreational size limit to 32 inches. Aggregate losses in economic value that are expected to result from the implementation of **Alternative 2** are estimated at $1.1 million, approximately. **Alternative 3** would establish a recreational closed season from March 1 through May 15. Losses in consumer and producer associated with **Alternative 3** would total $990,000, approximately.

6.5.4 Action 4: Greater Amberjack Commercial Management Alternatives

A detailed analysis of the expected impacts of this action is contained in Section 5.4.3 and is incorporated herein by reference. Reductions in greater amberjack commercial landings considered in this action would be expected to result in economic losses to the fleet. For the commercial sector, anticipated annual economic losses during the rebuilding schedule, relative to the status quo range from approximately $1.11 million under **Preferred Alternative 4,** which would establish a hard quota for the commercial greater amberjack fishery, to approximately $2.25 million under **Alternative 3,** which would reduce the commercial greater amberjack minimum size limit to 33 inches (fork length) and the commercial trip limit to 700 pounds. **Alternative 2**, which would establish a commercial greater amberjack trip limit of 1,100 is anticipated to result in economic losses estimated at $1.95 million. Under **Alternative 5**, the June 1 through August 9 extension to the existing closed season is expected to result in economic losses of $1.41 million to the commercial sector. Additional losses may be associated with this management alternative, due to the difficulties that would exist in maintaining a viable market for a product that is not available for more than half of the year.

6.5.5 Action 5: Gray Triggerfish Thresholds and Benchmarks

A detailed analysis of the expected impacts of this action is contained in Section 5.5.3 and is incorporated herein by reference. 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.

6.5.6 Action 6: Gray Triggerfish Rebuilding Plans

A detailed analysis of the expected impacts of this action is contained in Section 5.6.3 and is incorporated herein by reference. A rebuilding schedule does not directly affect the economic environment since it would not alter the current harvest or use of a resource. It does have indirect effects by conditioning the types of management measures to be adopted. The status quo alternative (**Alternative 1**) becomes a viable alternative only if the selected MSST is less conservative so that the stock may not be considered overfished and therefore no rebuilding strategy is required. In that event, **Alternative 1** would have no direct or indirect economic effects on fishing participants and associated industries and fishing communities. Considering the Council's current preferred alternative of a more conservative MSST under which the stock is considered overfished, maintaining status quo would not rebuild the stock. One implication of this is that setting a more conservative MSST and rebuilding the stock would bring about a higher sustainable stock level after the rebuilding period. Selecting **Alternative 1** then means that current economic benefits would be maintained at the cost of forgoing larger benefits in the future. The other two alternatives are constant F strategies and require the same target rebuilding date of 2012. These features may be expected to result in similar indirect economic effects. The areas where the two differ are in the manner TACs are established and date the stock would be fully rebuilt. **Alternative 3** implies more restrictive management measures over a longer period than **Alternative 2**, and thus would impose larger short-run adverse economic impacts. If the associated measures under both alternatives are successful in achieving the required target stream of harvests over the rebuilding period and the stock is rebuilt to the target B_{msy}, the resulting post-rebuilding benefits under both alternatives would slightly differ. The reason for this is that **Alternative 3** would fully rebuild the stock one year ahead of **Alternative 2**. If this difference in future benefits is not significant, the alternative with lower short-term cost (**Alternative 2**) may be adjudged more beneficial than Alternative 3.

6.5.7 Action 7: Accountability measures for the Gray Triggerfish Rebuilding Plan

A detailed analysis of the expected impacts of this action is contained in Section 5.7.3 and is incorporated herein by reference. With the exception of **Alternative 1**, all other three accountability alternatives have direct economic effects. **Alternative 1**, however, may be considered to have indirect economic impacts as it allows regulatory changes that can alter the economic conditions in the fishery.

If a sector's underage fully compensates another's overage, then AMs are required under **Alternatives 2 and 3**. Such situation would allow one sector to incur lower losses or generate more benefits than the other. The net effect depends on the values each sector gets out of the fishery. If AMs are triggered by overages, both **Alternatives 2 and 3** would impose restrictions that would result in economic losses to both sectors. The severity of the measures would be sector specific, and it is possible only one sector would face additional restrictions if the other did not exceed its trigger harvests. **Preferred Alternative 4** is more restrictive than the other measures in the sense that each sector's overage can trigger the implementation of AMs. It appears that this measure offers better chances of effectively realigning harvests when overages occur in the commercial and/or recreational sector, and thus would provide better chances of rebuilding the stock. One rather interesting case under this alternative is when one sector incurs overages but the combined harvests of both sectors fall below the target harvests. Although **Preferred Alternative 4** tends to preserve current relative participation of the commercial and recreational sectors as well as penalize only the offending sector, it can result in less overall benefits or higher overall costs during the rebuilding period. Depending on the magnitude of these lower benefits or higher costs, overall net benefits from the fishery would not be as high as can be expected from the rebuilding of the stock. Hence, while **Preferred Alternative 4** offers the highest future benefits than the other alternatives, it has the also the potential to result in higher short-run costs.

One type of indirect effects from the various alternatives relate 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 and to the shift in fishing effort to other fisheries. Another type arises if the directly affected fishing participants shift their 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.

6.5.8 Action 8: Gray Triggerfish Regional Management

A detailed analysis of the expected impacts of this action is contained in Section 5.8.3 and is incorporated herein by reference. Action 8 considers the establishment of differing regulatory measures between the eastern and western Gulf of Mexico to manage gray triggerfish. While it is not possible to predict changes in fishermen's behaviour once geographical discrepancies in regulation are introduced, foreseeable monitoring and enforcement difficulties would suggest that **Alternative 1**, the status quo, i.e., Gulf-wide management, constitutes a superior management option.

6.5.9 Action 9: Gray Triggerfish Recreational Management Alternatives

A detailed analysis of the expected impacts of this action is contained in Section 5.9.3 and is incorporated herein by reference. Decreases in targeted fishing effort required to achieve reductions in gray triggerfish recreational landings considered in this action would be anticipated to result in short-term net revenue losses to for-hire operators and consumer surplus losses to participating anglers. As the stock recovers in the long run, it is expected that economic benefits would result from future increases in recreational landings. The evaluation of management alternatives considered in this section focus on short-term effects. Estimates provided logically reflect the expectation that the greater the reduction in landings, the greater the corresponding short-term loss in economic value.

For the recreational sector, anticipated annual losses in economic value, i.e., consumer and producer surpluses, relative to the status quo range from approximately $1.1 million under **Alternative 3,** which would establish a bag limit of 8 gray triggerfish within the 20 reef fish aggregate and set a 13-inch (fork length) recreational size limit for gray triggerfish, to approximately $1.5 million under **Preferred Alternative 2,** which would increase the recreational minimum size limit from 12-inch (total length) to 14-inch (fork length). **Alternative 4,** which would set a bag limit of one gray triggerfish within the 20 reef fish aggregate, would result in aggregate consumer and producer surplus losses valued at $1.3 million, approximately. Although **Alternative 3** may appear superior because it minimizes losses in economic value, **Preferred Alternative 2** and **Alternative 4** achieve greater reductions in gray triggerfish recreational landings, thereby improving the probability of success of the rebuilding plan.

Preferred Alternative 2 may be better than other alternatives considered under this action due to its association with the largest reduction in recreational landings, i.e., the highest probability of rebuilding success other things equal, and to the inherent hardiness of gray triggerfish. Unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish have a very low release mortality rate; about 1.5 percent of gray triggerfish die after release.

6.5.10 Action 10: Gray Triggerfish Commercial Management Alternatives

A detailed analysis of the expected impacts of this action is contained in Section 5.10.3 and is incorporated herein by reference. Reductions in gray triggerfish commercial landings considered in this action would be expected to result in economic losses to the fleet. For the commercial sector, anticipated annual economic losses during the rebuilding schedule, relative to the status quo range from approximately $0.66 million under **Alternative 4,** which would increase the commercial gray triggerfish minimum size limit to 15 inches (fork length) and set a commercial trip limit of 210 pounds, to approximately $0.77 million under **Alternative 2,** which would establish a commercial gray triggerfish trip limit of 40 pounds. **Preferred Alternative 6** would increase the commercial gray triggerfish minimum size limit to 14 inches (TL) and establish 80,000 lbs hard quota. Losses in economic value incurred by the commercial fleet are expected to reach $0.72 million. **Alternative 6** appears to be better than the other alternatives considered under this action because it clearly sets a limit to commercial harvests and adjusts the minimum size limit. Given the hardiness and low discard mortality of gray triggerfish, alternatives focusing on size limit adjustments may be superior to those establishing trip limits.

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	$95,000
NMFS administrative costs of document preparation, Meetings and review	$70,000
Law enforcement costs	$0
TOTAL	$165,000

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 a Significant Regulatory Action

Pursuant to E.O. 12866, a regulation is considered a "significant regulatory action" if it is likely to result in a rule that may: (1) have an annual effect on the economy 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 and obligations of the 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 E.O. 12866.

Measures considered in this amendment are intended to reduce the harvest of greater amberjack and gray triggerfish in order to end overfishing and rebuild the stocks. The amendment also proposes to set management thresholds and targets for gray triggerfish that comply with the SFA.

In the commercial sector, direct short term adverse economic impacts are expected to result from proposed reductions in commercial greater amberjack and gray triggerfish landings. Measures considered to achieve expected reductions in commercial greater amberjack landings include adjustments to the commercial minimum size and the establishment of a commercial quota, trip limits, and additional season closures. Comparable management measures are considered to achieve required reductions in gray triggerfish commercial landings. In the recreational sector, proposed reductions in greater amberjack and gray triggerfish recreational landings are expected to result in direct short term adverse economic impacts. Bag limit, minimum size limit, and, season length adjustments are among the management measures considered to achieve expected reductions in greater amberjack and gray triggerfish recreational landings. Due to their administrative nature, the establishment of SFA-compliant thresholds and benchmarks for gray triggerfish and the selection of preferred rebuilding plans for greater amberjack and gray triggerfish are not expected to be associated with direct economic effects. Due to season and quota closures that would be imposed to sectors harvesting more than their allotted share, adverse economic effects are expected from AMs considered in this regulatory action. Quantitative analyses of the expected impacts of the various proposed alternatives are described within the RIR and Environmental Consequences sections of this amendment. In summary, the estimated maximum cumulative economic impact of these measures is well under the $100 million threshold. Therefore, the proposed action would not be expected to substantially impact the economy, a sector of the economy, productivity, competition or jobs.

Measures in this action do not adversely affect the environment, public health or safety, or state, local, or tribal governments or communities. Additionally, they do not interfere or create inconsistencies with any action of another agency, including state fishing agencies.

No effects on the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof have been identified. Measures in the proposed Amendment represent normal management options or practices and, therefore, do not appear to raise novel legal or policy issues.

The proposed action does not appear to meet any of the significance conditions listed above and thus, if implemented, may not constitute a "significant regulatory action." However, the final determination of the significance of this regulatory action will be made by the Secretary based on the information included in this section and on any additional information deemed relevant.

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 to address the overfished and overfishing conditions of greater amberjack and gray triggerfish and to establish management thresholds and targets for gray triggerfish that comply with the SFA. 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, though, that whereas there is a one to one correspondence between permits and vessels, the total number of vessels participating in the fishery in any given year may exceed the total number of permits. This occurs because of the transferability of commercial reef fish permits such that some vessels are inactive while others are active during certain parts of the year. This distinction is important when using logbook information to count vessels.

Perruso reports that in 2005 a total of 1,285 commercial vessels landed Gulf finfish. Of these, 519 landed greater amberjack and 477 landed gray triggerfish (personal communication, 2007). Of all the vessels landing finfish, about 96 percent landed more than 100 pounds, 81 percent landed more than 1,000 pounds, 40 percent landed more than 10,000 pounds, and 4 percent landed more than 100,000 pounds. The corresponding percentages for the "greater amberjack vessels" are 72 percent with more than 100 pounds, 23 percent with more than 1,000 pounds, 6 percent with more than 10,000 pounds, and none with more than 100,000 pounds. The corresponding percentages for the gray snapper vessels are substantially lower: 43 percent with more than 100 pounds, 9 percent with more than 1,000 pounds, and none for more than 10,000 or higher.

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. 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 are provided below.

	Gross Income	Net Income
High-volume vessels, vertical lines:		
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. But, 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 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 of 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 nonoperating 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.

Also affected by the measures in this amendment are fish dealers, particularly those that receive greater amberjack and gray triggerfish from harvesting vessels. Currently, a federal permit is required for a fish dealer to receive reef fish from commercial vessels. Based on the permits file, there are 227 dealers possessing permits to buy and sell reef fish species. Based on mail address data, most of them are located in Florida (146), with 29 in Louisiana, 18 in Texas, 14 in Alabama, 5 in Mississippi and 15 out of the Gulf States region. It should be noted that some dealers operate and/or maintain satellite operations in states other than their main operating sites.

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 2005, there were 192 reef fish dealers actively buying and selling greater amberjack. These dealers were distributed around the Gulf States as follows: 6 in Alabama, 131 in Florida, 28 in Louisiana, 1 in Mississippi, and 26 in Texas. These numbers differ from the ones taken from the permit file, because some dealers operate in more than one state. Dealers in Florida purchased about $836,000 of greater amberjack, followed by dealers in Louisiana with purchases of $115,000 and dealers in Texas with purchases of $72,000. Dealers in Alabama and Mississippi purchased $10,000 worth of greater amberjack. In 2005, there were 177 reef fish dealers actively buying and selling gray triggerfish. They were distributed around the Gulf States as follows: 8 in Alabama, 104 in Florida, 37 in Louisiana, 1 in Mississippi, and 27 in Texas. Dealers in Florida purchased about $109,000 of gray triggerfish, followed by dealers in Louisiana with purchases of $24,000 and dealers in Texas with purchases of $18,000. Dealers in Alabama and Mississippi purchased $6,000 worth of gray triggerfish. These dealers may hold multiple types of permits and because we do not know 100 percent of the business revenues, it is not possible to determine what percentage of their business comes from greater amberjack or gray triggerfish.

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. Although greater amberjack and gray triggerfish are not major fisheries within the reef fish complex, the number of commercial and for-hire vessels harvesting these species comprises a relatively large proportion of vessels in the reef fish fishery. Hence, 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.

<u>Disproportionality:</u> 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?

Except for the no action alternative, the various management measures for greater amberjack would reduce recreational harvest from 26 to 35 percent and commercial harvest from 38 to 43 percent. The current Preferred Alternatives would reduce recreational harvest by 26 percent and commercial harvest by 43 percent.

For the gray triggerfish fishery, the various management measures would reduce recreational harvest from 45 to 60 percent and commercial harvest from 61 to 63 percent. The current Preferred Alternative for the recreational sector would reduce this sector's harvest by 60 percent. The current Preferred Alternative for the commercial sector would reduce this sector's harvest by 61 percent.

Although the potential harvest reductions are relatively large, the consequent impact on vessel net return may or may not be large depending on the importance of greater amberjack and gray triggerfish as sources of vessel revenues. Perruso (personal communication, 2007) reports that 120 vessels landed greater than 1,000 pounds of greater amberjack and only 31 vessels landed more than 10,000 pounds of greater amberjack Also, 44 vessels landed more than 1,000 pounds of gray triggerfish and none with more than 10,000 pounds of gray triggerfish. The rest of the vessels landed substantially less amount of greater amberjack or gray triggerfish. It appears then there are relatively fewer vessels dependent on greater amberjack and even much fewer vessels dependent on gray triggerfish as important sources of revenues. There is a good possibility these few vessels are the ones that may experience relatively large reductions in net income as a result of the measures in this amendment. It is, of course, possible that those landing fewer pounds of greater amberjack and gray triggerfish may highly depend on revenues from these species to make up for any shortfall in other species. In this case, they too would experience significant reductions in net income.

Given the greater amberjack preferred alternatives for rebuilding and management measure, commercial vessels are expected to lose approximately $1.3 million dollars (discounted) over the 2008-2012 rebuilding period. This is roughly equivalent to a net income loss of $260,000 per year. If distributed across all vessels landing greater amberjacks (519), net income loss per vessel would be small; but if distributed mainly among those landing greater than 1,000 pounds (120), the resulting net loss per vessel would be relatively substantial. For gray triggerfish, the resulting net income loss to vessels would range from $585,000 to $726,000 during the rebuilding period, or from $117,000 to $145,200 per year. This loss is presented as a range because the Council has not yet decided on their preferred management alternative, although they now have a preferred alternative for the rebuilding strategy. Net income loss per vessel would be minimal if distributed among all vessels landing gray triggerfish (477), but would appear to be large when distributed only among those vessels landing more than 1,000 pounds of gray triggerfish (44).

Measures in this amendment would affect 1,692 for-hire vessels, and the impacts on these vessels would be a function of their level of dependence on greater amberjack and gray triggerfish. Holland and Milon (1999) reported that 73 percent of Florida charter captains they surveyed indicated targeting amberjacks at some time during the year, but targeting behavior varies during the year. About 48 percent of charter captains target amberjacks from April to June, 47 percent target the species from July to December, and 37 percent target from January to March. For Florida headboats, 60 percent target amberjacks at some time during the year, with some slight seasonal variations; 40 percent target amberjacks from April to December and 33 percent from January to March. For-hire vessels in Florida have low targeting activities on triggerfish, with 7 percent for charterboats and virtually none for headboats. Sutton et al. (1999) reported that 52 percent of charterboats in Alabama through Texas target amberjacks at least once during the year, with the following seasonal variations: 30 percent from May to August, 19 percent in September-October, 15 percent in March-April, 9 percent in November-December, and 5 percent in January-February. About 50 percent of headboats in Alabama through Texas target amberjacks at least once during the year. Targeting of triggerfish by for-hire vessels in Alabama through Texas is virtually non-existent.

For-hire vessels in the greater amberjack fishery would experience a net income loss of approximately $763,000 a year under the preferred management alternatives. Those in the gray triggerfish fishery would lose approximately $514,000 a year in net income, given the preferred alternative for rebuilding strategy and recreational management measures. If these losses were equally distributed across all 1,692 affected for-hire vessels, the resulting net income loss per vessel would be minimal. Naturally, the more dependent vessels are on these species, the greater will be their share of the total income loss to the for-hire sector. From the information presented above, it appears that at least 50 percent of for-hire vessels show some dependencies on greater amberjacks, and these are the ones that may bear the majority of reductions in for-hire 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. But there appears to be not enough information on whether vessels significantly affected by this amendment comprise a substantial portion of all affected vessels. Public input is therefore necessary to determine if a substantial number of for-hire vessels would incur significant losses in their net income.

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

Currently, the Council's preferred alternatives are:

Action 1: Status quo. Maintain the 3-year stepped rebuilding plan, with updates from new assessment information (**Alternative 1**).

Action 2: Provide the Regional Administrator the authority to shorten the current or subsequent fishing season for a sector that exceeds its target harvest or to reduce the next season's commercial quota by the amount of the sector's overage in the greater amberjack fishery (**Alternative 2**).

Action 3: Maintain the one-fish per angler bag limit, increase the recreational minimum size limit to 30 inches FL, and eliminate the bag limit for captain and crew in the greater amberjack fishery (**Alternative 4**).

Action 4: Establish a commercial quota for greater amberjack (**Alternative 4**).

Action 5: Define the maximum fishing mortality threshold, minimum stock size threshold, and optimum yield for gray triggerfish (**Alternative 2**).

Action 6: Establish a constant F rebuilding plan for gray triggerfish, with annually increasing TAC levels (**Alternative 2**).

Action 7: Provide the Regional Administrator the authority to shorten the current or subsequent fishing season for a sector that exceeds its target harvest or to reduce the next season's commercial quota by the amount of the sector's overage in the gray triggerfish fishery (**Alternative 4**).

Action 8: Manage gray triggerfish on a Gulf-wide rather than on a regional basis (**Alternative 1**).

Action 9: Increase the gray triggerfish recreational size limit to 14 inches FL (**Alternative 2**).

Action 10: Increase the commercial size limit to 14 inches FL and establish a commercial hard quota of 80,000 pounds in 2008, 93,000 pounds in 2009, 106,000 pounds in 2010, 117,000 pounds in 2011, 127,000 pounds in 2012, and 135,000 pounds in 2013. **(Alternative 6).**

The economic impacts of all the alternatives have been discussed in Section 5, which is included herein by reference. The following describes the alternatives to the preferred alternatives, and discusses their relative impacts on small entities.

Under **Action 1**, the two rejected alternatives (**Alternatives 2 and 3**) provide for an annually increasing TAC in contrast to the stepped up TACs in the preferred alternative. **Alternatives 2 and 3** would allow higher annual TAC than the **Preferred Alternative** although **Alternative 3** has only slightly higher TACs. The implied short-term adverse impacts of these two rejected alternatives are lower than those of the Preferred Alternative. It should be noted, however, that Action 1 mainly conditions the type of management measures to be implemented. Specific management measures are the ones that would have direct impacts on fishing participants.

Under **Action 2**, the two rejected alternatives are the status quo (do not establish AMs) and **Alternative 3**, which is similar to the **Preferred Alternative** except that it would allow overages in the first three years of the rebuilding period. The re-authorized MSA requires establishment of AMs by 2010 so that selection of the status quo alternative simply postpones the establishment of AMs. If the status quo is chosen and substantial overages occur during the rebuilding period, more stringent management measures will eventually have to be adopted. **Alternative 3** would result in less adverse short-term economic impacts than the **Preferred Alternative**, but it also would tend to delay the rebuilding of the stock and consequently the realization of benefits from rebuilding the stock.

Under **Action 3**, four other alternatives are considered. **Alternative 1** is the status quo recreational size and bag limits for greater amberjack; **Alternative 2** would increase the recreational size limit to 32 inches FL; **Alternative 3** would close the recreational fishing season from March 1 through May 15; and, **Alternative 5** would maintain the one-fish bag limit, implement a January-February fishing closure, and raise the size limit either to 30 or 31 inches FL. With the exception of **Alternative 1**, all other alternatives would result in reduced landings and consequently adverse economic benefits more than the **Preferred Alternative**. Adoption of **Alternative 1** may be expected to trigger AMs more often which could result in larger adverse effects than the **Preferred Alternative**.

Under **Action 4**, four other alternatives are considered for the greater amberjack commercial sector. **Alternative 1** is the status quo size limit and closed season for the greater amberjack fishery; **Alternative 2** would establish a 1,100-pound trip limit; **Alternative 3** would establish a 700-pound trip limit but reduce the size limit to 33 inches FL; and, **Alternative 5** would add June 1 though August 9 to the current three-month closed season. In principle, the Preferred Alternative would bring about the largest harvest reduction and consequently the largest negative economic impacts in the short-term. Examination, however, of fishing trips and accompanying costs and revenues reveal that with the exception of the status quo, all other alternatives would impose highly restrictive constraints on commercial fishing operations such that the resulting net economic impacts would be larger than those under the **Preferred Alternative**. It is possible that fishermen could adjust their operations to the trip limits (probably not for fishing closures) so as to harvest more than initially estimated. In this case, however, the AMs could potentially be triggered as to later require more stringent management actions which could result in larger adverse economic impacts.

Under **Action 5**, two other alternatives are considered for gray triggerfish thresholds and benchmarks. **Alternative 1** is the status, which does not establish thresholds and benchmarks required by MSA. **Alternative 3** is similar to the **Preferred Alternative** but it would set a relatively less conservative minimum stock size threshold (MSST). Alternatives in Action 5 mainly set the tone for type of management measures to implement. With a relatively more (biologically) conservative MSST, the **Preferred Alternative** may be expected to result in larger adverse economic impacts in the short-term than **Alternative 3**.

But the long-term scenario could just be the opposite because of the higher risk implied by the selection of MSST under Alternative 3.

Under **Action 6**, two other alternatives are considered for gray triggerfish rebuilding plan. **Alternative 1** is the status, which does not establish a rebuilding plan. **Alternative 3** would provide for stepped TACs of 0.5 MP the first three years and 0.73 in the last two years. This is unlike the Preferred Alternative, which provides for an annually increasing TAC. The implied short-term economic impacts of the **Preferred Alternative** are less adverse than those of **Alternative 3**. **Alternative 1** would not be a viable alternative given the current preferred alternative which would render gray triggerfish overfished.

Under **Action 7**, four other alternatives are considered for AMs in the gray triggerfish fishery. **Alternative 1** is the no action alternative which would not establish accountability measures. **Alternatives 2** and **3** would require that AMs be implemented only if the combined harvests of the commercial and recreational sectors exceed the overall target levels. Whereas **Alternative 2** provides for a variety of allowable AMs, **Alternative 3** limits such measures only to fishery closure. Similar to the **Preferred Alternative**, **Alternative 5** would impose sector-specific AMs, but it would provide for adoption of temporary regulations the following year. **Alternatives 2 and 3** have the same trigger mechanism but differ in the type of allowable management measures to be adopted in case of overages. It is possible that fishery closures under Alternative 3 could bring about larger economic costs than some other measures under Alternative 2 although both measures may provide the same long-term benefits. A similar statement can be made of the relationship between the **Preferred Alternative** and **Alternative 5**, with the latter potentially providing lower short-term economic costs. **Preferred Alternative 4** and **Alternative 5** are more restrictive than the other measures in the sense that each sector's overage can trigger the implementation of AMs. However, both alternatives afford a better chance of realigning harvests than **Alternatives 2** or **3** when overages occur in the commercial and/or recreational sectors. This implies that **Preferred Alternative 4** and **Alternative 5** can provide better long-term benefit prospects than the other alternatives. Primarily due to the type of management measures allowed under each alternative, **Preferred Alternative 4** may be expected to offer higher long-term benefits but also higher short-term costs than **Alternative 5**.

Under **Action 8**, the only alternative to the **Preferred Alternative** (no action) is to manage gray triggerfish on a regional basis (eastern vs. western Gulf). A regional management of gray triggerfish would imply differential economic impacts by region under the current rebuilding scheme of reducing gray trigger fish harvest by 49 percent. Most of these impacts would be borne by the eastern Gulf, which accounts for most gray triggerfish landings.

Under **Action 9**, three other alternatives are considered. **Alternative 1** is the status quo recreational size limit and inclusion of gray triggerfish in the 20 fish aggregate reef fish bag limit; **Alternative 3** would establish a bag limit of 8 gray triggerfish within the 20 reef fish aggregate and increase the size limit to 13 inches FL; and, **Alternative 4** would establish a bag limit of 1 gray triggerfish within the 20 reef fish aggregate. The Preferred Alternative is expected to result in the largest landings reduction and consequently in the largest economic cost during the rebuilding period. Being very restrictive, however, this alternative offers the highest chance of rebuilding the stock faster and therefore generating larger future benefits to the fishery.

Under **Action 10**, five other alternatives are considered. **Alternative 1** (status quo) would maintain a 12 inch TL minimum size limit. **Alternative 2** would establish a 40-pound trip limit; **Alternative 3** would increase the size limit to 16 inches FL; **Alternative 4** would increase the size limit to 15 inches FL and establish a 210-pound trip limit; **Alternative 5** would increase the size limit to 14 inches FL and establish a 90-pound trip limit. In terms of economic value losses, **Preferred Alternative 6**, after **Alternative 2**, corresponds to the second lowest loss. **Preferred Alternative 6 is the** superior alternative because it clearly sets a limit to commercial gray triggerfish harvests and accounts for the hardiness of gray triggerfish by adjusting the minimum size limit rather than relying on trip limits.

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 should 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.

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 requires federal agencies conduct their programs, policies, and activities in a manner to ensure individuals or populations are not excluded from participation in, or denied the benefits of, or subjected to discrimination because of their race, color, or national origin. In addition, and specifically with respect to subsistence consumption of fish and wildlife, federal agencies are required to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Impacts of commercial and recreational fishing on subsistence fishing are a concern in fisheries management; however, there are no such implications from the action proposed in this amendment.

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.

E.O. 13132: Federalism

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

No Federalism issues have been identified relative to the action proposed in this amendment. Therefore, consultation with state officials under Executive Order 12612 is not necessary.

E.O. 13158: Marine Protected Areas

This Executive Order requires federal agencies to consider whether their proposed action(s) will affect any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural or cultural resource within the protected area. There are several MPAs, HAPCs, and gear-restricted areas in the eastern and northwestern Gulf (as described in Section 3.2.1), where the fisheries for greater amberjack and gray triggerfish occur. Measures in this amendment do not have any area specific measures relative to MPAs or HAPCs, and so should not affect this habitat.

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
Dr. Assane Diagne	Economist	Economic analyses	GMFMC
David Dale	Biologist	EFH review	SERO
Dr. Stephen Holiman	Economist	Economic analyses/Review	SERO
Peter Hood	Biologist	Gray triggerfish actions/Affected environment	SERO
Dr. Palma Ingles	Anthropologist	Social analyses	SERO
Frank S. Kennedy	Biologist	Purpose and need/All actions/CEA/Reviews	GMFMC
David Keys	NEPA Specialist	NEPA Review	SERO
Dr. Antonio Lamberte	Economist	Economic analyses	SERO
Jennifer Lee	Biologist	Protected resources review	SERO
Larry Perruso	Economist	Economic analyses	SEFSC
Dr. Josh Sladek Nowlis	Biologist	Scientific analyses	SEFSC
Andrew Strelcheck	Biologist	Scientific analyses/GAJ and GTF actions	SERO

10. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE AMENDMENT / DSEIS 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

Responsible Agencies:
Gulf of Mexico Fishery Management Council (Lead Agency for FMP)
2203 North Lois Avenue, Suite 1100
Tampa, Florida 33607
813-348-1630

NOAA Fisheries Service (Lead Agency for NEPA analyses)
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701
727-824-5305

11. PUBLIC HEARING LOCATIONS AND DATES

Monday, September 10, 2007, W Hotel, 333 Poydras St., New Orleans, LA 70130, 504-525-9444;
Monday, September 10, 2007, Wingate Inn, 12009 Indian River Rd., Biloxi, MS 39540, 228-396-0036;
Tuesday, September 11, 2007, Courtyard by Marriott, 3750 Gulf Shores Pkwy., Gulf Shores, AL 36542, 251-968-1113;
Tuesday, September 11, 2007, Holiday Inn, 5002 Seawall Blvd, Galveston, TX 77551, 409-740-3581;
Wednesday, September 12, 2007, Edgewater Beach Resort, 11212 Front Beach Road Panama City, FL 32407, 800-331-6338;
Wednesday, September 12, 2007, Palacios Recreational Center, 2401 Perryman, Palacios, TX 77465, 361-972-2387;
Thursday, September 13, 2007, Holiday Inn Emerald Beach, 1102 S. Shoreline Blvd., Corpus Christi, TX 78401, 361-883-5731.
Monday, September 17, 2007, Radisson Hotel, 12600 Roosevelt Blvd., St. Petersburg, FL 33716, 727-572-7800;
Tuesday, September 18, 2007, Sombrero Cay Club Resort, 19 Sombrero Blvd., Marathon, FL 33050, 305-743-2250;
Wednesday, September 19, 2007, Clarion Hotel, 12635 S. Cleveland Ave., Ft. Myers, FL 33907, 239-936-4300.

12. SCOPING HEARING SUMMARIES

Reef Fish Amendment 30A was originally part of a larger Amendment 30 which included gag and red grouper as well as greater amberjack and gray triggerfish. The following summaries have been edited to include only those comments pertaining to greater amberjack and gray triggerfish as well as general comments. The summaries are listed in order by city from Texas through Florida

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.

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

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.

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

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.

Orange Beach, Alabama - March 19, 2007

In attendance: Bobbi Walker
Steven Atran
Tina Trezza
4 members of the public

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 may 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 baigt 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.

Panama City, Florida - March 20, 2007

In attendance: Bill Teehan
Steven Atran
Tina Trezza
22 members of the public

Jim Clements, Carabelle, FL – Charterboat and commercial grouper fisherman:

General comments:
- MRFSS data is hearsay and should be thrown out.
- Minimum size and bag limits are not working an should be thrown out.

Walter Akins, Panama City – retired charterboat fishermen, former wildlife statistician:

Pat Green, Panama City – recreational spearfisherman, also some experience as a commercial greater amberjack fisherman:

Greater Amberjack comments:
- Recreational fishermen are already down to a 1 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.
-

Scott Robson, Miramer Beach – recreational fisherman:

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:

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

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.

Henry Hunt, Panama City – charterboat operator.
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.

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)
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:
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:
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):
Greater Amberjack 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 Hartone, Cedar Key – commercial, charter and spearfisherman:
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
Greater Amberjack comments:
- Should be separates 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.

Raymond Oder (submitted written comments):
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:
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:
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.
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 id 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.
-

Paul Kerr, recreational fisherman and spearfisherman:
Greater Amberjack comments:
- Greater amberjack stocks appear healthy.

Gray Triggerfish comments:
- Has not seen much change in triggerfish in last 20 years,

<u>Naples, Florida - March 21, 2007</u>

<u>Council</u>	**<u>Staff</u>**
Julie Morris	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.

<u>Barry Nicholls</u>, a recreational fisherman, 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.

<u>John Biggs</u>, local business owner, urged the Council to split Reef Fish Amendment 30.

<u>Frank Panhuise</u>, 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.

<u>Adam Wilson</u>, 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.

<u>Carl Gill</u>, 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.

<u>Jasmine Workman</u>, 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.
The scoping hearing was adjourned at 8:08 p.m.

13. ALTERNATIVES CONSIDERED BUT REJECTED

Action: Modifications to Greater Amberjack Allocations

Alternative 1. Status Quo. Maintain the allocation of TAC between the recreational and commercial greater amberjack fisheries as specified in Amendment 1 to the Reef Fish FMP as the average share during the years 1981 through 1987. The recreational fishery would receive 84 percent of the TAC and the commercial fishery would receive 16 percent.

Old Alternative 2. Establish the allocation of TAC between the recreational and commercial fisheries as the average share during the years 2000 through 2004. The recreational fishery would receive 68 percent of the TAC and the commercial fishery would receive 32 percent.

Current Alternative 2. Establish the allocation of TAC between the recreational and commercial greater amberjack fisheries as the average share during the years 1995 through 2004. The recreational fishery would receive 60 percent of the TAC and the commercial fishery would receive 40 percent.

Preferred Alternative 3. Establish the allocation of TAC between the recreational and commercial greater amberjack fisheries as the average share during the years 1981 through 2004. The recreational fishery would receive 71 percent of the TAC and the commercial fishery would receive 29 percent.

Discussion: Old Alternative 2 was removed because it was very similar to **Alternative 3** which would have increased the recreational share of landings to 71 percent and add approximately 54 thousand pounds to the recreational share. The Council considered the range of alternatives for allocation of the greater amberjack resource to be sufficiently broad without Alternative 2.

Action 1 was moved to Considered but Rejected during the November Council meeting in favor of establishing an Allocation AD HOC Committee composed of Council members to study and develop consistent guidelines and principles for establishing allocations between recreational and commercial sectors in the Council's FMPs. The Committee will engage expertise from the SSC and SEP and incorporate requirements of National Standard 4 and other applicable laws. See the text on Action 3 in Section 2 for a more complete discussion of this issue.

Action 2: Modifications to the Greater Amberjack Rebuilding Plan

Alternative 3. Modify the rebuilding plan specified by Secretarial Amendment 2. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F projection at 60 percent of F_{2004} from the 2006 assessment; 2.2 mp for 2008 through 2010 and 3.6 mp for 2011 through 2012.

Alternative 4. Modify the rebuilding plan specified by Secretarial Amendment 2. Directed

TAC levels for 2008 through 2012 would be set at the directed yield for each year as defined by the constant F projection at 60 percent of F_{2004} from the 2006 assessment. TAC for 2008 would be 2.2 mp, TAC in 2009 would be 2.8 mp, TAC in 2010 would be 3.3 mp, TAC in 2011 would be 3.6 mp, and TAC in 2012 would be 3.9 mp.

Discussion: The two alternatives removed from this action were deemed by the Council to be insufficient to end overfishing and rebuild the stock within the short timeframe (five years) remaining. **Alternative 3** would rebuild the stock by 2012 allowing approximately 10.9 mp total landings during the rebuilding period, 2008 through 2011. **Alternative 4** also rebuilds the stock by 2012 but allows approximately 17 percent more landings (11.8 mp) than **Alternative 3**. Both these alternatives would have provided approximately a 50 percent chance of rebuilding the stock by 2012 with **Alternative 3** more conservative than **Alternative 4.** Since there are only five years left to rebuild the stock in compliance with the rebuilding plan established in Secretarial Amendment 2, the Council only retained alternatives that had better than a 50 percent chance of rebuilding the stock by 2012.

Action 3: Greater Amberjack Recreational Management Alternatives

Alternative 2. Reduce the recreational bag limit for greater amberjack to one fish for every three anglers with an allowance for fewer anglers and eliminate the bag limit for captain and crew. Reduces landings by 31 percent.

Alternative 4. Reduce the recreational bag limit to one fish for every two anglers with an allowance for fewer anglers, increase the recreational size limit to 30-inches FL and eliminate the bag limit for captain and crew. Reduces landings by 35 percent.

These two recreational Alternatives would have reduced the recreational bag limit for greater amberjack to less than one fish per angler per trip. Public hearing and Reef Fish AP comments called fractional bag limits the least acceptable way to manage the recreational fishery. They would be impossible to enforce and would disproportionately affect the for-hire fishery. The Council concurred with these comments and removed all Action 4 fractional bag limit alternatives from consideration.

Action: Modifications to Gray Triggerfish Allocations

Alternative 1. Status Quo, Maintain allocation of gray triggerfish TAC between the recreational and commercial fisheries as the average share during the years 1981 through 1987. The recreational fishery would receive 93 percent of the TAC and the commercial would receive 7 percent.

Old Alternative 2. Set the allocation of gray triggerfish TAC between the recreational and commercial fisheries as the average share during the years 2000 through 2004. The recreational fishery would receive 79 percent of the TAC and the commercial would receive 21 percent.

Alternative 2. Set the allocation of gray triggerfish TAC between the recreational and commercial fisheries as the average share during the years 1995 through 2004. The recreational fishery would receive 78 percent of the TAC and the commercial would receive 22 percent.

Preferred Alternative 3. Set the allocation of TAC between the recreational and commercial fisheries as the average share during the years 1981 through 2004. The recreational fishery would receive 84 percent of the TAC and the commercial would receive 16 percent.

Discussion: The ratio of recreational to commercial allocation in old Alternative 2 is very similar to current **Alternative 2** (78:22). The Council considered the range of alternatives for allocation of the gray triggerfish resource to be sufficiently broad without the old Alternative 2.

Action 9 was moved to Considered but Rejected during the November Council meeting in favor of establishing an Allocation AD HOC Committee composed of Council members to study and develop consistent guidelines and principles for establishing allocations between recreational and commercial sectors in the Council's FMPs. The Committee will engage expertise from the SSC and SEP and incorporate requirements of National Standard 4 and other applicable laws. See the text on Action 9 in Section 2 for a more complete discussion of this issue.

14. INDEX

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16. APPENDICES

Appendix A

Method and Models Used to Estimate Short-Term Economic Effects of Management Alternatives Proposed for the Commercial Fishery in Amendment 30A to the Gulf of Mexico Reef Fish Fishery Management Plan

Larry Perruso
National Marine Fisheries Service
Southeast Fisheries Science Center
Social Science Research Group
75 Virginia Beach Dr.
Miami, FL 33149
e-mail: Larry.Perruso@noaa.gov

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Method and Models Used to Estimate Short-Term Economic Effects of Management Alternatives Proposed for the Commercial Fishery in Amendment 30A to the Gulf of Mexico Reef Fish Fishery Management Plan

Introduction

The Gulf of Mexico Fishery Management Council prepared Amendment 30A to its Reef Fish Fishery Management Plan to reduce the harvest of greater amberjack, *Seriola dumerili*, by 32 percent and gray triggerfish, *Balistis capriscus*, by 49 percent in order to end overfishing and rebuild the stocks. In addition, Amendment 30A proposes to adjust the allocation of catches between recreational and commercial fisheries for both species.

This report describes the methodology and simulation model developed to analyze the short-term economic effects of management alternatives proposed for the commercial harvesting sector of the reef fish fishery in U.S. Gulf of Mexico waters from Texas through the Florida Keys. The model uses logbook trip reports to simulate the short-term economic effects of proposed management alternatives on catches of greater amberjack and gray triggerfish. The simulated fishing incomes net of trip operating costs for specific combinations of management alternatives were compared to historical averages for 2000-2005 to estimate the expected short-term economic effects of the proposed alternatives for commercial fishermen.

Method of Analysis

Commercial fishermen in the Gulf reef fish fishery are required to submit logbook trip reports within seven days of the completion of each trip. The general method of analysis in this study was to hypothetically impose proposed regulations on individual fishing trips as reported to the logbook database. Each reported trip was examined with regard to a combination of proposed rules for greater amberjack and gray triggerfish, and the effects of the rules on trip catches, revenues and costs were calculated. A six-year average was used to estimate the expected effects of proposed regulations so that anomalies that may have affected fishing success in any one year would be averaged out. Logbook data for the six most recent years, 2000-2005, with reasonably complete data were used to simulate the fishery with the proposed management alternatives.

Logbook trip reports include information about landings by species, but do not include information about trip revenues. Therefore, average monthly prices were calculated from the NMFS Accumulated Landings System and merged with logbook trip reports by year, month, species and state. Trip revenues for each species were calculated as the product of average monthly prices and reported pounds per trip.

Information about trip costs was obtained from a sample of reef fish boats that were required to report trip costs in 2005 in conjunction with their normal logbook reporting requirements. Data that were collected included their costs per trip for major variable inputs such as fuel, bait, ice, food and other disposable supplies. Trip costs were estimated for each major gear type as a function of effort, pounds landed, days per trip away from port, crew size and other trip characteristics, with the explanatory variables chosen to match the types of information reported for each trip in the logbook database. Then, the estimated coefficients from the trip cost equations were used to calculate expected trip costs for each trip in the logbook database for 2000-2005.

Net operating revenues for trip j in year t were calculated as trip revenues from all species s, $TR_{j,t} = \sum R_{s,j,t}$, minus predicted trip costs, $TC_{j,t}$, which include fuel, oil, bait, ice, and other supplies, and exclude labor and fixed costs. Thus, net operating revenues were interpreted as the combined gross incomes to boat owners, captains and crew members all of whom have an interest in maximizing profits under an assumed share system of compensation.

If trip revenues exceeded trip costs after accounting for the likely 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.

The net present value of the difference between net operating revenues for the combination of proposed rules denoted by a and net operating revenues for the base fishery is interpreted as the expected short-term economic effect that would result if combination a were implemented. This difference was predicted for the years 2008-2012, and the net present value of the sum of these economic losses over this five year rebuilding period was used to rank management alternatives. A discount rate of seven percent was used.

Net operating revenues in year t for rule combination a, $NR_{a,t}$, were calculated by simulating the effects of the proposed rules on the commercial fishery based on logbook data for 2000-2005. This time frame encompasses the period of current regulations in the reef fish fishery and covers dates used in the latest SEDAR assessments. Net operating revenues were totaled for all trips within each logbook year, with the annual totals averaged across all six years.

$$NR_{a,t} = \frac{\sum_{t=2000}^{t=2005} \sum_{j=trips} (TR_{a,j,t} - TC_{a,j,t})}{6}$$

The base fishery without the proposed combination of rules was evaluated as the historical six-year average with extra information from predicted biomass growth. Estimates of biomass growth rates were factored into the base model depending on the rebuilding plan being analyzed. Estimates were based on the ratios of rebuilding TACs which were assumed to be proportional to growth in biomass. If biomass was assumed to remain constant over the rebuilding period (i.e., no rebuilding plan was specified), the base model was the same as the status quo fishery. In general, the difference between the base fishery and the status quo fishery is the biomass growth related to the rebuilding plan assumed for the base model.

Three types of regulatory analyses were implemented. Ranking of alternatives in these analyses were based on changes in net operating revenues due to the marginal effect of a proposed regulation from Amendment 30A when compared to a base fishery. The base fishery always incorporated an estimation of biomass growth and different assumptions regarding allocation schedules and rebuilding plans. The first analysis examined losses resulting from modifications to greater amberjack and gray triggerfish allocations (Actions 1 and 9). Alternatives were ranked based on comparisons of the net present value of losses associated with changing the allocation strategy from the current distribution to a different split among the commercial and recreational sectors. These comparisons were made after assuming a rebuilding strategy, which resulted in estimated biomass growth rates factored into the simulation model, and annual commercial quotas that were derived by multiplying the assumed TAC by the appropriate allocation percentage to the commercial sector.

The second analysis examined losses that resulted from modifications to the greater amberjack and gray triggerfish rebuilding plans and by comparing alternatives from Actions 5 and 12. In this analysis a particular allocation schedule was assumed for the base fishery.

The third analysis compared individual regulations associated with Actions 5 and 12. These alternatives included trip limits, seasonal closures, quotas and minimum size limits. In this analysis a particular allocation schedule and rebuilding plan were assumed for the base fishery. In all three cases net present value of the sum of projected losses over the rebuilding period was used to rank alternatives for each Action under consideration.

Method of Modeling Management Alternatives

The proposed management alternatives included modifications to allocations between the recreational and commercial fisheries and species-specific rebuilding plans, minimum size limits, limits on catch per trip (a.k.a., trip limits), seasonal closures, regional landings reductions and quotas. Each type of regulation was modeled by restricting the ability to catch and/or keep fish that were reported on a logbook trip report. Only when minimum size limits were decreased were landings allowed to increase.

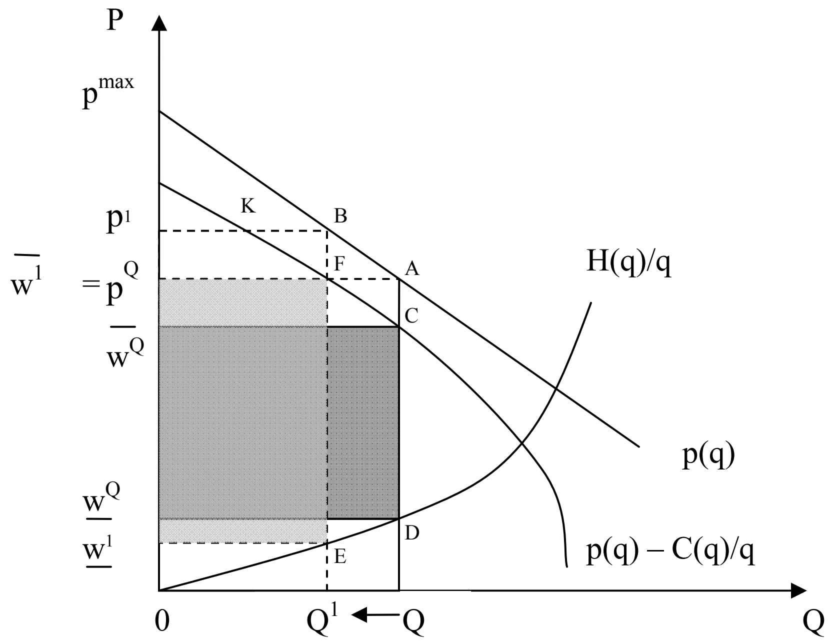
Analysis of Modifications to Allocations (Actions 1 and 9)

Rent in a vertically coordinated commercial fishery (processors and harvesters) can be defined as the total revenues from sales in the downstream consumer market less the sum of harvesting and processing costs. Denote the aggregate processing and harvesting cost functions as $C(q)$ and $H(q)$, respectively, where $C(.)$ and $H(.)$ are nondecreasing functions of the per-period harvest level, q. Assume a fixed proportions processing and harvesting technology and zero processing and harvesting waste. Per-period rent in the fishery is, $\Phi^* = p^Q Q - C(Q) - H(Q)$, where p^Q is the downstream consumer price and Q is the commercial quota resulting from the proposed TAC.

Graphically, rents can be defined as in Figure 1. Denote the maximum ex-vessel price that would ensure nonnegative processing sector earnings as $\overline{w^Q}$. This price just covers average processing costs. Similarly, let $\underline{w^Q}$ denote the minimum ex-vessel price needed to cover average harvesting costs. Thus, total resource rent is equivalently written as $\Phi^* = \left(\overline{w^Q} - \underline{w^Q}\right) \cdot Q$, and is represented by area $\underline{w^Q} DC \overline{w^Q}$ in Figure 1. Consumer surplus is represented by area $p^Q A p^{\max}$. Processor surplus is $\overline{w^Q} CF p^Q$, and harvester surplus is $OD\underline{w^Q}$.

Changing the allocation between the commercial and recreational sectors will affect this equilibrium situation, assuming the commercial quota and allocation scheme are strictly related. If management wants to allocate more catch to the recreational sector, this will necessarily cause a reduction in the commercial quota from $Q \rightarrow Q^1$, causing prices to rise for consumers from $p^Q \rightarrow p^1$. The minimum price processors require to cover average costs rises ($\overline{w^Q} \rightarrow \overline{w^1}$) while the minimum ex-vessel price that harvesters require to cover average costs drops ($\underline{w^Q} \rightarrow \underline{w^1}$). Total resource rent changes to $\underline{w^1} EF \overline{w^1}$. The amount of consumer surplus lost is $p^Q ABp^1$ while the change in processor surplus is $\overline{w^Q} CFp^Q - \overline{w^1} FKp^1$. Harvesters lose $\underline{w^1} ED \underline{w^Q}$ with the new commercial quota, Q^1.

Figure 1. Resource rent in a TAC-managed fishery (adapted from Weninger 1999).



Theoretically we have shown what losses in welfare the commercial sector will incur due to a decrease in commercial quota resulting from a reallocation. Empirically, the simulation model estimates these welfare losses to the commercial sector by predicting changes in the net present value of the losses in net operating revenue to harvestors over the rebuilding period while incorporating estimates of biomass growth.

Analysis of Modifications to Rebuilding Plans (Actions 2 and 7)

Alternatives proposed to modify the rebuilding plans for greater amberjack and gray triggerfish specify different TACs during the rebuilding period of 2008-2012. If hard commercial quotas accompany the proposed TACs, welfare changes are described theoretically in Figure 1. Welfare losses to the commercial sector resulting from these modifications were examined in the simulation model by predicting changes in the net present value of the losses in net operating revenue over the rebuilding period while incorporating estimates of biomass growth and assumptions about allocation schedules.

The following discussion describes methods of modeling the management alternatives associated with Actions 5 and 12.

Analysis of minimum size limits:

Larger minimum size limits were modeled by assuming that an additional (when compared to the base fishery) percentage, ρ_s^{msl}, of species s on each trip are undersized and must be culled from the catch and discarded.

$$q_{s,j,t} = h_{s,j,t}(1-\rho_s^{msl})$$

Smaller minimum size limits were modeled by assuming that an additional (when compared to the base fishery) percentage, $-\rho_s^{msl}$, of species s on each trip would be caught; thus, the quantity of species s caught on trip j in year t, $h_{s,j,t}$, is multiplied by a factor greater than one. Variable $q_{s,j,t}$ denotes quantity kept after accounting for the effects of the modified minimum size limit. In the case of larger size limits, each trip is assumed to catch the same quantity of species s as without the size limit, but that undersized fish would be discarded and subject to release mortality. Revenues for species s on trip j, $R_{s,j,t} = p_{s,j,t}\, q_{s,j,t}$, are based on quantities kept, $q_{s,j,t}$, and price per pound, $p_{s,j,t}$. The harvest of other species on trip j, $h_{sp,j,t}$ for $sp \neq s$, is assumed not to be affected by the proposed modified size limit for species *s*. If trip revenues exceeded trip costs after accounting for the proposed increased (decreased) minimum size limit and other jointly-proposed rules, then the expected losses (gains) for trip *j* due to a modified size limit were calculated as a reduction in (addition to) trip revenues for species *s*, $p_{s,j,t}\ (q_{s,j,t} - h_{s,j,t})$. However, if the trip became unprofitable with the proposed combination of rules, then 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 because the trip would not be taken, $\sum_s p_{s,j,t}\ h_{s,j,t} - TC_{j,t}$.

In the simulation model, trip costs are a function of total catch, including discards, and are not changed by the minimum size limit. Data were not available with which to estimate the potential additional costs of culling and discarding undersized fish.

The percentages that define the additional fish associated with each proposed minimum size limit and release mortality rates were held constant throughout the analysis regardless of the alternatives proposed for other species in the fishery. When effective biologically, minimum size limits gradually change the age and size distribution of the resource and the percentage of undersized fish landed. However, this analysis is static and does not include a biological component with which to endogenously determine changes in the proportion of undersized fish that would be landed each year.

These percentages refer to numbers of fish smaller (larger) than the proposed increased (decreased) minimum size limits. However, the simulation model works with quantities of each species landed as reported on logbook trips rather than numbers of fish. Hence, this method of simulating the effect of minimum size limits is an approximation for the preferred method that would use numbers of fish, and is likely to overestimate the effect of the minimum size limit when the average weight per fish for species *s* exceeds 1 pound.

Analysis of trip limits:

Trip limits for species *s* impose a maximum allowable catch per trip, and trips with catches of species *s* in excess of the trip limit, TL_s, were modeled by restricting their catches to the trip limit. Some proposed management actions combine trip limits and minimum size limits. For increased (decreased) minimum size limits, the simulation model reduced (increased) catches according to the percentage, ρ_s^C ($-\rho_s^C$), of undersized (newly available) fish on trip *j* before determining if the trip limit would be restrictive.

$$q_{s,j,t} = TL_s \qquad\qquad when\ h_{s,j,t}(1-\rho_s^C) \geq TL_s$$

Losses attributable to the trip limit were measured as the value of the difference between catches for species *s* that would have occurred with and without the trip limit, $p_{s,j,t}\,[TL_s - h_{s,j,t}\,(1 - \rho_s^C)]$[6]. Please note that losses due to the trip limit would be equal to the difference between the trip limit and reported catches, $p_{s,j,t}\,[TL_s - h_{s,j,t}]$, only when there were no proposed minimum size limits. The portion of the overall loss measured by $[p_{s,j,t}\,h_{s,j,t}\,\rho_s^C]$ is attributable to the minimum size limit rather than the trip limit. The quantity of species *s* in excess of the trip limit, after accounting for the effects of minimum size limits, is assumed to have been caught, discarded, and subject to release mortality because the trip would continue in search of other species. In this event, trip costs would not change due to implementation of trip limits.

[6] For decreased size limits, $-\rho_s^C$ is substituted for ρ_s^C for the remainder of the methodological discussion.

Trips with catches less than the trip limit, after accounting for the effects of minimum size limits, would not incur additional losses due to the trip limit.

$$q_{s,j,t} = h_{s,j,t}(1-\rho_s^C) \qquad \text{when } h_{s,j,t}(1-\rho_s^C) < TL_s$$

Trip limits create an incentive for fishermen to take shorter, but more frequent fishing trips. However, this behavioral response has not been modeled for this analysis.

Analysis of seasonal closures:

Seasonal closures for species *s* were modeled by defining variable $open_s = 0$ when the season is closed for species *s* and $open_s = 1$ when it is open, and then multiplying by the reported catch of species *s* on trip *j*. Therefore, catch of species *s* would be affected by a seasonal closure policy only during the closed season; *i.e.*, $q_{s,j,t} = 0$ only when $open_s = 0$.

$$q_{s,j,t} = h_{s,j,t}(1-\rho_s^C)\ open_s \qquad \text{when } h_{s,j,t}(1-\rho_s^C) < TL_s$$
$$q_{s,j,t} = TL_s\ open_s \qquad \text{when } h_{s,j,t}(1-\rho_s^C) \geq TL_s$$

Seasonal closures create an incentive for boats to re-schedule trips to minimize the likely effect of the closure. However, the model does not accommodate this type of behavioral adaptation to regulation. Logbook data record the month and day landed for each reported trip, and the duration of each trip so that start dates could be calculated. The model uses landed date to identify the trips that would be subject to the closure.

Analysis of quotas:

Fishery-wide quotas were modeled in a similar way as seasonal closures. The primary difference between seasonal closures and quotas is that seasonal closures have fixed beginning and ending dates, whereas quotas may or may not result in fishery closures. When quotas are filled, the closure dates vary annually depending on the speed at which the fishery lands its quota for species *s*. The closure extends through the end of the fishing year once the quota is filled.

The equations that describe the short-term economic effects of quotas are the same as already presented for seasonal closures. The model sets variable $open_s = 0$ to reflect a no-harvest rule resulting from seasonal closures or fishery closures after the quota is filled. Otherwise, it sets $open_s = 1$ to indicate that the fishery for species *s* is open and that trips are unaffected by either quota or seasonal closure.

The model compares the accumulated fishery landings of species *s* with its quota to determine if and when the fishery would be closed. This is accomplished by sorting logbook trip reports by year, month and day landed, and then performing a chronological trip-by-trip accumulation of landings that likely would occur given the selected combination of proposed management alternatives. The model sets $open_s = 1$ at the beginning of each fishing year, and sets $open_s = 0$ as soon as accumulated landings exceed the quota for species *s*.

Quotas tend to promote a race for fish as fishermen compete to maximize their shares of the overall catch before the fishery is closed. The model does not include the possibility that fishermen might accelerate their trips in anticipation of a fishery closure, or that dockside prices might fall if market gluts occur due to the accelerated harvesting activity. More work is needed on these issues since they are two of the primary outcomes of quota management.

Method for Simulation of Proposed Alternatives

The list of proposed alternatives appears in Appendix Table 1. Ideally, the effects of proposed management alternatives for greater amberjack and gray triggerfish would be evaluated simultaneously to account for potential joint effects on the fishery. However, the total number of combinations of proposed alternatives was too numerous to be evaluated. The method adopted in this analysis was to simulate the effects of the different alternatives that were proposed for a particular species while holding the alternatives proposed for the other species at their status quo levels, which do not include adjustments for growth in biomass. Biomass growth was incorporated into the base model for the simulated species based on the ratios of TAC proposed by Actions 2 and 7 (Table 1). Thus, comparisons of the net present value of economic losses associated with proposed alternatives always assumed a particular rebuilding path for the simulated species but not the other species. In all simulations, growth in biomass was assumed to be proportional to growth in projected TAC; however, since no rebuilding plan is offered for Alternative 1 in Action 7, comparisons of economic displacement are based on the assumption of no growth in biomass.

Each combination of proposed alternatives is reported as a comparison between the simulated outcomes for the proposed alternative and the base model. When alternatives associated with Actions 5 and 12 are evaluated, the parameters for the simulation model change as different rebuilding and allocation plans are assumed. A summary of these parameters for greater amberjack and gray triggerfish are described in Tables 2 and 3, respectively. Results are reported in thousands of nominal dollars and sums were discounted at a rate of 7%.

Table 1. Management rebuilding alternatives that determine biomass growth in the Base Model for greater amberjack and gray triggerfish.

Species	Action	Description of Proposed Alternative
Greater Amberjack	2	*ternative 1*) Status Quo. Maintain the three-year stepped rebuilding plan based on a constant F_{OY} projection as specified in Secretarial Amendment 2. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F_{OY} projection from the 2006 assessment; 1.9 mp for 2008 through 2010 and 3.5 mp from 2011 through 2012.
		(*Preferred Alternative 2*) Modify the rebuilding plan specified by Secretarial Amendment 2. Directed TAC levels for the 2008 through 2012 would be set at the directed yield for each year as defined by the constant F_{OY} projection from the 2006 assessment. TAC for 2008 would be 1.9 mp, TAC in 2009 would be 2.5 mp, TAC in 2010 would be 3.1 mp, TAC in 2011 would be 3.5 mp, and TAC in 2012 would be 3.7 mp.
Gray Triggerfish	7	(*Alternative 1*) Status Quo. Do not establish a rebuilding plan for gray triggerfish.
		(*Alternative 2*) Establish a constant F rebuilding plan for gray triggerfish defined by the constant F_{OY} projection from the 2006 assessment. Directed TAC levels for the 2008 through 2012 would be set at the directed yield for each year; TAC for 2008 would be 0.5 mp, TAC in 2009 would be 0.58 mp, TAC in 2010 would be 0.66 mp, TAC in 2011 would be 0.73 mp, and TAC in 2012 would be 0.79 mp.
		(*Alternative 3*) Establish a three-year stepped rebuilding plan for gray triggerfish based on the constant F_{OY} projection specified in the 2006 stock assessment. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F_{OY} projection; 0.5 mp for 2008 through 2010 and 0.73 mp from 2011 through 2012.

Table 2. Alternatives for reducing landings of greater amberjack in the commercial fishery. The shaded column represents landings reductions based on the preferred Alternative 3 in Action 1, Allocation and the Alternative 2 rebuilding plan in Action2.

	Foy Rebuilding plan		
Allocation Basis	81-87 (Allocation 1)	95-04 (Allocation 2)	81-04 (Allocation 3)
Percent Reduction	67%	15%	38%
trip limit	300 pounds 67% reduction	3,400 pounds 15% reduction	1,100 pounds 38% reduction
Season	Add Feb & 6/1 - 9/25 67% reduction	Add 6/1 - 6/24 15% reduction	Add 6/1 - 8/9 38% reduction
Size reduction / Trip	N/A	32" & 1,700 #s 15% reduction	33" & 700 #s 41% reduction
Quota	294,000 67% reduction	747,000 15% reduction	547,000 38% reduction

Table 3. Alternatives for reducing landings of gray triggerfish in the commercial fishery based on the F_{OY} rebuilding plan in Action 7. Management measures necessary to end overfishing based on the preferred alternatives selected in Actions 7, 9, and 10 are shaded in gray.

	No Regional Management		
Allocation Basis	81-87 (Allocation 1)	95-04 (Allocation 2)	81-04 (Allocation 3)
	82%	48%	61%
Trip Limit	15 pounds 82% reduction	70 pounds 51% reduction	40 pounds 63% reduction
Size Limit	18 inches FL 85% reduction	15 inches FL 48% reduction	16 inches FL 63% reduction
Size & Trip	16" FL & 70 pounds 82% reduction	14" FL & 220 pounds 48% reduction	15" FL & 210 pounds 62% reduction
Size & Trip	N/A 36,449	13" FL & 120 pounds 48% reduction	14" FL & 90 pounds 62% reduction
	Regional Management		
Allocation Basis	81-87	95-04	81-04
	132%	77%	98%
Trip Limit Size Limit Size & Trip Size & Trip	Close the eastern Gulf and take 42,000 pounds from the western Gulf.	Bycatch Fishery % by weight of landings number of fish TAC=30,000 pounds	Close the eastern Gulf TAC = 2,000 pounds

Data Used in the Analysis

On average from 2000-2005, 664 boats made 4,788 trips that landed at least one pound of greater amberjack or gray triggerfish, and produced 10.6 million pounds (whole weight) of all Gulf of Mexico finfish (GOMFF) species combined with a dockside value of $20.60 million. The predicted trip costs exceeded trip revenues for about 1.5% of these reported trips. Two possible explanations are offered for this outcome. First, the activity of fishing has an uncertain component, and bad-luck trips would have had lower catches and revenues than expected. Therefore, some reported trips probably lost money due to bad luck. Second, the trip cost equations assign median trip costs for each gear type, but some boats actually expend less than the median, with the result that predicted trip costs may be greater than actual trip costs. The combination of lower than expected revenues and predicted trip costs that may be greater than actual costs can produce simulated trips for which revenues are less than predicted trip costs. Trips were deleted from the simulation analysis if predicted trip costs exceeded trip revenues, regardless of the reason. For instance, many of the deleted trips took place during 2005 when fuel prices increased significantly. If these trips were kept in the analysis, the simulation model would have attributed losses due to increases in fuel price to the implementation of the proposed management alternatives.

The base fisheries for the simulation analysis were derived from the remaining 98.5% of trips for which revenues exceeded predicted trip costs. From 2000-2005, these data consisted of an average of 4,716 trips by 655 boats that landed 768,000 pounds of greater amberjack and 198,000 pounds of gray triggerfish worth $748,000 and $231,000, respectively. Revenues from all species landed on these trips averaged $20.59 million per year, and trip costs were estimated as $3.16 million, which left approximately $17.43 million as net operating incomes to boat owners, captains and crew. The species that is not under analysis is set at this status quo level; consequently, net operating revenues are constant during 2008-2012. On the other hand, net present values that show the marginal economic loss due to implementation of a particular regulation are derived as differences from the base model of the species being analyzed. Biomass growth estimates were used to adjust net operating revenues in the years 2009-2012 relative to the TAC proposed in the rebuilding plans for 2008. In other words, comparisons to status quo alternatives in Actions 5 and 12 are done by comparing changes in the net present value of net operating revenues predicted by the simulation model to the base value which includes the status quo fishery, adjustments due to predictions in biomass growth, and possible assumptions about allocation schedules or methods of regulation. However, the results of comparisons of Alternatives 2 and 3 to the status quo in Action 7 are differences in predicted net value of losses in relation to the status quo fishery (with no biomass growth) since Alternative 1 explicitly states that no rebuilding plan for gray triggerfish is to be adopted.

References

Weninger, Quinn. 1999. Equilibrium Prices in a Vertically Coordinated Fishery. *Journal of Environmental Economics and Management*, Vol. 37, pp. 290-305.

Appendix Table 1: Management actions and alternatives proposed in Amendment 30A affecting the Gulf of Mexico commercial greater amberjack and gray triggerfish fisheries.

Action	Alt.	Description of Proposed Alternative
1- Modifications to Greater Amberjack Allocations	1	Status Quo. Maintain the allocation of TAC between the recreational and commercial greater amberjack fisheries as specified in Amendment 1 to the Reef Fish FMP as the average share during the years 1981 through 1987. The recreational fishery would receive 84 percent of the TAC and the commercial fishery would receive 16 percent.
	2	Establish the allocation of TAC between the recreational and commercial greater amberjack fisheries as the average share during the years 1995 through 2004. The recreational fishery would receive 60 percent of the TAC and the commercial fishery would receive 40 percent.
	3	**Preferred**: Establish the allocation of TAC between the recreational and commercial greater amberjack fisheries as the average share during the years 1981 through 2004. The recreational fishery would receive 71 percent of the TAC and the commercial fishery would receive 29 percent.
2- Modifications to the Greater Amberjack Rebuilding Plan	1	Status Quo. Maintain the three-year stepped rebuilding plan based on a constant F_{OY} projection as specified in Secretarial Amendment 2. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F_{OY} projection from the 2006 assessment; 1.9 mp for 2008 through 2010 and 3.5 mp from 2011 through 2012.
	2	**Preferred**: Modify the rebuilding plan specified by Secretarial Amendment 2. Directed TAC levels for the 2008 through 2012 would be set at the directed yield for each year as defined by the constant F_{OY} projection from the 2006 assessment. TAC for 2008 would be 1.9 mp, TAC in 2009 would be 2.5 mp, TAC in 2010 would be 3.1 mp, TAC in 2011 would be 3.5 mp, and TAC in 2012 would be 3.7 mp.
3- Accountability measures for the Greater Amberjack Rebuilding Plan	1	No action. Do not establish an accountability measure for the greater amberjack rebuilding plan.
	2	**Preferred**: If annual landings for any sector as estimated by the SEFSC exceed the annual share of TAC for that sector, the Regional Administrator shall issue a notice reducing the length of the fishing season for that sector for the time necessary to recover the overage by the following fishing year. If, however, the Council establishes a commercial quota (see Action 4), the Regional Administrator shall issue a notice reducing the commercial quota in the following year by the amount the quota was exceeded in the previous year(s).
	3	If annual landings for any sector as estimated by the SEFSC are 20 percent greater than the TAC for that sector in 2008, 10 percent greater then the cumulative TAC for that sector in 2008-2009, or greater than the cumulative TAC for that sector in 2008-2010, the Regional Administrator shall issue a notice reducing the length of the fishing season for that sector for the time necessary to recover the overage by the following fishing year. If, however, the Council establishes a commercial quota (see Action 4), the Regional Administrator shall issue a notice reducing the commercial quota in the following year by the amount the quota was exceeded in the previous year(s) as calculated above. During 2011 and 2012, no landings overages will be allowed.

5- Greater Amberjack Commercial Management Alternatives		No action. Maintain the greater amberjack commercial minimum size limit of 36 inches FL and the closed season from March through May.
	2	Establish a commercial greater amberjack trip limit of 1,100 pounds. Reduces landings by 38 percent.
	3	Reduce the commercial greater amberjack minimum size limit to 33 inches FL and the commercial trip limit to 700 pounds. Reduces landings by 41 percent.
	4	**Preferred**: Establish a quota for the commercial fishery (Reduces landings by 38 percent). The annual commercial quota under a constant F_{OY} rebuilding plan TAC for 2008 would be 547,000 pounds, TAC in 2009 would be 744,000 pounds, TAC in 2010 would be 907,000 pounds, TAC in 2011 would be 1.02 mp, and TAC in 2012 would be 1.09mp.
	5	Add June 1 through August 9 to the current three-month closed season. Reduces landings by 38 percent.
6- Thresholds and Benchmarks for Gray Triggerfish	1	No Action: Do not establish a minimum stock size threshold (MSST), maintain optimum yield (OY) as the yield associated with $F_{20\%SPR}$, and maintain the maximum fishing mortality threshold (MFMT) at $F_{30\% SPR}$
	2	**Preferred**: Set MFMT equal to F_{MSY} (proxy = $F_{30\%SPR}$); set MSST equal to (1-M)*SSB_{MSY} (proxy = (1-M)*$SSB_{30\%SPR}$); and set OY as the yield associated with: Preferred Option a: 75 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium. Option b. 90 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium.
	3	Set MFMT equal to F_{MSY} (proxy = $F_{30\%SPR}$); set MSST equal to 0.5*SSB_{MSY} (proxy = (0.5*$SSB_{30\%SPR}$); and set OY as the yield associated with: Option a: 75 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium. Option b: 90 percent of F_{MSY} (proxy = $F_{30\%SPR}$) when the stock is at equilibrium.
7- Gray Triggerfish Rebuilding Plan	1	Status Quo. Do not establish a rebuilding plan for gray triggerfish.
	2	Establish a constant F rebuilding plan for gray triggerfish defined by the constant F_{OY} projection from the 2006 assessment. Directed TAC levels for the 2008 through 2012 would be set at the directed yield for each year; TAC for 2008 would be 0.5 mp, TAC in 2009 would be 0.58 mp, TAC in 2010 would be 0.66 mp, TAC in 2011 would be 0.73 mp, and TAC in 2012 would be 0.79 mp.
	3	Establish a three-year stepped rebuilding plan for gray triggerfish based on the constant F_{OY} projection specified in the 2006 stock assessment. Directed TAC for 2008 through 2010 and 2011 through 2012 would be set to the first year of each interval as defined by the constant F_{OY} projection; 0.5 mp for 2008 through 2010 and 0.73 mp from 2011 through 2012.
8- Accountability measures for Gray Triggerfish	1	No action. Do not establish an accountability measure for the gray triggerfish rebuilding plan. The Council could address landings overages and implement management measures to constrain harvest to TACs specified in the preferred rebuilding plan by developing a regulatory amendment to the Reef Fish FMP.

	2	If annual landings for any sector as estimated by the SEFSC exceed the yield associated with fishing at $0.9*F_{30\%SPR}$ (overfishing level) for that sector, as specified in Table 2.2.2, the Council shall request the Regional Administrator implement temporary regulations in the following year to return landings to the target annual TAC level (annual catch limit) as specified in the preferred rebuilding plan in Action 6. However, if the cumulative sum of landings for all sectors does not exceed the maximum allowable yield for rebuilding the stock, then no accountability measures would be required.
	3	If annual landings for any sector as estimated by the SEFSC exceed the yield associated with fishing at $0.9*F_{30\%SPR}$ (overfishing level) for that sector, as specified in Table 2.2.2, the Regional Administrator shall issue a notice reducing the length of the fishing season for that sector in the following year to return landings to the target annual TAC level (annual catch limit) as specified in the preferred rebuilding plan in Action 6. However, if the cumulative sum of landings for all sectors does not exceed the maximum allowable yield for rebuilding the stock, then no accountability measures would be required.
	4	If commercial and/or recreational gray triggerfish landings, as estimated by the SEFSC, exceed the three-year running average TAC associated with fishing at F_{OY} (Table 2.2.3), then the Regional Administrator shall issue a notice reducing the length of the fishing season for the sector experiencing the overage by a percentage equal to the average percentage overage during the previous three years. In year-1 of the rebuilding plan, the accountability measure will be the same as for Alternatives 2 and 3, in year-2 of the rebuilding plan overages will be based on average landings during 2008 and 2009, thereafter, a three year running average will be used.
10- Gray Triggerfish Regional Management	1	**Preferred:** No Action. Manage gray triggerfish on a Gulf wide basis. Implement Gulf wide management measures to reduce gray triggerfish landings by 49 percent overall to end overfishing and rebuild the stock.
	2	Manage gray triggerfish on a regional basis. Reduce the eastern Gulf (Fishing Statistical Areas 1 – 12, Mississippi through Florida) landings of gray triggerfish by 59 percent to end overfishing Gulf wide.
12- Gray Triggerfish Commercial Management Alternatives	1	Status Quo. Maintain the 12-inch TL minimum size limit.
	2	Establish a commercial trip limit of 40 pounds. Reduces landings by 63 percent.
	3	Increase the commercial size limit to 16 inches FL. Reduces landings by 63 percent.
	4	Increase the commercial size limit to 15 inches FL and establish a commercial trip limit of 210 pounds. Reduces landings by 62 percent.
	5	Increase the commercial size limit to 14 inches FL and establish a commercial trip limit of 90 pounds. Reduces landings by 62 percent.
	6	Increase the commercial size limit to 14 inches FL and establish a commercial quota of 80,440 pounds.

APPENDIX B: RESPONSE TO COMMENTS ON DSEIS

Including comments from the EPA, comments on the DSEIS were received from 6 individuals and organizations during the 45-day comment period. This appendix includes NMFS' response to these comments. The EPA classified the DSEIS and proposed action as an "LO," i.e., the EPA has "Lack of Objections" to the proposed alternative (see Appendix C). Alternatives considered but rejected through the development process of the DSEIS with an explanation of why they were rejected can be found in Section 13.

The following are responses to comments received from individuals and organizations.

Comment: Two comments asked NMFS not to implement increases in the recreational minimum size limits for greater amberjack and gray triggerfish. The comments indicated these species would be more difficult to catch, thus increasing the recreational cost to go fishing. Another comment cited increased bycatch and discard mortality as a reason to why size limits in general may not be the best way to reduce the harvest for these species.

Response: Decreases in targeted fishing effort required to achieve reductions in greater amberjack and gray triggerfish recreational landings would be expected to result in short-term consumer surplus losses to participating anglers and net revenue losses to charter and headboat operators. It is expected that, as the stock recovers in the long run, economic benefits would result from future increases in recreational landings. For greater amberjack, Preferred Alternative 4 uses a modest increase in the size limit combined with an elimination of for-hire captains and crew to achieve the required reductions in harvest. This alternative minimizes the anticipated annual losses in economic value (see Section 5.3.3) relative to the other alternatives considered to meet the management objectives. For gray triggerfish, Preferred Alternative 2 does not minimize losses in economic value as well as some of the other considered alternatives (see Section 5.9.3). However, this alternative was found superior because it achieves greater reductions in gray triggerfish recreational landings, thereby improving the probability of success of the rebuilding plan.

For greater amberjack, increasing the recreational minimum size limit to 30 inches FL would increase discard mortality, but it also allows slightly more than 50 percent of all females to mature before being landed. Preferred Alternative 4 is expected to allow dead discards to increase from about 12 percent by weight of current recreational landings to about 18 percent by weight of recreational total landings. Although the percentage of dead discards to landings is estimated to increase, the magnitude of dead discards is actually estimated to decrease by 13 percent because of the large reduction in recreational landings. Additionally, anglers can avoid targeting and catching greater amberjack as bycatch, unlike other species of reef fish, and increases to the minimum size limit may benefit yield-per-recruit (see Section 4). Also, greater amberjack grow quickly (i.e., it takes less than six months for a greater amberjack to grow from 28 to 30 inches FL) and have a relatively low release mortality rate (~20 percent, although anecdotal information suggest it may be less), so any changes in the proportion or magnitude of dead discards may be short-lived.

For gray triggerfish, an increase the minimum size limit from 12 inches TL (10.44 inches FL) to 14 inches FL (16.2 inches TL) is not expected to significantly increase discard mortality and is expected to benefit the stock. As discussed in Section 5.9.2, unlike nearly all other reef fish species managed by the Gulf Council, gray triggerfish are hardy fish that have a very low release mortality rate. Only a small percentage (1.5 percent) of gray triggerfish die after release. The number of eggs produced by a gray triggerfish increases exponentially by size and age, allowing for increased spawning potential. Additionally, increasing the minimum size limit to 14 inches FL would delay harvest of gray triggerfish by two years, allowing gray triggerfish to spawn two additional seasons before becoming susceptible to fishing mortality.

Comment: One comment was against reducing the greater amberjack bag limit.

Response: In selecting its preferred alternative, the Council maintained the existing 1-fish bag limit. They did consider fractional bag limits, but rejected alternatives using this management strategy because they would be difficult to enforce and would disproportionately affect the for-hire fishery (See Section 13).

Comment: One comment suggested the Gulf of Mexico should be divided up into regional management zones. This would allow fisheries managers the ability to better fit regulations with the specific needs of fishermen in specific regions of the Gulf.

Response: The Council did consider regional management for gray triggerfish in Action 8 by dividing the Gulf of Mexico into an eastern and western zone; however, this strategy was rejected. Monitoring and enforcement problems would occur, particularly in areas around the Mississippi River, which would divide the eastern from western Gulf. Fishermen could harvest fish from the same area, but dependent of where they landed their fish (e.g., Louisiana vs. Mississippi), they could be subject to different regulations. Additionally, the most recent assessment of gray triggerfish indicated there was little evidence to support more than one biological stock in the Gulf of Mexico (SEDAR 9, 2006c).

APPENDIX C: EPA COMMENTS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

January 17, 2008

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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 Supplemental Environmental Impact Statement (DSEIS) for Final Reef Fish Amendment 30A: Greater Amberjack-Revise Overfishing Plan, Accountability Measures, Gray Triggerfish-Establish Rebuilding Plan, End Overfishing, Accountability Measures, Regional Management, Management Thresholds and Benchmarks (Amendment 30A).

EPA classified your DSEIS and proposed action as "LO," i.e., EPA has "Lack of Objections" to the proposed alternative. 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 DSEIS. We request that you send our office one (1) copy of the Final SEIS 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,

Michael P. Jansky, P.E.

Michael P. Jansky, PE
Regional EIS Coordinator

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